Environmental and Social Impact Assessment Report

Nakkaş Otoyol Yatırım ve İşletme A.Ş.

Nakkaş-Başakşehir Motorway, Turkey

21 August 2023

Project No.: 0580559

The business of sustainability

Signature Page

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Every effort has been made to ensure the quality of the translation is technically correct. However, where discrepancies between the various translated texts occur, the English version is to be relied upon as the original and formal version.

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Abbreviations

Name	Description
AADT	Annual Average Daily Traffic
AF	Associated Facilities
AFAD	T.C. İçişleri Bakanlığı Afet ve Acil Durum Yönetimi Başkanlığı Resmi İnternet Sitesi (Turkey Ministry Of Interior Disaster And Emergency Management Presidency)
AoI	Area of Influence
AASHTO	American Association of State Motorway and Transportation Officials
ANZECC	Australian and New Zealand Environment and Conservation Council
AQS	Air Quality Standards
BAP	Biodiversity Action Plan
BAU	Business As Usual
BMS	Building Management System
BOD	Biological Oxygen Demand
BOT	Build, Operate and Transfer
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CCTV	Closed Circuit Television
CEACR	Committee of Experts on the Application of Conventions and Recommendations
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CESMP	Construction Environmental and Social Management Plan
CGDDY	Cevresel Gürültünün Değerlendirilmesi ve Yönetimi Yönetmeliği (Environmental Noise Assessment and Management Regulation)
CHSSP	Community Health Safety and Security Plan
CIA	Cumulative Impact Assessment
CIE	International Commission of Illumination
CITIES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CMIP5	Coupled Model Inter-comparison Project
CO	Carbon monoxide
COD	Chemical Oxygen Demand
CORINE	Coordination of Information on the Environment
COVID-19	Coronavirus Disease 2019
CPI	Transparency International's Corruption Perception Index
CR	Critically Endangered
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
DCMP	Design Change Management Procedure
DD	Data Deficient
DSI	Devlet Su İşleri (General Directorate of State Hydraulic Works in Turkey)
EBRD	European Bank for Reconstruction and Development
ECoW	Ecological Clerk of Works
ECtHR	European Convention for the Protection of Human Rights and Fundamental Freedoms

Name	Description
E&S	Environmental and Social
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EN	Endangered
EP4	Equator Principles 4
EPC	Engineering, Procurement and Construction
EPFI	Equator Principles Financial Institution
EPRP	Emergency Preparedness and Response Plan
ERM	Environmental Resources Management
ERT	Emergency Response Team
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESS	Environmental and Social Standards
ETL	Energy Transmission Line
EU	European Union
EUNIS	European Nature Information System
EV	Electric Vehicle
FAO	Food and Agriculture Organisation
GBV	Gender Based Violence
GBVH	Gender Based Violence and Harassment
GD	General Directorate
GDP	Gross Domestic Product
GEM	GEM Sustainability Services and Consultancy Inc.
GHG	Greenhouse Gases
GM	Grievance Mechanism
HHQ	Household Questionnaires
HPV	Human papillomavirus
HSE	Health, Safety and Environment
HGV	Heavy Goods Vehicles
IBB	Istanbul Buyuksehir Belediyesi (İstanbul Metropolitan Municipality)
IBA	Important Bird Area
ICCPR	International Covenant on Civil and Political Rights
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICMW	International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families
IFC	International Finance Corporation
ILO	International Labour Organization
IMM	İstanbul Metropolitan Municipality

Name	Description
IMF	International Monetary Fund
IPA	Important Plant Area
IPCC	Intergovernmental Panel on Climate Change
İSİG	İşçi Sağlığı ve İş Güvenliği (Turkish Health and Safety Labour Watch)
ISIMIP	Inter-Sectoral Impact Model Intercomparison Project
ISTAC	İstanbul Environmental Protection and Waste-Processing Corporation
IUCN	International Union for Conservation of Nature
IVM	Integrated Vegetation Management
KBA	Key Biodiversity Area
KGM	Karayolları Genel Müdürlüğü (General Directorate of Motorways in Turkey)
KII	Key Informant Interviews
Lden	Noise Level Day, Evening, Night
Leve	Noise Level Evening
LACR	Land Acquisition, Compensation and Resettlement
LRP	Livelihood Restoration Plan
LC	Least Concern
LGV	Light Goods Vehicles
MAPEG	Maden ve Petrol İşleri Genel Müdürlüğü (General Directorate of Mining and Petroleum Affairs)
MIC	Maximum Instantaneous Charge
MoAF	Ministry of Agriculture and Forest
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoLSS	Ministry of Labour and Social Security
MoTI	Ministry of Transport and Infrastructure
MSE	Mechanically Stabilized Earth
MTS	Traffic Direction Matrices
NCD	Non-communicable Diseases
NH4-N	Ammonium Nitrogen
NMM	Northern Marmara Motorway
NO3-N	Nitrate Nitrogen
NO_2	Nitrogen dioxide
NOx	Oxides of Nitrogen
NT	Near Threatened
O3	Ozone
OECD	Organisation for Economic Cooperation and Development
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
O&M	Operation and Maintenance
PABs	Project Affected Businesses
PAHs	Project Affected Households

Name	Description
PAPs	Project-Affected-Persons
PASs	Project Affected Settlements
PEEN	Pan European Ecological Network
PGE	Permeable Grain Environment
PESERA	Pan-European Soil Erosion Risk Assessment
$PM_{2,5}$	Particulate Matter with aerodynamic diameter below 2,5 µm
PM_{10}	Particulate Matter with aerodynamic diameter below 10 µm
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
PR	Performance Requirement
PRE	Permeable Rock Environment
PS	Performance Standard
PTR	Pneumatic Tire Roller
QHEI	Qualitative Habitat Evaluation Index
RAP	Resettlement Action Plan
RCIA	Rapid Cumulative Impact Assessment
RoW	Right of Way
RCP	Representative Concentration Pathways
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
SES	Socioeconomic Status
SMA	Stone Mastic Asphalt
SO_2	Sulphur dioxide
SPV	Special Purpose Vehicle
SSHB	Standard Specifications for Highway Bridges
STDs	Sexually Transmitted Diseases
TAP	Taşınabilir Pil Üreticileri ve İthalatçıları Derneği (Portable Battery Manufacturers and Importers Association)
TCFD	Task Force on Climate-related Financial Disclosures
TEIAS	Turkish Electricity Transmission Corporation
TEM	Trans European Motorway
TGNA	Turkish Grand National Assembly
TKN	Total Kjeldahl Nitrogen
TL	Turkish Lira
TSE	Türk Standartları Enstitüsü (Turkish Standard Institute)
TUIK	Türkiye İstatistik Kurumu (Turkish Statistical Institute)
TVPA	Trafficking Victims Protection Act
UDHR	Universal Declaration of Human Rights
VEC	Valued Environmental and Social Component
VMS	Variable Message Signs

Name	Description
VOC	Volatile Organic Compounds
VU	Vulnerable
VTS	Traffic Velocity Matrices
WHO	World Health Organisation
WWSF	We Will Stop Femicide

1. INTRODUCTION

İstanbul has historically been an intersection of international and national trade routes. Due to its socio-economic attractiveness, İstanbul has also faced an intensive internal migration from across the country and its population has increased to nearly 15 million (nearly 18 % of the total population in Turkey[1]). Growing population and intense logistic activities driven from economic growth create enormous traffic pressure and challenges in İstanbul and the Marmara region.

For this reason, several motorways were constructed in the Marmara Region with the aim to decrease the traffic load, including the “Northern Marmara Motorway” (NMM). The NMM was originally comprised of seven sections in total connecting Asia and Europe with an uninterrupted traffic flow and is considered an alternative route to the European Road 80 (E 80 also known as Trans European Motorway (TEM). The first seven sections of the NMM have already been completed and are under operation (See Figure 1-1).

Based on the tender process held on 30 June 2020 and the agreement following on 13 April 2021, the 1st Regional Directorate of General Directorate of Motorways (KGM) involved an additional section within the scope of NMM which is called “Section 8 – Nakkaş-Başakşehir Motorway” (hereafter called the “Project").

The Project is a new 4-lane dual toll road with a total length of 30.64 km including connection roads and 1,619 m long Sazlıdere Cable Stayed Bridge. Nakkaş Otoyol Yatırım ve İşletme A.Ş. (Nakkaş Otoyol A.Ş or SPV) - a Special Purpose Vehicle (SPV) under a Build, Operate and Transfer (BOT) contract signed with Turkish Ministry of Transport and Infrastructure, General Directorate for Highways (KGM) in 2020 - is responsible for the construction and operation of the Project.

The construction of the Project has started in August 2021 while the preparation of publicly disclosed studies was being carried out:

- Environmental Impact Assessment Report (ESIA);
- Stakeholder Engagement Plan (SEP);
- Resettlement Action Plan (RAP); and
- ESHS Management Plans.

Nakkaş Otoyol A.Ş paused all construction activities (earthworks, relocation works, structures etc.) as of April 2022 and proceeded with the construction of “Cable Stayed Bridge Piers” and “Viaduct Piers” which did not require any further land take.

Lately in September 2022, Nakkaş Otoyol A.Ş decided to pause all Project activities including construction of piers and demobilized a significant number of subcontractors.

[1] Source: Turkish Statistical Institute (TUIK) – https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2020-37210

Figure 1-1 Sections of Northern Marmara Motorway

1.1 The Need for the Project

Open-source data made available by KGM for the year 2019 indicate that existing motorway infrastructure in the area is highly congested and at near-saturation levels. Statistics are available by vehicle type: Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV).

Sections closer to İstanbul carry the most traffic, with key section of O3 (corresponding to TEM) showing an Annual Average Daily Traffic (AADT) of over 190,000. The share of heavy traffic varies from 8 % (15 July Martyrs Bridge) up to 35 %, on the westernmost sections of O3.

Several major facilities and infrastructure are located in the Project vicinity[2], at a distance ranging from 0.7 km to 4 km from the Project Right of Way (RoW) (see Figure 1-3) and causing heavy traffic and transportation problems due to daily movements. These facilities are:

- **İkitelli Organized Industrial Zone**: Employing around 200,000 – 250,000 people with daily passenger movement around 700,000 people[3].
- **Deliklikaya Industrial Zone:** Employing around 60,000 people[4].
- **Hadımköy Industrial Zone:** Employing around 35,000 people[5].
- **Başakşehir Çam and Sakura City Hospital:** A large complex with about 2700 beds[6].
- **Atatürk Olympic Stadium:** With a capacity around 76,000 people[7].

2 Despite the proximity, none of these facilities are located within the Project route and are not envisaged to be subject to resettlement.

3 Source: İkitelli Organized Industrial Zone – www.iosb.org.tr

4 Source: İstanbul Chamber of Industry – www.iso.org.tr/haberler/etkinlikler/İstanbullu-sanayiciler-deliklikaya-organize-sanayi-bolgesinde-bulustu/

5 Source: İstanbul Chamber of Industry – www.iso.org.tr/haberler/etkinlikler/İstanbullu-sanayiciler-deliklikaya-organize-sanayi-bolgesinde-bulustu/

6 Source: Rönesans

7 Source: http://ataturkolimpiyatstadi.gov.tr/2012/tr/detay.aspx

Figure 1-2 Traffic in the Study Area[8]

[8] Northern Marmara Motorway Project, Nakkaş-Başakşehir section: Traffic and Revenues Study, Steer, March 2021

Figure 1-3 Major Facilities within the Project Vicinity

Considering the current heavy traffic and transportation problems in Istanbul as presented above, with the completion of this 8th section (which is the final section of the NMM) the following benefits are likely to be expected in the region:

- Increase service quality and safety in transportation by separating regional traffic which grows and develops around the main transportation arteries in the East-West direction in the Northern Marmara Region created by urbanization and industrialization and intercity and international traffic passing through;
- Reduce the traffic accidents caused by the inadequate standard of the current roads around the Project vicinity;
- Connect the Marmara Region to the Aegean and Central Anatolia Region via a motorway network, thus travel time is planned to decrease to 1.5 hours from İstanbul to Bursa, 3.5 hours from İstanbul to Izmir, 2.5 hours from İstanbul to Eskişehir and 3.5 hours from İstanbul to Ankara;
- Contribute to the developing industrial investments of the Marmara Region that will pave the way for new investments in this region with İstanbul Airport connections, Osmangazi Bridge Gulf connection and Karasu intersections;
- Reduce the traffic load in the existing transportation networks and especially the Bosphorus crossings;
- Reduce the economic losses such as increased fuel consumption, vehicle maintenance and repair costs;
- Minimize the Greenhouse Gas Emissions (GHGs) caused by traffic density in other road network around the Project vicinity;
- Relieve the transportation problems occurring in three Industrial Zones located on the Project route;
- Ease transportation to Başakşehir Çam and Sakura City Hospital and Atatürk Olympic Stadium;
- Enable transit and heavy vehicles traffic to alternatively pass by the NMM and the Yavuz Sultan Selim Bridge, to alleviate intense traffic on the TEM-O3, Fatih Sultan Mehmet Bridge and D-100 motorway;
- Link the intercity traffic to NMM and provide a time-saving route for users;
- Help to navigate transit passenger and freight traffic coming from West-East directions to North side; and
- Alleviate the transportation problems of the developing regions of İstanbul, Halkalı, Başakşehir, Kayaşehir, Bahçeşehir and Hadımköy.

Consequently, as illustrated in Figure 1-1, the transportation corridor between Nakkaş Junction – Başakşehir Junction has gained importance as the last missing piece of the overall motorway network.

1.2 The Need for the ESIA Study

Nakkaş Otoyol A.Ş is planning to seek for financing of the investment costs of the Project by debt and equity under a Project Finance structure involving the European Bank for Reconstruction and Development (EBRD), the Asian Infrastructure Investment Bank (AIIB), Atradius, Standard Chartered Bank, SERV, DZ BANK and Bank of China, Deutsche Bank, Credit Suisse, the Islamic Corporation for the Development of the Private Sector (ICD) and Vakıfbank.

The Lenders follow a categorization process which classifies the projects depending on the nature and complexity of impacts likely to occur, as follows:

1.2.1 EBRD Categorization

EBRD categorization process is as follows as defined in EBRD E&S Policy (2019):

- **Category A**: "*A project is categorised "A" when it could result in potentially significant environmental and/or social impacts, including direct and cumulative environmental and social impacts, which are new and additional and, at the time of categorisation, cannot readily be identified or assessed. Projects categorised as A require a formalised and participatory environmental and social impact assessment process".*
- **Category B**: "*A project is categorised "B" when its potential environmental and/or social impacts are typically sitespecific, and/or readily identified and addressed through effective mitigation measures. The scope of environmental and social appraisal will be determined by EBRD on a case-by-case basis".*
- **Category C**: "*A project is categorised "C" when it is likely to have minimal or no potential adverse environmental and/or social impacts".*

1.2.2 AIIB Categorization

AIIB categorization process is as follows as defined in AIIB E&S Framework (amended in November 2022):

- **Category A**: "*A Project is categorized "A" if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works and may be temporary or permanent in nature. The Bank requires the Client to conduct an environmental and social impact assessment (ESIA) or equivalent environmental and social assessment, for each Category A Project, and to prepare an ESMP or ESMPF, which is included in the ESIA report for the Project. The ESIA for a Category A Project examines the Project's potential environmental and social impacts, both positive and adverse, compares them with those of feasible alternatives (including the "without Project" situation), and recommends any measures needed to avoid, minimize, mitigate, or compensate for adverse impacts and improve environmental and social performance of the Project".*

- **Category B**: "*A Project is categorized "B" when: it has a limited number of potentially adverse environmental and social impacts; the impacts are not unprecedented; few if any of them are irreversible or cumulative; they are limited to the Project area; and can be successfully managed using good practice in an operational setting. The Bank requires the Client to conduct an initial review of the environmental and social implications of the Project. On the basis of this review, the Bank, in consultation with the Client, determines the appropriate instrument for the Client to assess the Project's environmental and social risks and impacts, on a case-by-case basis. The Bank may determine that an environmental and social assessment or another similar instrument is appropriate for the Project. The scope of the assessment may vary from Project to Project, but it is narrower than that of the Category A ESIA. As in the case of a Category A Project, the assessment examines the Project's potentially negative and positive environmental and social impacts and recommends any measures needed to avoid, minimize, mitigate, or compensate for adverse impacts and improve environmental and social performance of the Project".*
- **Category C**: "*A Project is categorized C when it is likely to have minimal or no adverse environmental and social impacts. The Bank does not require an environmental and social assessment, but does require the Client to conduct a review of the environmental and social implications of the Project".*

1.2.3 ESIA Study

As a major, long-term infrastructure Project, "Section 8 - Nakkas-Basaksehir Motorway" is considered as **Category A** and it is subject to full ESIA assessment including a Resettlement Action Plan (RAP). Since the Lenders standards described in Chapter 2.4 are applicable to the Project, Nakkaş Otoyol A.Ş appointed ERM GmbH (ERM) to conduct the ESIA studies and appointed GEM Sustainability Services and Consultancy Inc. (GEM) to conduct the studies to develop RAP in line with Lender's standards.

The scope of this ESIA study only covers "Section 8 - Nakkas-Basaksehir Motorway", and the other seven sections of NMM are not subject to this ESIA report since the other sections are already operational. Therefore, it is not possible to have any leverage on these sections.

Based on the publicly available information, ESIA studies were also conducted in other seven sections in 2018 in accordance with the requirements of the relevant Turkish laws and regulations as well as Equator Principles and IFC Performance Standards[9], and all sections were built and operated in line with international standards.

This ESIA study is a systematic process of predicting and evaluating the potential E&S impacts of the Project and identifying measures that Nakkaş Otoyol A.Ş. will need to take to avoid, reduce, remedy, offset or compensate for adverse impacts, and to provide benefits where possible (see Chapter 4 for details of the ESIA process).

If in future, there are additional potential impacts identified due to design changes or other factors, these will be thoroughly evaluated by Nakkaş Otoyol A.Ş. as per the Design Change Management Procedure (Annex 1) and appropriate mitigation measures will be employed. Corresponding documentation will be prepared to supplement the ESIA, and – depending on the type and location of impact – will be available for review by the affected public.

[9] https://www.anadoluotoyolisletmesi.com/en/environmental-management

1.3 Structure of the ESIA Report

This report has been complied as per the below chapters:

Chapter	Content
Chapter 1	Introduction
Chapter 2	Policy, Legislative and Regulatory Framework
Chapter 3	Project Description
Chapter 4	ESIA Methodology
Chapter 5	Environmental and Social Baseline Conditions
Chapter 6	Environmental and Social Impact Assessment
Chapter 7	Cumulative Impact Assessment

1.4 Appraisal of Alternatives and Route Selection

1.4.1 Project Route

Nakkaş Otoyol A.Ş. stepped into the Project by tendering as Build Operate Transfer (BOT) Implementation Contractor for a route design pre-approved by KGM. As such, no high-level, strategic alternative investigations were foreseen within the Contract, which requires Nakkaş Otoyol A.Ş. to construct the motorway along the broad alignment specified in the KGM-prepared BOT tender design.

KGM considered the following range of factors, including environmental and social issues, during their selection of motorway routes in line with KGM`s Technical Specifications for Engineering Services for Motorway Projects:

- Geology, geotechnical conditions (including seismic), geohazard risks;
- Road design safety and community safety risks;
- Meteorological conditions and climate risks including flooding;
- Economic viability of construction and operation;
- Residential areas, cultural heritage, historical artefacts and historical ruins, industrial and military areas, cemeteries, agricultural and forestry areas on/next the motorway route;
- Biodiversity, marine areas, lakes, streams, dams and water protection areas;
- Existent and planned motorways and seaways, airports, ports;
- Existing and planned infrastructure facilities such as electric energy transmission lines, water pipeline, natural gas and oil pipelines, telecommunication and similar infrastructure;
- Existing and potential transportation development considering the social, cultural, commercial and industrial structure of the route and adjoining area; and
- Existing and planned development plans within the municipality boundaries.

Based on the information received from Nakkaş Otoyol A.Ş, the following criterias were used during selection of the Project route:

- Presence of Sazlıdere Dam Basin to avoid the flooding and drainage risks that might have been caused by Sazlıdere Dam Basin.
- The avoidance to the greatest possible extent of agricultural areas, socio-economic impact on businesses and the need for resettlement, to minimize the potential social impacts on people and livelihoods.

In addition to the above listed criteria, KGM informed Nakkaş Otoyol A.Ş. that the following engagement activities were conducted during the selection of the route:

- Negotiations were held with the relevant institutions, and the latest arrangements in the final route work in this section were made in line with the demands of the İstanbul Metropolitan Municipality.
- Correspondences were made with the Metropolitan Municipality and other institutions in the sections where the route passes, and the objections made during the recording of the route in the zoning plans were also examined and the necessary correspondence and arrangements were made.
- Various engagements have been made with the Ministry of Transport and Infrastructure, Ministry of Environment and Urbanization, KGM and the Metropolitan Municipality during the stage of processing the Northern Marmara Motorway into the zoning plans.
- Personal applications by the communities have also been taken into consideration.

As presented in the RAP (GEM, 2023), following the execution of the BOT Contract, the design and engineering works conducted by Nakkaş Otoyol A.Ş have resulted in route and design modifications, as summarised in Table 1-1 and shown on the maps presented at Figure 1-4 Route Modifications – Lot 1 and further details are presented in RAP.

In October 2021, the RAP Consultant has provided the boundaries of the houses and businesses overlapping with the Expropriation Corridor, along with the key findings of the RAP surveys, requesting the Design Team to review and evaluate the feasible measures that may be potentially taken to avoid and/or minimise displacement impacts. The assessments of the Nakkaş Otoyol A.Ş Design Team in consideration of the Motorway design criteria and traffic safety requirements are reflected in Table 1-1 Alternative Assessments and Route Modifications

In November 2021, the Nakkaş Otoyol A.Ş Design Team has confirmed that the following houses have been avoided through design optimisation:

- House on Parcel no. [redacted] (Basaksehir/Kayabasi) – avoided through wall design.
- House on Parcel no. [redacted] (Basaksehir/Sahintepe) – avoided through expropriation boundary revision.

In 2022, KGM has decided to cancel Yesilbayir Connection Road, which was originally planned to connect the Nakkas-Basaksehir Motorway to the existing E80 Motorway (Trans European Motorway – TEM) through Nakkas Interchange planned at KM 36+540. This connection road was originally designed in consideration of a railway logistics centre planned by the Turkish State Railways Authority (TCDD). As this logistic centre is not in the current investment planning of TCDD (cancelled at the feasibility stage), KGM has decided that the Yesilbayir Connection Road will not be an essential component of the Nakkas-Basaksehir Motorway particularly taking into consideration the existing roads and planned roads providing access between the operational sections of the Northern Marmara Motorway and TEM, which results in traffic projections below the guaranteed traffic volumes according to the Traffic Demand Estimation and Capacity Report prepared for Nakkas-Basaksehir Motorway Project. Also, the projections based on the 1/1,000 scale development plans indicate restricted population growth in this region in the next decades mainly because of the agricultural character and the boundaries of the surrounding protected areas.

Further information on the displacement impacts avoided through this design change is provided in Table 1-1 Alternative Assessments and Route Modifications.

Table 1-1 Alternative Assessments and Route Modifications done by Nakkaş Otoyol A.Ş. in the Post BOT Tender Phase (as of June 2022)

Location Description	KM	Description of the Route Modifications (Justifications and/or Results)
Basaksehir district	59+000	■ The impact on decorative pool at the Sular Vadisi Social Complex has been avoided by reducing the number of viaduct foundations and increasing the distance between piers (through utilisation of balanced cantilevel viaduct design; Maximum Bridge Span Length: 110 m).
	58+500	■ The circular interchange design studies by the Design Team are ongoing in line with the request of the Basaksehir Municipality. As of October 2021, the feasibility of the avoidance and/or minimisation measures for the physical displacement impact on the houses overlapping with the route at KM 58+500 are under consideration by the Design Team.
	55+000	■ Minor modifications have been made in response to the request of the Basaksehir Municipality and Istanbul Metropolitan Municipality in accordance with the city development plans. The crossing structures have been planned by Nakkaş Otoyol A.Ş in consultation with these municipalities.
	55+550	■ Upon official application done by a private company to KGM (in July 2021, a local route modification has been done by the Design Team at the request of KGM to avoid impact on the parcel on which a hospital is planned to be constructed with the approval secured from the Ministry of Health of Türkiye.
	54+000-59+000	■ The OHTL displacement works were completed in August 2022. Along a 5 km stretch that has been displaced, there were 35 ETL towers (pylons) along the previous OHTL route which have been reduced to 32 new ETL towers (pylons) minimising the expropriation (pylon locations) and easement right requirements. In the design, Nakkaş Otoyol A.Ş prioritised selection of the pylon locations within the previous expropriation corridor of TEIAS or the expropriation corridor of the Motorway so as to minimise the number and area of additional parcels to be expropriated where feasible. As such, total number of additional parcels to be affected is 18 (11 private + 7 treasury), whilst 9 of them are affected by only easement rights. Similarly, design works targeted minimisation of additional private parcels to be expropriated. Accordingly, among the 18 additional parcels (private and public) to be affected, only 4 of them are privately owned. At the viaduct locations, it was not feasible to site the pylons within the Motorway expropriation corridor due to areal limitations of the construction corridor. At the cut (excavation) and fill (embankment) locations of the Motorway, only excavation locations could be utilised due to technical reasons (as pylons cannot be built on embankments). At the Sular Valley, the towers have been heightened to the extent possible to allow future activities that may be conducted under the towers and wire alignment. The previous OHTL was consisting of 3 lines (2 x 154 kV + 1 x 380 kV). As part of displacement, number of transmission lines has been reduced to 2 (1

Location Description	KM	Description of the Route Modifications (Justifications and/or Results)
		x 154 kV + 1 x 380 km) not to expand the Motorway expropriation corridor and minimise land acquisition. As reported by Nakkaş Otoyol A.Ş, the pylon locations for the new OHTL route within the gardens of the housing complexes has been decided in consultation with their management in a way to minimise the land use within their gardens.
	53+082 – 52+213	■ Expropriation corridor has been slightly enlarged to include 17 additional parcels (15 privately owned, 2 owned by legal entities) that are required to be expropriated to ensure displacement of existing water pipelines of ISKI.
Bahcesehir Connection Road	48+825; 0+690	■ The location of the Tatarcik Interchange has been shifted towards north to improve accessibility of the interchange.
	48+825; 3+000	■ The multi-storey residential building complex at around KM 3+000 have been avoided. There is potential for impact on the garden of the complex.
	48+825; 4+000-5+000	■ The modifications in this part have been made to consider the traffic intensity and flows from different directions. The existing TEM Motorway infrastructure has been considered for the optimisation of operational traffic as well as to avoid traffic interruptions on TEM during construction phase. This change has also avoided the Ancient City of Spradon. ■ The impact of a greenhouse could not be avoided at KM 4+500 due to technical design of the interchange arms.
Deliklikaya Industrial Region	44+930	■ The location of the Deliklikaya Interchange has been shifted towards north to minimise the amount of excavation at this location and connect the Motorway to an existing road for improved access to the Deliklikaya Industrial Region. This change resulted in the minimisation of the area required for the storage of excess excavated materials and the area required to establish connection, and the area accessible to the Deliklikaya Indsutrial Region for future expansions.
Hastane neighbourhood (indicated as Hadimkoy in the Expropriation Plans)	KM 40+500-43+000	■ The route passes through a business neighbourhood in the south of Hadimkoy (within the boundaries of Hastane neighbourhood) crowded with buildings mostly used for commercial purposes. In this part of the route, the Expropriation Corridor has been sited to avoid the buildings to the maximum extent possible in order to minimise expropriation costs and associated economic and social impacts on the businesses. Further measures such as retaining walls, an additional underpass have been embedded in the design to avoid buildings. Despite the best efforts made for avoidance of buildings, the following businesses will be affected by expropriation through loss of operational buildings due to the technical criteria required to be fulfilled in Motorway design (the name of the neighbourhoods are as indicated in the Expropriation Plans): - KM 40+600 (Hadimkoy – Parcel 0/4797)

Location Description	KM	Description of the Route Modifications (Justifications and/or Results)
		- KM 42+210 (Omerli – Parcel 163/15): Iltas Aliminyum - KM 42+700 (Omerli – Parcel no. 0/1119): Isıtek Makine ■ The design of the Hadimkoy interchange has been bended inwards to avoid impact on the wall of the Public Bread Factory of the Istanbul Metropolitan Municipality. ■ The southern artery of the Hadimkoy Interchange connection road has been eliminated from the design due Project scope change.
Yesilbayir Interchange	KM 36+540	■ There is a Waste Recycling Facility/Warehouse overlapping with the Nakkas Interchange, which was not being affected in the Project design. Nakkaş Otoyol A.Ş informed that due to technical reasons (e.g. connection to the existing operational Northern Marmara Motorway at Nakkas Interchange), impact on the building at the interchange located cannot be avoided and the building will be expropriated. ■ The design of the interchange has been changed to provide a less complex structure and better traffic circulation conditions with the deceleration need of the vehicles avoided, resulting in the minimisation of the area (agricultural) to be expropriated at this location.
Yesilbayir Interchange	KM 35+540	■ An Integrated Dairy Facility Project (future project) has been identified on Parcel No. 135/3 registered in Nakkas neighbourhood. This parcel was previously included in the Project expropriation corridor and has been avoided in response to the request of the developer of the Integrated Dairy Facility Project. To avoid this parcel, design of the Yesilbayir Interchange has been revised and expropriation corridor has been slightly enlarged to include 2 additional parcels (1 privately owned, 1 treasury) required as part of design change.
Yesilbayir Connection Road	KM 0+000 – KM 7+542.14	■ Yesilbayir Connection Road, which was originally planned to connect the Nakkas-Basaksehir Motorway to the existing E80 Motorway (Trans European Motorway – TEM) through Nakkas Interchange planned at KM 36+540 has been cancelled in the latest design. This design change has led avoidance and minimisation of displacement impacts as summarised below: - The length of the Motorway has reduced by approximately 6 km in parallel leading to cancellation of 3 interchanges previously planned on the Motorway (Bahsayis-1, Karaagac and TEM Karaagac). - 158 parcels have been avoided from acquisition/expropriation – of which 107 parcels are privately-owned. Karaagac and Bahsayis neighbourhoods, which were previously affected from Project-related land acquisition/expropriation, have been fully avoided. - Physical displacement of 2 inhabitable structures (registered as houses on the expropriation plans) has been avoided. These

Location Description	KM	Description of the Route Modifications (Justifications and/or Results)
		inhabitable structures are used by the households non-permanently to support agricultural activities conducted on the parcels. - A total of 561 fruit and non-fruit trees located on 25 parcels have been avoided.
Minimisation of the land used by the facilities located outside of the Expropriation Corridor		■ The parcels owned by the Military have been prioritised (by KGM as the owner of the Project) for the excavated material storage site alternatives, minimising the number and area of privately-owned parcels to be expropriated/acquired. ■ Excavated materials from the earthworks with suitable quality will be reused (app. 47% of the excavated materials) as fill material in road construction works. This will minimise the land to be required for the storage of excavated materials and amount of material to be extracted from external borrow sites.

Source: GEM, RAP, 2023 (Meeting with the Head of Design of Nakkaş Otoyol A.Ş (Meeting date: 16 July 2021); Review of the Affected Businesses and Houses by the Design Team (Review date: 22-25 October 2021); Review of Official Correspondence (July-October 2021) between KGM and Nakkaş Otoyol A.Ş; Update provided by Nakkaş Otoyol A.Ş in June 2022.)

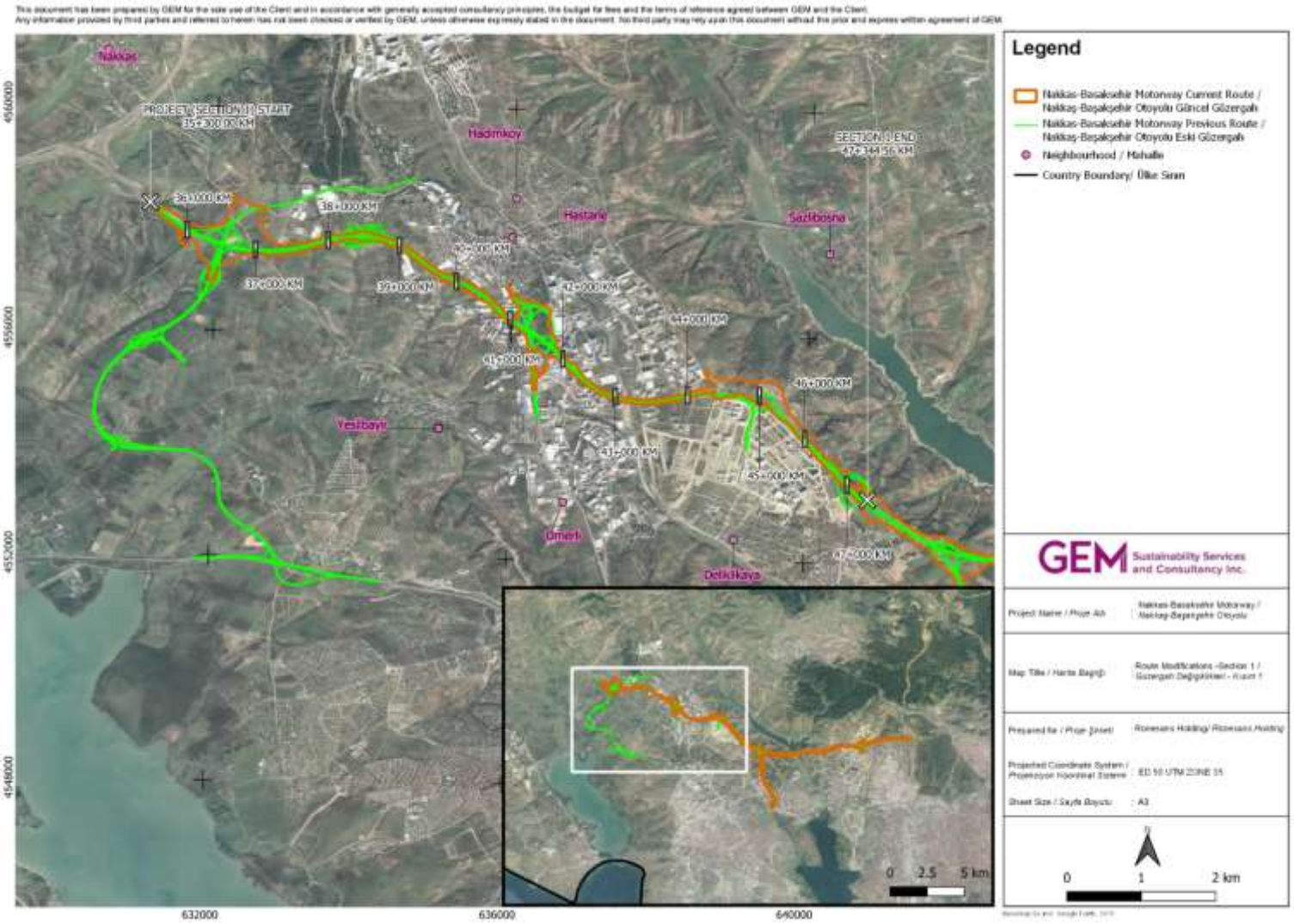


Figure 1-4 Route Modifications – Lot 1

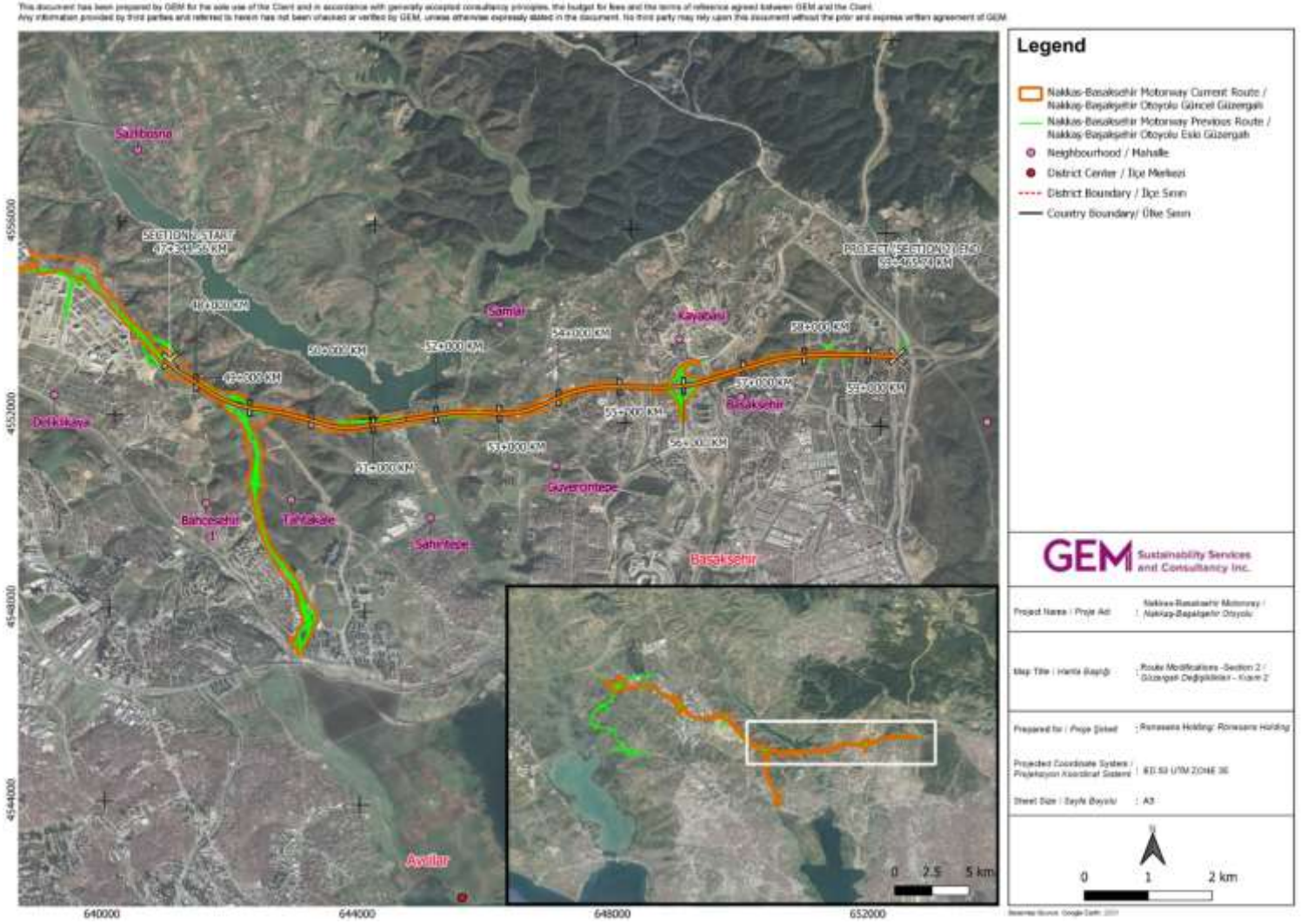


Figure 1-5 Route Modifications – Lot 2

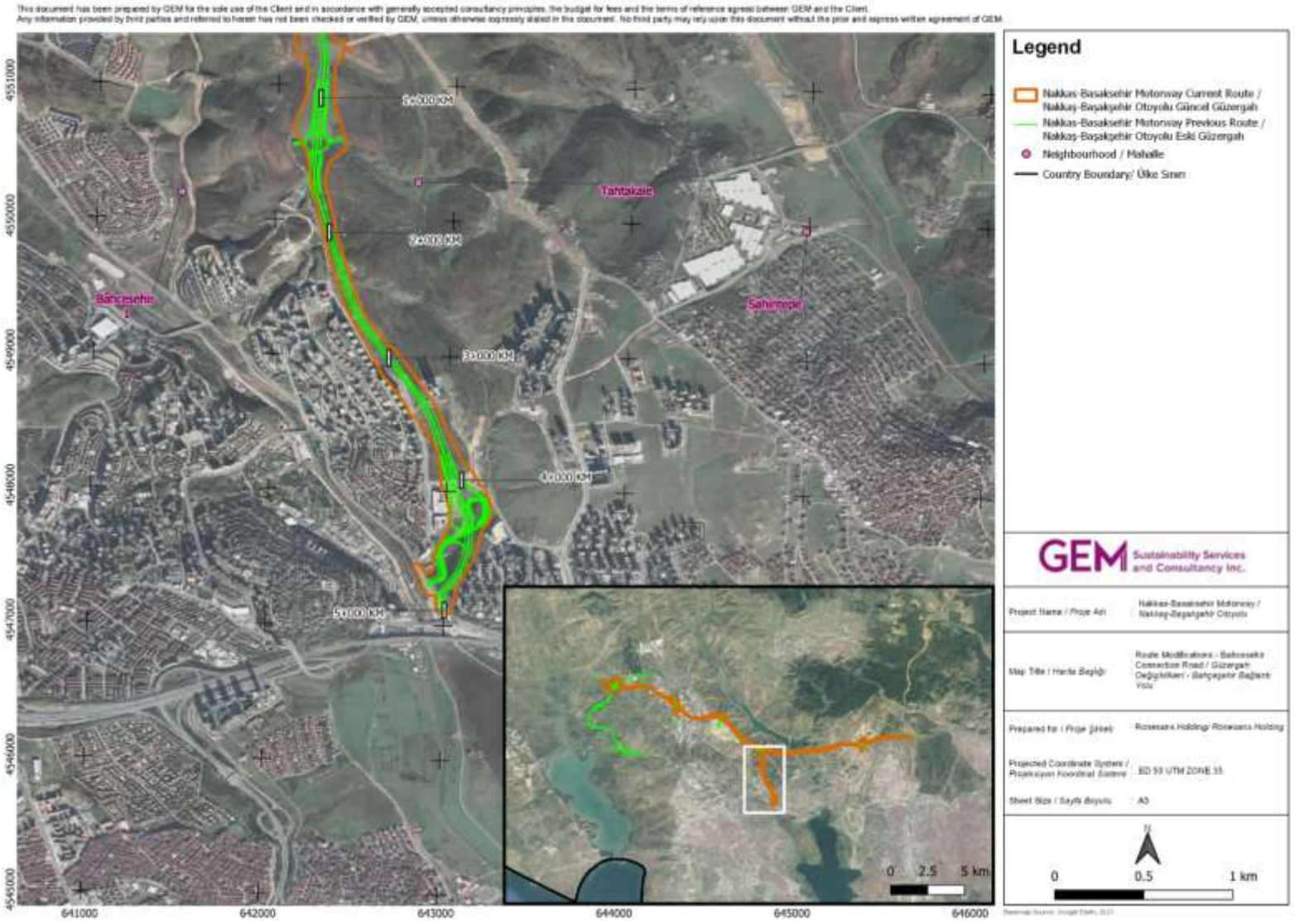


Figure 1-6 Route Modifications Bahcesehir Connection Road

1.4.2 Do- Nothing Scenario

As per ESIA good practice, a comparative assessment of project alternatives includes a "Do-Nothing Scenario" as an alternative for the Project implementation. This chapter summarizes the potential negative and positive and consequences that would possibly occur in case the Nakkaş-Başakşehir Motorway Project had not been implemented:

1.4.2.1 Negative Impacts of the Do-Nothing Option (compared to Project)

- **Northern Marmara Motorway (NMM) remains incomplete**: The first seven sections of the NMM have already been completed and are under operation, whilst the last portion "Section 8 - Nakkaş-Başakşehir Motorway" is to be constructed. Since Nakkaş-Başakşehir Motorway is an integral part of overall NMM network, the NMM network would remain incompleted in a Do-Nothing Scenario.
- **Longer Travel Times in Region & Lost Productivity**: Currently there is intense traffic congestion in the Northern Marmara Region created by urbanization and industrialization, as well as intercity and international traffic passing through, e.g., via the European Road 80. Without the Project, this situation will remain, and traffic flow will be further slowed. The Do-Nothing option will mean that travel times will increase, instead of decreasing with the Project (e.g., current travel times with Project will decrease to 1.5 hours from İstanbul to Bursa, 3.5 hours from İstanbul to Izmir, 2.5 hours from İstanbul to Eskişehir and 3.5 hours from İstanbul to Ankara).
- **Traffic Congestion in Project Vicinity**: Several major facilities such as İkitelli Organized Industrial Zone, Deliklikaya Industrial Zone, Hadımköy Industrial Zone, Başakşehir Çam and Sakura City Hospital and Atatürk Olympic Stadium are located in the Project vicinity. These facilities are and causing heavy traffic and transportation problems due to daily movements.
- **Heavy Traffic around Istanbul**: The Project aims to reduce the traffic load in the existing transportation networks and alleviate the transportation problems of the developing regions of İstanbul, Halkalı, Başakşehir, Kayaşehir, Bahçeşehir and Hadımköy. Thus, reduction in the economic losses such as increased fuel consumption, vehicle maintenance and repair costs are also expected. The existing heavy traffic load and economic losses will remain as they are – and possibly worsen - in the Do-Nothing Scenario.
- **Missed Employment Opportunities**: The Project will provide local employment and local procurement opportunities during the construction and operation phases, which will not be the case in Do-Nothing Scenario.
- **Continued Poor Road Safety:** The existing roadways are congested and of low quality, thus resulting in traffic accidents; this trend would continue – and possibly worsen – in the Do-Nothing Scenario as compared to the more modern, safer roads of the Project.

1.4.2.2 Positive Impacts of the Do-Nothing Option (compared to Project)

The "positive impacts" of the Do-Nothing Option can be seen in the context of the avoidance or absence of many of the negative impacts of the Project construction and operations, as identified in this ESIA. Several key topics are listed below:

Construction

- Avoidance of need for land expropriation.
- Avoidance of land clearance and destruction of local vegetation, topsoil.
- Avoidance of construction nuisance due to noise, dust, fumes, vibration.

Operations

- Absence of vehicle noise and air emissions.
- Absence of visual effect of roadway presence.
- Absence of decrease in landscape.

2. POLICY, LEGISLATIVE AND REGULATORY FRAMEWORK

2.1 Institutional Framework

The administrative structure in Turkey is governed by central and local administrations. The central administration is organized so that the country is divided into provinces and the provinces into further smaller divisions (i.e., districts, municipalities, villages/settlements) according to geographic and economic conditions, and the need for public services.

Ministries are the units of central administration. Local branches of ministries are composed of provincial organizations attached to governors and district organizations attached to the district governors.

At the local level, municipality mayors and the headmen (Muhtar) of the villages/neighbourhoods are the representatives of the administrative structure.

The figure below presents the administrative layers with highlights on the most relevant for the Project. Further information about these authorities and their administrative and decision-maker roles are described below (see Table 2-1).

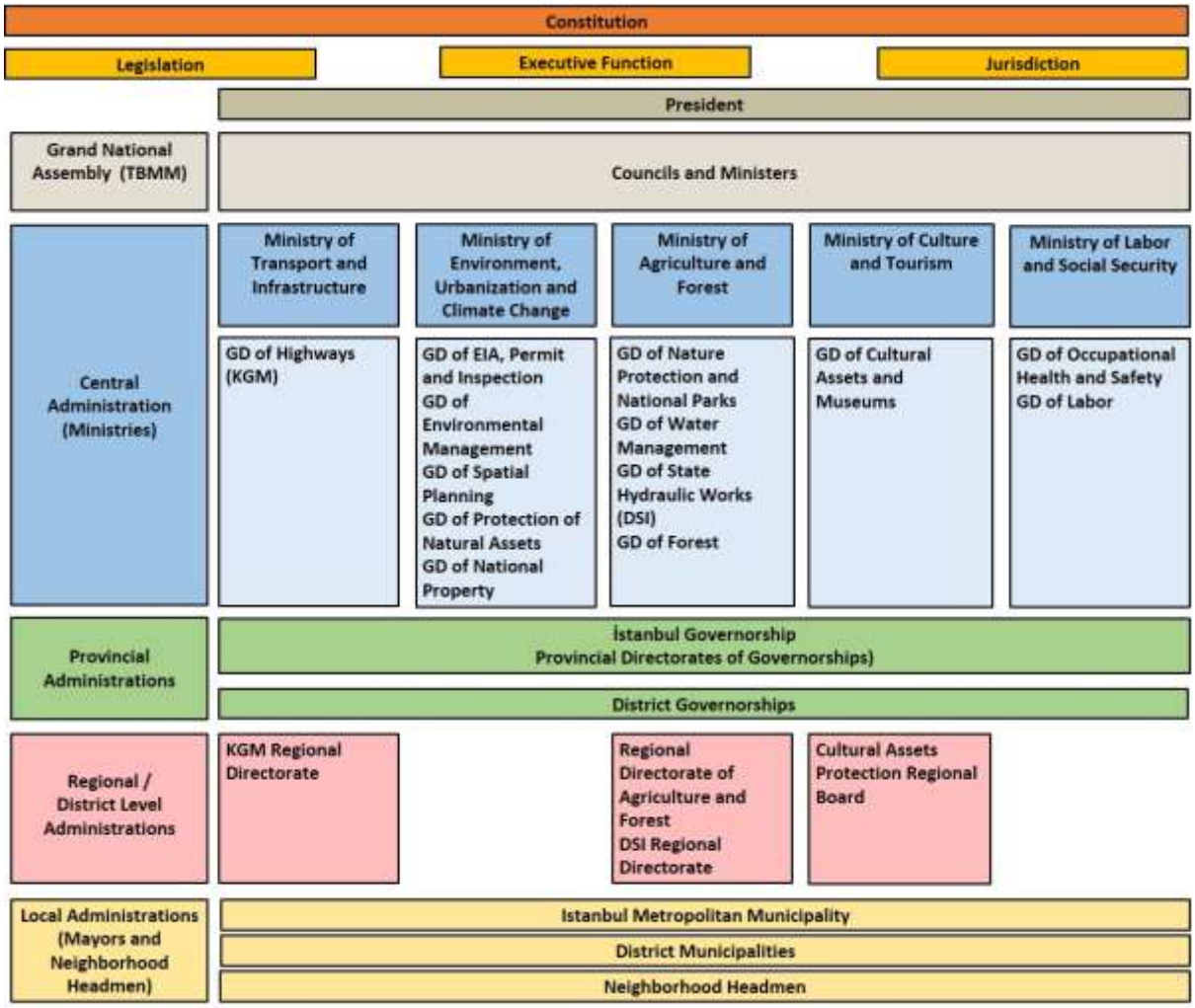


Figure 2-1 Institutional Framework in Turkey

Table 2-1 Administrative Units and Respective Roles

Administrative Unit	Role
Ministry of Transport and Infrastructure (MoTI)	MoTI 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 thirteen Regional Transport and Infrastructure Directorates across Turkey; 1st Regional Directorate covers İstanbul Province. The General Directorate (GD) of Motorways (KGM), an affiliated authorized body of MoTI, is the responsible authority for the development of the Nakkaş-Başakşehir Motorway Project. KGM is represented by eighteen Regional Directorates across Turkey; 1st Regional Directorate covers İstanbul Province. Both MoTI and KGM will cooperate with relevant directorates within the Governorate of İstanbul Province for monitoring and supervision of the Project.
Ministry of Environment, Urbanization and Climate Change (MoEUCC)	MoEUCC is a relevant authority for the Project in terms of environmental permits and auditing. MOEUCC is made up of several directorates; the most relevant directorates related to the Project given below: ■ GD of EIA, Permit and Inspection organizes the procedures of EIA and follow-up in coordination with Governorship structures at the local level. ■ GD of Environmental Management is the primary authority in environmental protection and monitoring procedures, holding the authority for assessment, supervision, and sanctioning in coordination with Governorship structures at the local level. ■ GD of Spatial Planning identifies the procedures and guidelines related to the preparation of all kinds of physical spatial development plans and environmental management plans in all scales; approves these plans and ensures that the plans are applied and monitored. ■ GD of Protection of Natural Assets is responsible for determining the procedures and principles regarding the registration, approval and announcement of national parks, nature parks, natural monuments, nature protection areas, wetlands and other areas with similar protection status and registering the boundaries of these areas. ■ GD of National Property is the notified body in terms of the assets of the Treasury. One of its duties is to develop and appraise immovables under private ownership of the Treasury and under the jurisdiction and disposition of the State and to buy, barter, bartering, expropriate and consolidate immovables owned by individuals. ■ MoEUCC is represented at the governorship level by the Provincial Directorates of Environment and Urbanization (i.e. İstanbul Provincial Directorate of Environment and Urbanization in relation to the Project).
Ministry of Agriculture and Forest (MoAF)	MoAF is a relevant authority for the Project particularly in terms of nature conservation. MoAF is made up of several directorates; the most relevant directorates related to the Project given below: ■ GD of Nature Protection and National Parks is responsible for identification of national parks, nature parks, natural monuments, nature protection areas and wetlands; and for undertaking activities for the protection, development,

Administrative Unit	Role
	management, and auditing of these areas that are registered by the MoEUCC. The GD manages terrestrial hunting, takes necessary measures for the conservation of flora and fauna species protected by international conventions, identifies principles of protection, and use for areas determined by international protection conventions. ■ GD of Water Management undertakes studies to identify policies for the protection, improvement, and use of water resources; prepares river basin management plans; identifies surface water and groundwater quality standards in coordination with relevant authorities; identifies measures and monitors their implementation for the protection of pollution within water basins; prepares flooding management plants. ■ GD of State Hydraulic Works (DSI) is responsible for the planning, management, development and operation of all water resources in Turkey. DSI undertakes priority activities in dam works that serves DSI's purpose for flood protection, dissemination of irrigated agriculture, generation of hydroelectric energy and supply of drinking water to cities and settlements. DSI also carries out to protect groundwater and issues permits for groundwater exploration and use. ■ GD of Forest undertakes work for the development, protection, and control of forests and carries out work for permits, usufructs and easements in forests related to forest cadastre and ownership works. MoAF is represented at the governorship level by the Provincial Directorates of Agriculture and Forest (i.e. İstanbul Provincial Directorate of Agricultural and Forest in relation to the Project). MoAF is also represented by fifteen Regional Directorates.
Ministry of Culture and Tourism (MoCT)	MoCT carries out work to undertake research for and to develop and protect national, spiritual, historical, cultural and touristic values. ■ GD of Cultural Assets and Museums is the responsible body to reveal and protect movable and immovable cultural assets. ■ There are also Cultural Assets Protection Regional Boards at regions defined by the MoCT, which are responsible for the protection of cultural heritage within their respective jurisdictions. Istanbul 1st Cultural Assets Protection Regional Board is responsible for the Project route.
Ministry of Labour and Social Security (MoLSS)	MoLSS is a relevant authority for the Project in terms of labour aspects and occupational health and safety of the workers of the Project. ■ GD of Occupational Health and Safety defines standards of health and safety and coordinates all aspects associated with occupational health and safety. ■ GD of Labour is responsible for implementing the legislation related to working life and regulates employee-employer relations.
İstanbul Governorship	İstanbul Governorship is the highest authority at the provincial level who is directly responsible to the Ministry of Internal Affairs. Governors represent central government (i.e. the Council of Ministers) at the provincial level. Provincial directorates represent their respective ministries at the provincial level and form the Provincial Administration under the authority of the Governor.

Administrative Unit	Role
Provincial Directorates of the above-mentioned ministries	Provincial Directorates represent their respective ministries at the provincial level and form the provincial administration under the authority of governorship.
İstanbul Metropolitan Municipality	İstanbul Metropolitan Municipality is the administrative body responsible of urban planning and implementation, management of transportation systems, construction and maintenance of urban roadways and provision of water, sewerage and utility services, as well as waste collection/disposal, permits, licences, traffic planning, fire control and emergency response.
Governorships and municipalities of Başakşehir, Arnavutköy, Avcılar and Çatalca Districts	Districts are administered by appointed sub-governors (*Kaymakam*), who report directly to the Governor and are responsible for a number of directorates including, amongst others, education, health, population, and security, which in turn are closely linked to the ministries of central government.
Headmen of neighbourhoods (Muhtars) falling into the Project's area of influence that include İkitelli 1, İkitelli 2, Şamlar, Kayabaşı, Şahintepe, Tatarcık, Deliklikaya, Hadımköy, Ömerli, Sazlıbosna, Yeşilbayır, Karaaağaç, Bahşayiş, Nakkaş Firuzköy and Ispartakule neighbourhoods;	Muhtars are the elected village and neighbourhood heads acting as administrative body.

2.2 Turkish Legislative Requirements

2.2.1 Applicable Turkish Environmental and Social Legislation

The Project is required to comply with relevant Turkish laws and regulations related to environmental and social aspects. The key laws include but not limited to Environmental Law, Labour Law, Occupational Health and Safety Law, Expropriation Law, Law on Right to Access to Information and Law on the Use of the Right to Petition as briefly mentioned below:

Turkish Environmental Law (No: 2872), which came into force in 1983, is Turkey's primary framework for environmental legislation and is supported by a series of regulations that have been developed in line with national and international initiative and standards, and some of them have been revised recently to be harmonized with the European Union (EU) Directives in the scope of pre-accession efforts of Turkey. Labour, health and safety issues are collectively ruled by the Labour Law (No. 4857), Occupational Health and Safety Law (Law No. 6331) and associated regulations.

The expropriation process in Turkey is undertaken as per the requirements of the Expropriation Law (No: 2942). The Law on Right to Access to Information (No: 4982) and Law on the Use of the Right to Petition (No: 3071) are the relevant laws that allow individuals to exercise their right of information acquirement and their right to make applications to competent authorities related to their requests and complaints, respectively.

Environment

- Environmental Law No: 2872; Official Gazette (OG) Date/Number: 11.08.1983/18132;
- Environmental Impact Assessment Regulation; OG Date/Number: 25.11.2014/29186;
- Regulation on Environmental Permits and Licenses; OG Date/Number: 10.09.2014/29115;
- Regulation on Environmental Management Services; OG Date/Number: 30.07.2019/30847;
- Environmental Audit Regulation; OG Date/Number: 12.06.2021/31509;
- Regulation on Workplace Opening and and Operating Licenses; OG Date/Number: 10.08.2005/25902;
- Industrial Air Pollution Control Regulation; OG Date/Number: 03.07.2009/27277;
- Regulation on the Control of Exhaust Gas Emissions; OG Date/Number: 11.03.2017/30004;
- Regulation on Assessment and Management of Air Quality; OG Date/Number: 06.06.2008/26898;
- Water Pollution Control Regulation; OG Date/Number: 31.12.2004/25687;
- Surface Water Quality Regulation; OG Date/Number: 30.11.2012/28483;
- Groundwater Law No: 167; OG Date/Number: 23.12.1960/10688
- Regulation on Protection of Groundwater against Pollution and Deterioration; OG Date/Number: 07.04.2012/28257;
- State Hydraulic Works Regulation on Groundwater Measurement Systems; OG Date/Number: 12.10.2013/28793;
- Regulation on the Protection of Drinking-Utilization Water Basins; OG Date/Number: 28.10.2017/30224
- Regulation Concerning Water Intended for Human Consumption; OG Date/Number: 17.02.2005/25730;
- Regulation on Pollution Control Caused by Dangerous Substances in Aquatic Environment; OG Date/Number: 26.11.2005/26005;
- Waste Management Regulation; OG Date/Number: 02.04.2015/29314;

- Regulation on Control of Excavated Soil, Construction and Demolition Wastes; OG Date/Number: 18.03.2004/25406;
- Communique on Recycling of Certain Non-Hazardous Wastes; OG Date/Number: 17.06.2011/27967;
- Packaging Waste Control Regulation; OG Date/Number: 26.06.2021/31523;
- Waste Oil Management Regulation; OG Date/Number: 21.12.2019/30985;
- Regulation on Control of Waste Batteries and Accumulators; OG Date/Number: 31.08.2004/25569;
- Regulation on Control of Waste Electrical and Electronic Equipment; OG Date/Number: 22.05.2012/28300;
- Regulation on Control of Waste Vegetable Oils; OG Date/Number: 6.06.2015/29378;
- Regulation on Medical Waste Control; OG Date/Number: 25. 01.2017/29959;
- Regulation on the Control of End-of-Life Tires; OG Date/Number: 25.11.2006/26357;
- Regulation on the Control of End-of-Life Vehicles; OG Date/Number: 30.12.2009/27448;
- Zero Waste Regulation; OG Date/Number: 12.07.2019/30829;
- Circular on COVID-19 Measures for the Management of Wastes of Single Use Masks, Gloves and Other Personal Hygiene Materials (Number: 2020/12 Date:07.04.2020);
- Regulation on Mining Wastes; OG Date/Number: 15.07.2015/29417;
- Regulation on Safety Data Sheets for Hazardous Substances and Mixtures; OG Date/Number: 13.12.2014/29204
- Regulation on the Registration, Evaluation, Permission, and Restriction of Chemicals; OG Date/Number: 23.08.2017/30105;
- Regulation on Soil Pollution Control and Point-Source Contaminated Sites; OG Date/Number: 08.06.2010/27605;
- Regulation on Ozone Depleting Substances; OG Date/Number: 07.04.2017/30031;
- Regulation on the Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls; OG Date/Number: 27.12.2007/26739;
- Regulation on the Assessment and Management of Environmental Noise; OG Date/Number: 04.06.2010/27601;
- Regulation on Environmental Noise Emission Created by Equipment Used in Outdoor (2000/14/AT); OG Date/Number: 30.12.2006/26392;
- Communiqué on Road Transportation of Wastes; OG Date/Number: 20.03.2015/29301;
- Regulation on the Transport of Dangerous Goods by Road; OG Date/Number: 24.04.2019/30754;

Health and Safety

- Occupational Health and Safety Law No. 6331; OG Date/Number: 30.06.2012/28339;
- Occupational Health and Safety Risk Assessment Regulation; OG Date/Number: 29.12.2012/28512;
- Regulation on Duties, Authorizations, Responsibilities, and Training of Occupational Safety Specialists; OG Date/Number: 29.12.2012/28512;
- Regulation on Duties, Authorizations, Responsibilities, and Training of Workplace Doctors and Other Health Officials; OG Date/Number: 20.07.2013; 28713;

- Regulation on Procedures and Principles of Occupational Health and Safety Training of Employees; OG Date/Number: 15.05.2013/28648;
- Regulation on Occupational Health and Safety Committees; OG Date/Number: 18.1.2013/28532;
- Regulation on Occupational Health and Safety Services; OG Date/Number: 29.12.2012/28512;
- Regulation on Occupational Health and Safety in Construction Works; OG Date/Number: 05.10.2013/28786;
- Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Extensions; OG Date/Number: 17.7.2013/28710;
- Regulation on Vocational Training for the Workers to be Employed in Dangerous and Very Dangerous Works; OG Date/Number: 13.07.2013 /28706;
- Regulation on Health and Safety Requirements in the Use of Work Equipment; OG Date/ Number: 25.04.2013/28628;
- Regulation on Manual Handling Operations; OG Date/Number: 24.07.2013/28717;
- Regulation on Health and Safety Requirements in the Use of Work Equipment; OG Date/Number: 25.04.2013/28628;
- Regulation on Manual Handling Operations; OG Date/Number: 24.07.2013/28717;
- Regulation on Emergencies in Workplaces; OG Date/Number: 18.6.2013/28681;
- Regulation on the Use of Personal Protective Equipment in Workplaces; OG Date/Number: 02.07.2013/28695;
- Personal Protective Equipment Regulation; OG Date/Number: 01.05.2019/30761;
- Regulation on Health and Safety Signs; OG Date/Number: 11.09.2013/28762;
- First Aid Regulation; OG Date/Number: 29.07.2015/29429;
- Regulation on the Protection of Employees from Noise Related Risks; OG Date/Number: 28.07.2013/28721;
- Regulation on Protection of Employees from Vibration Related Risks; OG Date/Number: 22.08.2013/28743;
- Regulation on Control of Dust; OG Date/Number: 05.11.2013/28812;
- Regulation on Occupational Health and Safety in Temporary or Fixed-Term Works; OG Date/Number: 23.08.2013/28744;
- Regulation on Suspension of Work in Workplaces; OG Date/Number: 30.03.2013/28603;
- Regulation on Health and Safety Measures in Works with Chemical Substances; OG Date/Number: 12.08.2013/28733;
- Regulation on Protection of the Workers from Dangers of Explosive Environments; OG Date/Number: 30.04.2013/ 28633;
- Regulation on Equipment and Protective Systems Used in Potentially Explosive Environment; OG Date/Number: 30.06.2016/29758;
- Regulation on Protection of Buildings from Fire; OG Date/Number: 19.12.2007/26735;
- Regulation on Occupational Health and Safety in Mine Workplaces; OG Date/Number: 19.09.2013/28770;
- Regulation on the Works in which Workers shall Work Maximum Seven and Half Hours or Less in a Day in Terms of Health Rules; OG Date/Number: 16.07.2013/28709;

- Regulation on the Prevention of Risks of Exposure to Biological Factors; OG Date/Number: 15.06.2013/28678;
- Regulation on Health and Safety Measures in Working with Carcinogenic or Mutagen Substances; OG Date/Number: 06.08.2013/28730;

Cultural Heritage Protection

- Law on the Preservation of Cultural and Natural Assets; OG Date/Number; 23.07.1983/18113;
- Regulation on Conducting Survey, Drilling and Excavation Works Related to Cultural and Natural Properties; OG Date/Number; 10.08.1984/18485.

Labour Management

- Labour Law No. 4857; OG Date/Number: 10.06.2003/25134;
- Regulation on Work Durations related to the Labour Law; OG Date/Number: 06.04.2004/25425;
- Regulation on Excess and Overtime Work related to the Labour Law; OG Date/Number: 06.04.2004/25425;
- Regulation on Certain Procedures and Principles for Works Conducted in Shifts; OG Date/Number: 07.04.2004/25426;
- Regulation on Minimum Wage; OG Date/Number: 01.08.2004/25540;
- Regulation on Procedures and Principles for Employment of Children and Young Workers; OG Date/Number: 06.04.2004/25425;
- Regulation on Annual Paid Vacation; OG Date/Number: 03.03.2004/25391;
- Regulation on Subcontractors; OG Date/Number: 27.09.2008/ 27010;
- Regulation on Working Conditions of Female Employees in Night Shifts; OG Date/Number: 24.07.2013/28717;
- Regulation on the Employment Terms of Pregnant or Nursing Women and Breastfeeding Rooms and Child Care Residences; OG Date/Number: 16.08.2013/28737;

Involuntary Resettlement and Economic Displacement

- Expropriation Law No:2942; OG Date/Number: 08.11.1983/18215;
- Resettlement Law; OG Date/Number: 26.9.2006/26301;
- Cadastral Law No:3402; OG Date/Number: 09.07.1987/19512;
- Pasture Law No. 4342; OG Date/Number: 28.02.1998/23272;
- Forest Law No: 6831; OG Date/Number: 08.09.1956/ 9402;
- Law on Soil Protection and Land Use No. 5403; OG Date/Number: 19.07.2005/25880;
- Agricultural Reform Law on Land Arrangement in Irrigated Areas No. 3083; OG Date/Number: 01.12.1984/18592;
- Land Registry Law No.2644; OG Date/Number: 29.12.1934/2892;
- Law on Preventing Intrusion on Possession of Immovable Property No. 3091; OG Date/Number: 15.12.1984/18606;
- Notification Law No. 7201; OG Date/Number: 19.02.1959/10139.

Stakeholder Engagement and Grievance Mechanism

- Law on Right to Access to Information No: 4982; OG Date/Number: 24.10.2003/25269;
- Law on the Use of the Right to Petition No: 3071; OG Date/Number: 10.11.1984/18571.

2.2.2 Environmental Impact Assessment (EIA) Process under Turkish EIA Regulation

Article 10 of the Environmental Law sets the framework for the Environmental Impact Assessment (EIA) procedure in Turkey, indicating that institutions, agencies, and establishments that lead to environmental problems as a result of their planned activities are obliged to prepare environmental impact assessment report or Project Information File. Based on this legal framework, the EIA Regulation was put into force for the first time after being published in the Official Gazette numbered 21489 and dated 7 February 1993. Since then, there had been several amendments in the first regulation and new EIA regulations were published in 2008 and 2013 repealing the former regulations in force. The latest EIA Regulation (2014 EIA Regulation) has been published in the Official Gazette dated 25 November 2014 and numbered 29186, which repealed the 2013 EIA Regulation.

Under its annexes, the EIA Regulation categorizes investments as projects subject to full EIA (Annex-1) and projects subject to screening-elimination criteria (Annex-2). This categorization is done based on the type of activity and/or plant capacity. If the planned investment is defined as an activity under Annex-1 of the EIA Regulation, a full EIA Report is required. For Annex-2 activities, first a Project Information File is prepared in accordance with a limited format specified in the Annex-4 of the EIA Regulation and the Ministry of Environment, Urbanization and Climate Change (“MoEUCC”) evaluates the need for a full EIA process for the project.

The full EIA process (i.e. for projects falling into Annex-1 of the EIA Regulation) starts with the submission of an EIA Application File to the MoEUCC. Upon review of the EIA Application File by the MoEUCC, a commission is established by the MoEUCC comprising the representatives of relevant institutions and establishments, authorized staff of the MoEUCC, project owner and the consultant that has been appointed to prepare the EIA report. The MoEUCC and the relevant Provincial Directorate of Environment and Urbanization (PDEU - where the project will be developed) makes a public announcement through advertising on their website that the EIA process of the project is initiated, the EIA Application File is open to public opinion and any comments can be channeled through PDEU or MoEUCC. A Public Consultation Meeting is required upon submission of the EIA Application File in order to inform the public and get their opinions and recommendations on the project. The project owner is responsible for advertising the location, date, time and content of the meeting in both a national newspaper and a local newspaper at least 10 days before the meeting date. The timeframe over which the public can submit queries, views or questions is announced during the public consultation meeting and all comments received are submitted to the EIA commission at the end of this period. The EIA scope is defined based on the findings of the commission and the comments and recommendations received from the public. After the EIA Report is prepared and submitted to the MoEUCC, it is reviewed by the MoEUCC and the commission members. The MoEUCC and the relevant PDEU again makes a public announcement through advertising on their website that the review process for the Project is commenced, the EIA Report is open to public opinion and any comments can be channeled through PDEU or MoEUCC until the finalization of the EIA Report. The comments received from the public within this period are considered by the EIA commission and reflected to the EIA report. After the EIA Report is finalized based on the review of the MoEUCC and the commission, the MoEUCC and the relevant PDEU once again announces that the Final EIA Report is open to the public opinion for 10 days. Opinions received within this period are considered in the decision of MoEUCC regarding the project.

A public consultation meeting is not required for projects subject to screening-elimination criteria (i.e. for projects falling into Annex-2 of the EIA Regulation). After the submission of the Project Information File to the relevant PDEU and its review by the PDEU, the PDEU makes a public announcement through

advertising on their website regarding the decision (i.e. “EIA Not Required” or “EIA Required”) given by the PDEU for the Project.

The categorization for motorway projects under Turkish EIA regulation is done according to the type or length of the road (km) as follows:

- Full EIA process is required for the following Annex-1 activities;
  - Motorways and state motorways (Article 8-c);
  - Construction of express roads having four and more lanes (Article 8-ç)
  - Rehabilitation or expansion of the existing express roads having two or less lanes in a way that they are upgraded to have four or more lanes, extension of the motorway section that will be reconstructed or expanded in a way that it has a non-stop length of 10 km or more (Article 8-d).
- Limited EIA process is required to be conducted for the following Annex-2 activities;
  - Ring roads having a length of 20 km and more (Article 31-i)
  - Provincial roads (excluding the settlement and village roads; Article 31-j)
  - Change of the route of the motorway projects listed in Annex-1 and Annex-2 (of the EIA Regulation) for a non-stop length of 20 km and more (Article 31-k)
  - Expansion of the existing provincial roads having two or less lanes for at least 20 km in a way that they are upgraded to have four or more lanes (Article 31-l).

The North Marmara Motorway Project was included in the public investment program in 1991 with the number 1991E040150 and evaluated by the MoEUCC with its official letter dated 31 July 2009 as out-of-scope of EIA Regulation as per the Temporary Article 3 of the EIA Regulation in force at the time (2008 EIA Regulation). Temporary Article 3 (“Out of Scope Projects”) of the 2008 Regulation states the following: “In relation to the projects whose application projects have been approved or for which required approval, permit, license or expropriation decision have been taken in line with environmental legislation and other relevant legislation or which have been included in the investment program or whose local zoning plans have been approved before the EIA Regulation published in the Official Gazette dated 7 February1993 and numbered 21489 (i.e. 1993 EIA Regulation) or those projects with documented proof of start of production and/or operation before this date; the provisions of this Regulation shall not apply, without prejudice to the permits required to be obtained as per the Environmental Law and other relevant regulations”.

The Project is exempted from the Turkish EIA Regulation due to the inclusion of the North Marmara Motorway Project in the public investment program in 1991 prior to the enactment of the first EIA Regulation in Turkey in 1993. This exemption of the Project from Turkish EIA Regulation was recently confirmed by a decision of the İstanbul Provincial Directorate of the Environment and Urbanization, as issued to 1st Regional Directorate of KGM with an official letter dated 2 December 2020 (Annex 3). The Project’s EIA exemption also includes all material quarries, connecting roads, energy transmission lines, storage areas, ready mix concrete plants, asphalt plants and manufacturing facilities required for constructions. Although the Project was exempted from the EIA regulation, all other obligations for environmental permits and licences under current Turkish regulations are still applicable for the Project.

2.2.3 Expropriation Process under Turkish Expropriation Law

Expropriation is regulated by the Expropriation Law (Law No. 2942, amended in 2001 by Law No. 4650). A Public Benefit Decision 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 or the President. In these cases, a Decision is taken indicating that the expropriation process will be initiated by the authorised executive body. Acts of expropriation can only be exercised on immovable assets.

There are a number of steps in the expropriation process including:

- Commencement of expropriation process with the issuance of Public Benefit Decision;
- Preparation of expropriation plans;
- Identification of property owners and their addresses;
- Issuance of expropriation decision;
- Purchasing process (article 8 of the Expropriation Law) that includes:
  - Establishment of a “Valuation Commission” and the valuation process: The authority carrying out the expropriation appoints a Valuation Commission to determine the value of the property;
  - Establishment of a “Negotiation Commission”: The authority carrying out the expropriation appoints a Negotiation Commission to negotiate the amount of compensation and execute and complete the purchase by solving possible disputes on expropriation value;
  - Notification to the property owner: The authority carrying out the expropriation notifies the property 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;
  - Application to the authority by the property 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 are held at a date determined by the Negotiation Commission. Provided the agreed price or the value of the exchange does not exceed the valuation, a minute of agreement is issued and signed by the property owner or his representative and the members of the Negotiation Commission;
  - Payment to the property owner: The authority prepares the payment within forty-five days as of the of the date of the minute of agreement, and after the completion of the ownership transfer, the payment is made to the property owner. The property is considered to be purchased by expropriation and the property owner has no right of objection against the expropriation or the agreed compensation.

In cases when the purchasing process as per article 8 of the Expropriation Law does not result in an agreement, judicial process is implemented as per article 10 of the Expropriation Law that includes:

- Determination of the expropriation value by the court: The authority carrying out the expropriation applies 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 notifies the property owner of the date of hearing within 30 days as of the date of application by the authority. If the previous searches have not identified the owner’s address the hearing date must be announced in a local and a national newspaper.
- Reaching an agreement: On the date of the hearing, the judge invites the parties to agree on the value of the property and if the parties agree, the judge accepts the agreed value as the expropriation value. The payment is then made to the property owner.
- Disagreement: In cases the parties fail to reach an agreement, the court sets a date for an on-site survey to be undertaken by an Expert Commission consisting of independent experts, within 15 days, and a new hearing date within 30 days. The headmens of the village/neighbourhood ares also invited to participate in the site survey. The Expert Council reports the value of the property to the court within 15 days following the on-site survey. The court then sends this report to both parties. If the parties still cannot reach an agreement on the hearing date, a new expert council, if required, is appointed by the court, to finalize the situation within 15 days. The court then sets a fair expropriation value (for the property, resource of right of easement) based on the expert reports. Both sides still have the right to appeal to the “Supreme Court” about the valuation. The

property ownership transfer and payment of expropriation compensation are completed within 15 days in line with the decision of the court.

Expropriation Law also includes provisions for immediate expropriation of properties as defined in article 27 of the said law. Article 27 of the Expropriation Law indicates the following:

- In cases where there is a need or urgency of defending the country in the implementation of National Defence Liability Law (Law no: 3634) to be determined by the President or for extraordinary situations anticipated by particular laws, the property can be expropriated by the court within seven days upon the request of the relevant administration, with the condition that all processes except the valuation of the property to be completed later.
- Within seven days, the value of the property to be determined according to article 10 of the Expropriation Law (i.e. judicial process as explained above) by experts to be selected according to article 15 of the Expropriation Law, is paid to the bank account stated in the invitation and notice to be made in line with article 10 of the Expropriation Law, and the property is expropriated.

In accordance with the relevant provisions of the Expropriation Law, expropriation works for the Project will be conducted by the KGM as the related administrative authority/responsible agency. Nakkaş Otoyol A.Ş. will have the responsibility to comply with international standards and Lender's requirements regarding the execution of expropriation works.

2.3 International Conventions

A list of relevant conventions ratified by Turkey and relevant for the environmental and social aspects is presented in Annex 4 and below (e.g. ILO conventions, UNESCO, Climate change, Biodiversity protection etc.) which include but not limited to the following:

- Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto (1997)
- Paris Agreement under the United Nations Framework Convention on Climate Change (2015)
- Vienna Convention for the Protection of Ozone Layer (1985)
- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1976)
- CITES Convention on Trade in Endangered Species of Wild Flora and Fauna (1975)
- Convention on Biodiversity – Biological Diversity (1992)
- Agreement on the Conservation of Nature and Natural Resources – ASEAN, Kuala Lumpur (1985)
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel (1992)
- International Covenant on Economic, Social and Cultural Rights
- Agreement on the Conservation of Populations of European Bats (1994)
- Pan European Ecological Network (PEEN)
- RAMSAR Convention on Wetlands (1971)
- UNESCO Convention on the Protection of the World Cultural and Natural Heritage, Paris (1972)
- UNESCO Convention for the Safeguarding of Intangible Heritage, (2003)
- UNESCO Man and Biosphere Program, launched in the early 1970s
- ILO Conventions on Forced Labour - No.29 (1930), Freedom of Association and Protection of the Right to Organize - No:87 (1948), Right to Organize and Collective Bargaining - No:98 (1949), Equal Remuneration - No:100 (1951), Abolition of Forced Labour - No:105 (1957) , Discrimination - No: 111 (1958), Minimum Age - No:138 (1973), Worst Forms of Child Labour – No: 182 (1999), Occupational Safety and Health - No:155 (1981), and Promotional Framework for Occupational Safety and Health - No: 187 (2006).

2.4 International Standards for the ESIA development

As previously discussed, Nakkaş Otoyol A.Ş is planning to finance the investment costs of the Project by debt and equity under a Project Finance structure involving European Bank for Reconstruction and Development (EBRD), Asian Infrastructure Investment Bank (AIIB) and Atradius.

This ESIA has been developed in accordance with recognised international financing requirements, namely the EBRD Performance Requirements (PRs), the IFC Performance Standards (PSs), AIIB Environmental and Social Standards (ESSs), OECD Revised Council Recommendation on Common Approaches on Environment and Officially Supported Credits, and Equator Principles IV as detailed below:

- **EBRD E&S Policy (2019) and associated Performance Requirements (PRs):**

The EBRD Performance Requirements (in particular PR1 - Assessment and Management of Environmental and Social Impacts) set out expectations and guidance for undertaking E&S Impact Assessment. In particular, these note that adverse impacts on Project-affected ecosystems and communities should be avoided where possible, and if these impacts are unavoidable, then they should be appropriately reduced and/or compensated for.

PR7 (Indigenous peoples) are not applicable because there are no indigenous peoples in Turkey per EBRD and IFC definition. Additionally, EBRD PR9 which refers to Financial Intermediaries is also not applicable to the Project.

Table 2-2 Applicable EBRD PRs

EBRD PR	Applicability	Project Phase	Notes
PR 1: Assessment and Management of Environmental and Social Risks and Impacts	Yes	Construction and Operation phase	To be in line with good international practice and meet the requirements of the international lenders, there is a need to identify and evaluate the potential environmental and social risks and impacts of the Project, to identify relevant mitigation measures, and to establish and implement environmental and social management system at corporate and site level.
PR 2: Labour and Working Conditions	Yes	Construction and Operation phase	The Project is required to establish and maintain a sound worker-management relationship between compliance with national labor, occupational health, and safety legislation and following the Bank's performance requirements on labour and working conditions including the contractors and core suppliers.
PR 3: Resource Efficiency and Pollution Prevention and Control	Yes	Construction and Operation phase	The Project is required to identify and implement necessary resource efficiency, pollution prevention, and abatement measures for the protection of the environment and the people.
PR 4: Health, Safety, and Security	Yes	Construction and Operation phase	The Project is required to identify risks and potential impacts on the health and safety of the worker and communities by the project activities and to establish preventative measures to address them in a manner commensurate with the identified risks and impacts. Gender-Based Violence and Harassment (GBVH) risks to the workforce and communities were also assessed as required by PR 4.
PR 5: Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement	Yes	Construction Phase	The Project is required to avoid or, when unavoidable, minimise, involuntary resettlement by exploring alternative project designs and mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of

EBRD PR	Applicability	Project Phase	Notes
			and access to assets and land by providing compensation for loss of assets as required by PR 5.
PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	Construction and Operation phase	The Project has the potential to affect the biodiversity. Critical habitat assessment, biodiversity action plan will be described in the ESIA to avoid, minimize the potential impacts on biodiversity.
PR 7: Indigenous Peoples	No		PR 7 is not applicable as none of the following social and cultural groups were identified in the Project site and/or surroundings: ■ Members self-identified of a distinct indigenous ethnic or cultural group; ■ Collectively attached to distinct habitats, traditional lands or ancestral territories; ■ Members with customary cultural, economic, social or political affiliations: ■ Speaking a distinct language or dialect
PR 8: Cultural Heritage	Yes	Construction phase operation	The Project has the potential for adverse impacts on archaeological and the built heritage. Detailed plans for mitigation will be required, including prior investigation of any high risk areas, modifications to the design if appropriate, and establishment of a Chance Finds Procedure during construction. Presence of critical tangible and/or intangible cultural heritage will be evaluated, and mitigation measures identified accordingly.
PR 9: Financial Intermediaries	No	-	This PR is not applicable, as there are no EBRD financial intermediaries involved during financing based on available information.
PR 10: Information Disclosure and Stakeholder Engagement	Yes	Construction and operation phase	The Project should identify and engage with the relevant stakeholders, focusing specially on vulnerable groups and disclose project information throughout the lifetime of the Project. An effective grievance management system will be established and implemented in line with PR 10.

- **IFC Performance Standards on Social and Environmental Sustainability (January 2012):**

  - PS 1: Assessment and Management of Environmental and Social Risks and Impacts
  - PS 2: Labour and Working Conditions
  - PS 3: Resource Efficiency and Pollution Prevention
  - PS 4: Community Health, Safety and Security
  - PS 5: Land Acquisition and Involuntary Resettlement
  - PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
  - PS 7: Indigenous Peoples (Not applicable for the Project)
  - PS 8: Cultural Heritage

- **AIIB Environmental and Social Standards (amended in November 2022)**
  - ESS 1: Environmental and Social Assessment and Management
  - ESS 2: Land Acquisition and Involuntary Resettlement
  - ESS 3: Indigenous Peoples (Not applicable for the Project)
- **OECD Revised Council Recommendation on Common Approaches on Environment and Officially Supported Credits (April 2016);**
- **Equator Principles IV (2020).**

In addition to the above standards, the following guidelines are also relevant for the Project:

- EBRD Sub-sectoral Environmental and Social Guidelines (i.e., Building and Construction Activities, 2010);
- The EBRD's Strategy for the Promotion of Gender Equality (2021 – 2025);
- World Bank Group EHS General Guidelines
- IFC Environmental, Health, and Safety (EHS) General Guidelines (April 2007);
- IFC Environmental, Health, and Safety Guidelines for Toll Roads (April 2007);
- IFC/EBRD Worker's Accommodation: Processes and Standards (August 2009);
- Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector jointly commissioned by IFC, EBRD, and CDC Group;
- EU environmental, social and occupational health and safety directives:
  - EU Directive 2014/52/EU – The EIA Directive;
  - EU Directive 2000/60/EC – The Water Framework Directive;
  - EU Directive 2008/98/EC – The Waste Framework Directive;
  - EU Directive 2006/118/EU – The Groundwater Directive;
  - EU Directive 2009/147/EC – The Birds Directive;
  - EU Directive 92/43/EEC – The Habitats Directive;
  - EU Directive 2008/50/EC – The Ambient Air Quality Directive;
  - EC Directive 2008/96/EC – Road Infrastructure Safety Management Directive; and
  - EU Directive 89/391/EEC – The Occupational Health and Safety Framework Directive.

3. PROJECT DESCRIPTION

3.1 Introduction

This Chapter presents general information on the Project, its key components, design standards and construction activities which may influence various E&S (environmental and social) aspects discussed in the chapters below.

The Project is located in western part of İstanbul passing through four districts: Başakşehir, Arnavutköy, Avcılar and Çatalca (see Figure 3-1).These are densely populated areas with diverse economic and livelihood activities as well as hosting large residential apartment buildings, public service institutions and sports facilities.

The Project will be a new 4-lane dual Motorway and 2x3 lane connecting road which is intended to be used solely by motor vehicles such as automobiles, buses, small and large trucks/lorries, and motorcycles. Special vehicles (such as over-sized transporters), or lorries carrying certain hazardous cargoes will be subject to approval by KGM in accordance with the Turkish motorway regulations applicable for all such motorways. Pedestrians, bicycles, grazing animals, slow-moving farm vehicles and other vehicles that are inappropriate for such a motorway will be prohibited. As a limited access roadway, there will be no traffic-light intersections; entry or exit will be via right-side ramps at newly built interchanges.

There will be no provisions for pedestrians, cyclists, or other vehicles to cross the Motorway at grade. Signs and fences will be erected all along the Motorway to prevent pedestrians from attempting to cross. Instead, the Motorway design provides underpasses, overpasses, and culverts to allow safe passage for pedestrians and vehicles, as well as for animal crossings (including wildlife) as furtherly discussed in Chapter 6.2. The underpass locations are designed at or as close as possible to all existing roadways and farm roads/paths. Underpasses will be installed at appropriate locations to facilitate the existing transport routines/passage and to thus avoid any motivation for attempting an illegal crossing of the Motorway itself.

The Project includes a number of elements currently identified as shown in the following Table 3-1. The different elements will be described in detail in the subsequent parts of this Chapter.

Table 3-1 Project's Key Elements

Component	Details
Length of main road	24.17 km
Length of connecting roads	6.47 km
Cross Sections	2x4 lanes for main Motorway and 2x3 for connecting road
Interchanges	10
Cable Stayed Bridge	1,619 m (Length) x 46 m (Width) and Tower Height of 196 m
Overpasses	18
Underpasses	18
Viaducts	5
Culverts	55
Toll Booth	The number of toll booths has not been specified at the current stage. Free flow systems and tollgate toll collection systems will be incorporated in the Project, similar to the other segments of the NMM.
Lighting	Will be provided at cable stayed bridge, intersections and toll booths.
Service Stations/Rest Areas	There are no service stations/rest areas planned as part of the existing road design.
O&M Facilities	There are two O&M facilities planned at KM 36+300 and at 49+200 specific for Sazlıdere Cable Stayed Bridge. These O&M facilities will also serve as Disaster Recovery centres.

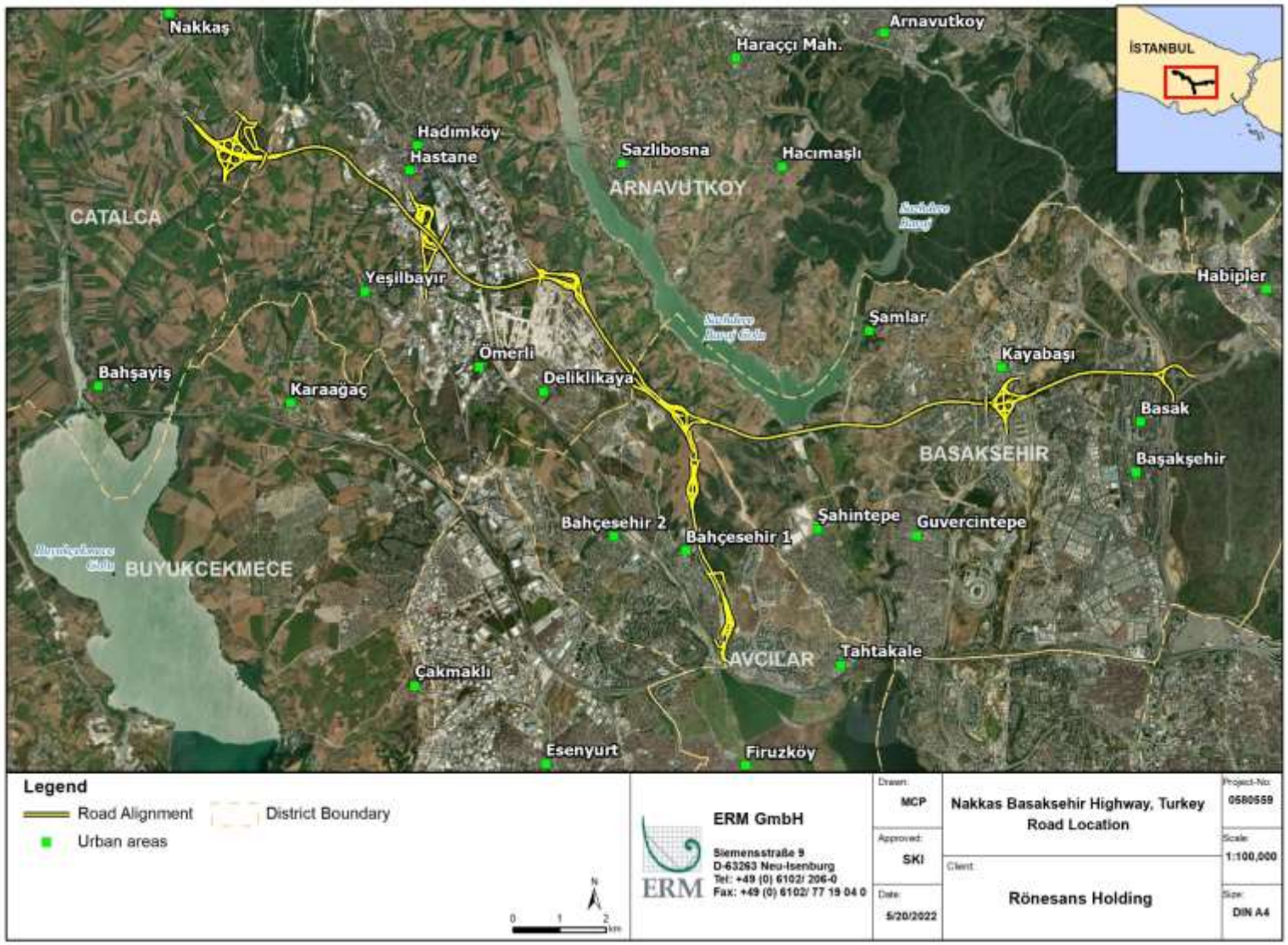


Figure 3-1 Project's Location

3.2 Project Parties

The parties involved in the Project are listed in Table 3-2.

Table 3-2 Project Parties

Responsible Party	Role	Responsibilities
General Directorate of Motorways Turkey (KGM)	Project Owner	■ Management of the BOT Contract ■ Approval of the design documents prepared by Nakkaş Otoyol Yatırım ve İşletme A.Ş. ■ Land acquisition to facilitate the construction and operation of the Project ■ Consultation with affected parties and valuation and negotiation of compensation in accordance with the provisions of the relevant Turkish Expropriation Law (Law No. 2942, amended in 2001 by Law No. 4650) and in accordance with Lenders' requirements.
Nakkaş Otoyol Yatırım ve İşletme A.Ş.	Special Purpose Vehicle	■ Borrower of the Project finance ■ Development of Project design ■ Implementation of ESIA including its annexes, RAP and to ensure all social and environmental management plans are implemented by EPC Contractor in line with Lenders requirements ■ Compensation of RAP related measures in addition to those provided by KGM in response to national expropriation law. ■ Procurement of Project components ■ Management and assurance of the construction of the Project ■ Operation of the Project
REC (Rönesans Affiliate)	EPC Contractor	■ Development of Project design ■ Procurement of Project components ■ Construction of the Project ■ Implementation of environmental and social management plans
ERM & ACE	Independent international and national sustainability consulting firms engaged by Nakkaş Otoyol A.Ş.	■ Development of Scoping Report ■ Development of ESIA Report and environmental and social management plans including Stakeholder Engagement Plan (SEP)
GEM	Independent consulting firm engaged by Nakkaş Otoyol A.Ş.	Conducting land acquisition, compensation, livelihood, and resettlement related field studies to develop RAP.
ARUP	Social Advisor engaged by Nakkaş Otoyol A.Ş	Advising Nakkaş Otoyol A.Ş. regarding quality control of the project documentation.
Arkeoteknik	Cultural Heritage Advisor engaged by Nakkaş Otoyol A.Ş	■ Communication with relevant authorities regarding cultural heritage sites and chance finds. ■ Monitoring earthworks at archaeological sites Coordinating the salvage excavations with authorities when needed.

3.3 Project Design

3.3.1 Introduction

The Project is subject to the following design standards:

- **KGM Technical Specifications** – these are the underlying obligatory technical standards for all motorways of such type in Turkey, and the main ones are listed in the box below. Any intended variation to these specifications requires specific prior approval by KGM;
- **Other Turkish and international design standards and specifications** referred to by KGM in the BOT contract tender documents for the Project;
- **EC Directive 2008/96/EC [10] – Road infrastructure safety management** requires the establishment and implementation of procedures relating to road safety impact assessments, road safety audits, the management of road network safety and safety inspections by the Member States. This directive applies to roads which are part of the Trans-European road network, whether they are at the design stage, under construction or in operation.

Nakkaş Otoyol A.Ş. appointed a third-party consultant "J.B. Barry & Partner Consulting Engineers in partnership with BTY Engineering" to conduct a Road Safety Audit as required by the EC Directive.

The Road Safety Audit is consisted of four stages and the first phase of the Road Safety Audit (preliminary design phase) was conducted between June – August 2022 and the summary of the audit findings have been defined in ESIA Chapter 3.3.15. The audit findings and recommendations have been taken into account by the Project design team and integrated into the design.

The independent Road Safety Audits will continue for the remaining three stages (during the detailed design, pre-opening and early operation)of the Project, and the findings of the audits will be reviewed and required actions will be implemented by Nakkaş Otoyol A.Ş.

- **Requirements stemming from Turkish environmental and other permits and licenses** for particular Project elements (as discussed above the entire Project is exempted from the Turkish EIA requirements, but other permitting and licensing requirements are nevertheless applicable);
- **Requirements stemming from the international Lender Requirements** for environmental and other topics, including the results of this ESIA as described in the ESMMP (Annex 14); and
- **Additional standards and specifications applied by the Project designers** during the further detailed design process and design modifications, for example to incorporate environmental considerations of the ESMMP, and subject to final approval by KGM.

[10] Directive (EU) 2019/1936 of the European Parliament and of the Council of 23 October 2019 amending Directive 2008/96/EC on road infrastructure safety management

Summary of Relevant Technical Specifications

Turkish KGM Standards for Motorway Design and Construction

- Technical Specifications for Research Engineering Services (*Araştırma mühendislik hizmetleri teknik şartnamesi)*, 2005
- Technical Specifications for Motorways (*Karayolu teknik şartnamesi)*, 2006
- Technical Specifications for Engineering Services for Motorway Projects (*Otoyolu proje mühendislik hizmetleri teknik şartnamesi (ön ve kesin proje)*, 2008
- Technical Specifications for Engineering Services – Criteria Reports for Project, Drainage, Construction, Standard Motorway Details *(Otoyolu proje mühendislik hizmetleri Kriter Raporlari – Proje, Drenaj, Raporu,Yapı, Otoyol Standart Detayları)*, 2008
- Technical Specifications for Landscaping *(Otoyolu peyzaj teknik şartnamesi)*, 2008
- Technical Specifications for Landscaping – Hydroseeding *(Otoyolu peyzaj-2 Püskürtme yöntemi ile bitkilendirme (hydroseeding) teknik şartnamesi)*, 2008

Standards for Motorway Service Areas

- Manual for Maintenance and Operation for Motorway Service Areas (*Otoyollarda yolculukla ilgili hizmet tesislerinin bakim ve isletme el kitabi)*, 2006
- Technical Specifications for Maintenance and Operation of Motorway Service Areas (*Otoyollarda yolculukla ilgili hizmet tesislerinin bakim ve isletme şartnamesi)*, 2008
- Technical Specifications for Motorway Service Areas (*Otoyollarda yolculukla ilgili hizmet tesisleri teknik şartnamesi*), 2008

3.3.2 Design Codes

In addition to the above listed standards and Technical Specifications, the Project will also comply with various international design codes as set out in Table 3-3.

Nakkaş Otoyol A.Ş. is committed to comply with all measures and requirements as per KGM specifications and as set out this ESIA study and accompanying Environmental and Social Management and Monitoring Plan (ESMMP). These commitments of Nakkaş Otoyol A.Ş. will be subsequently passed on to the EPC and Sub-Contractors both during construction and operation phases via the obligations in the tender specifications and the signed contracts. Nevertheless, Nakkaş Otoyol A.Ş. will retain overall responsibility for the Project conformance.

Table 3-3 Applicable Design Codes for various Project Components

Component	Design Code	Description
Road	AASHTO ASTM Motorway Traffic Law	American Association of State Motorway and Transportation Officials American Standard Society for Testing Material Turkish Motorway Traffic Law (Karayolları Trafik Kanunu)
Bridge & Viaducts	AASHTO LRFD Bridge Design Specification 9th Edition	Standard Specifications for Motorway Bridges
Drainage	AASHTO SSHB CALTRANS	Californian Department of Transportation as auxiliary
Material	TS	For all materials Turkish Standards will be used
Steel	BS5400 AASHTO EN 10025/ EN 10113	British Standard for design and construction of steel, concrete and composite bridges used in motorways and railways European Standard for Road Tunnels, Bridges, and Other Limited Access Motorways
Electrical Equipment	CIE	Central Commission of Illumination to illuminate different structures the appropriate definitions for the CIE-115, CIE-140 were taken British standards and rules or European equivalent related to mechanical equipment.
Life and Fire Safety	NFPA 13-2003 BS PN 16	National Fire Protection Association, British standards Pipe pressure category
Seismicity	AASHTO LRFD Seismic Bridge Design Ground acceleration for earthquakes in Turkey, Disaster and Emergency Management Presidency (AFAD) maps	Motorway Bridge Technical Specifications of the American Association of State Motorway and Transportation Officials Earthquake risk index map for Turkey

3.3.3 Carriageway Design

3.3.3.1 Motorway Carriageway

The main Motorway will be of 4-lane dual carriageway with a design speed of 120 km per hour. The overall motorway width is 43 m, comprising the following elements and as shown in Figure 3-2:

- 2x 1.00 m earth extension on both side of the motorway;
- 2 x 3.00 m coated shoulder/emergency stripe;
- 2 x 4 x 3.75 m traffic lanes;
- 2 x 1.00 m inner reserve shoulders; and
- 2 x 2.50 m central reserve.

The road base will be constructed of several layers as shown in Figure 3-3 and the pavement surface of the motorway will consist of Stone Mastic Asphalt (SMA) having “Noise Absorption Feature”.

Whilst the core width of the built Motorway is 43 m, the maximum width of the RoW during construction at certain cut/valley locations will be up to approximately 165 m due to technical reasons such as cut

and fill areas which require additional land to decrease the slope inclination to prevent road safety risks (landslide, rock fall, etc.).

The overall average permanent land-take for the whole Project is a corridor of 80 m, including the safety buffers at each side of the road subject to land acquisition and compensation. The motorway will be fenced and the following restrictions will be applied within the safety zone:

- No pedestrian access;
- No construction of houses or structures; and
- No crops and permanent plantations (except for the landscaping work within Project scope).

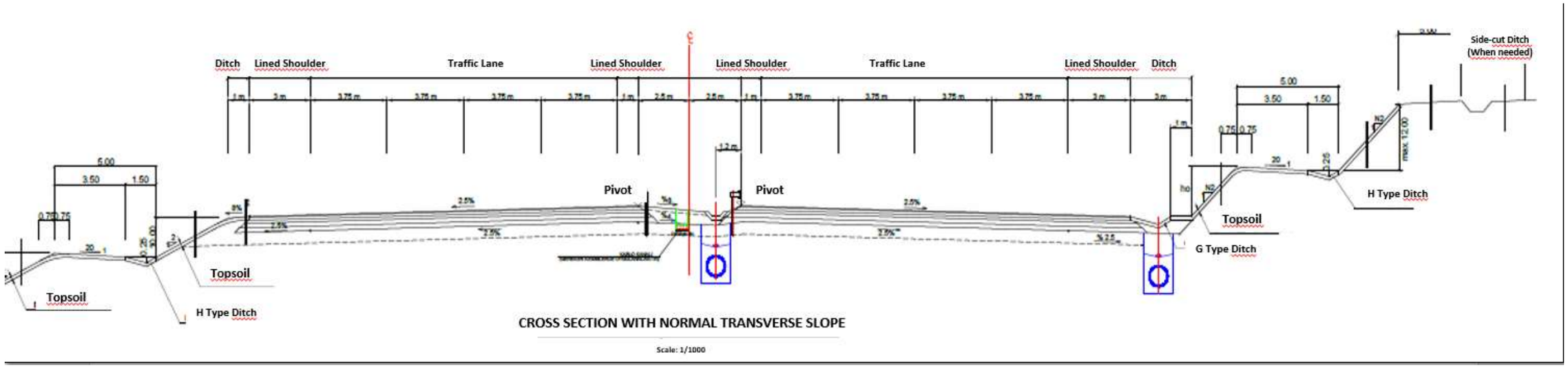


Figure 3-2 Typical Cross Section of the Motorway

Source: Rönesans

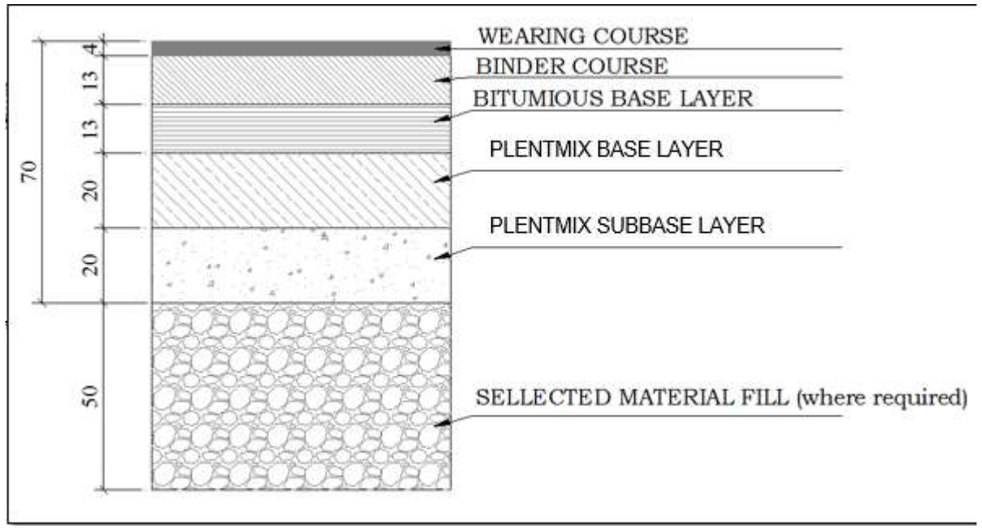


Figure 3-3 Typical Road Base

Source: Rönesans

3.3.3.2 Sazlıdere Cable Stayed Bridge Carriageway

Sazlıdere Cable Bridge will be constructed between KM 50+742 – KM 52+359 (1,619 m length in total) and the cross section over the Bridge will be 46 m long carriageway consisting of:

- 2 x 4 x 3.75 m lanes, plus 2 x 1 m outer shoulders;
- 2 x 0.5 m inner shoulder;
- Two towers with 196 meters each;
- 4.50 m emergency and maintenance walkway on both sides;
- 2 x 1.3 m stay cable supports; and
- 2 x 1 guardrail width.

A typical cross section of the carriageway and is shown in Figure 3-4 below:

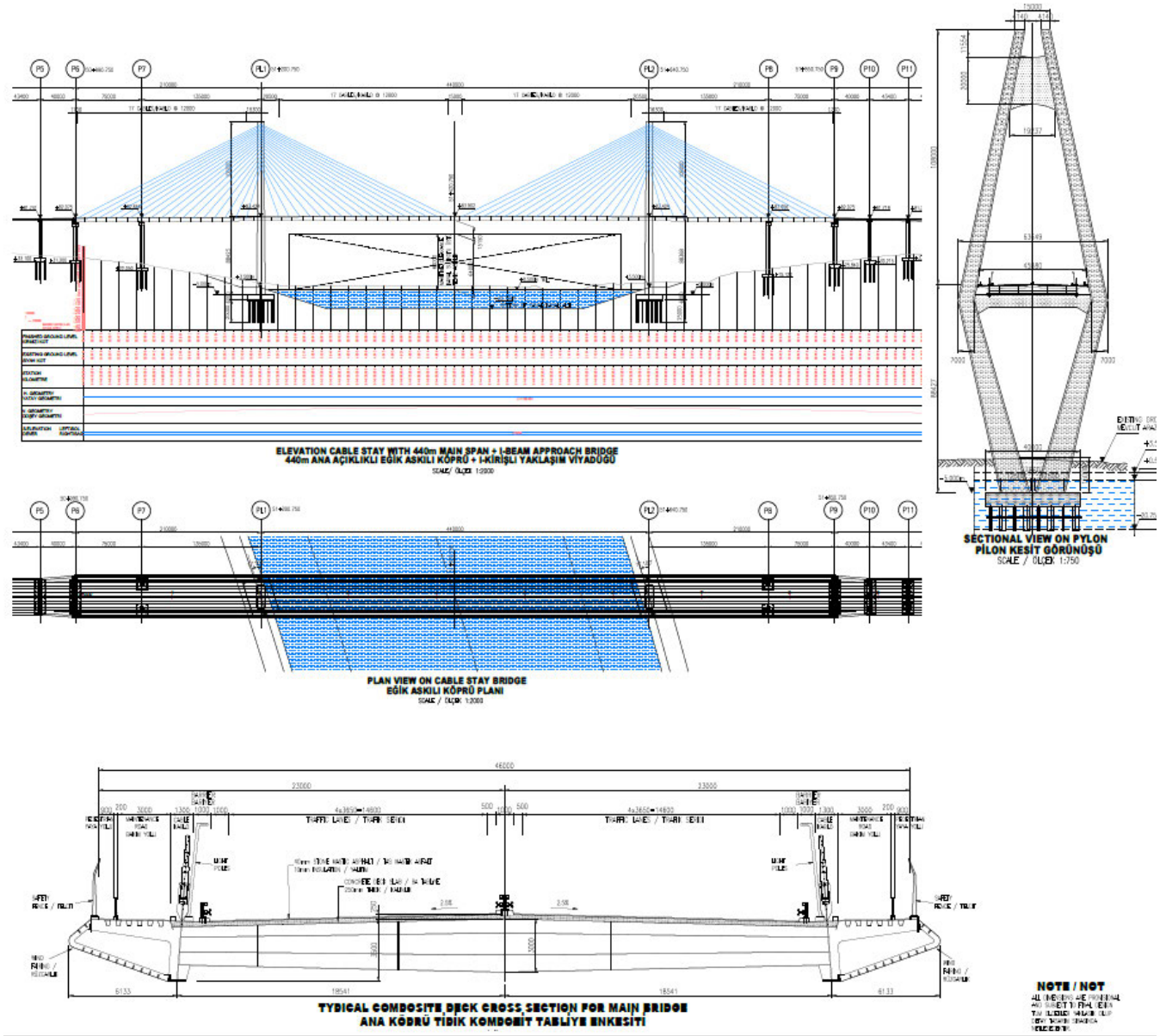


Figure 3-4 Typical Cross Section for Main Bridge

3.3.4 Viaducts

Bridges and viaducts are *the structures having a span of more than 10 meters in between any the supports of its openings over the bridge axis; constructed to provide passage over rivers, valleys, any other road or railways etc.*[11] Viaducts will be used in 5 locations where the road crosses larger elevation differences in rough terrain such as in steep valleys as listed in Table 3-4.

The following specifications will be used for viaduct designs:

- AASHTO: The American Society of State Motorway and Transportation Officials, and
- SSHB: Standard Specifications for Motorway Bridges.

Table 3-4 Viaducts along the RoW

District	Neighbourhood	KM Start	KM End	Total Width (m)	Total Length (m)
Arnavutkoy	Omerli	42+800	43+800	43.5	1,937.00
Basaksehir	Kayabasi	55+130	55+670	58.0	1,078.00
Basaksehir	Kayabasi	56+310	56+920	56.2	1,135.00
Basaksehir	Basak (Ikıtelli-1)	58+810	59+280	52.3	940.00
Basaksehir	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	3+940	4+460	26.0	931.00

Source: Rönesans

3.3.5 Interchanges

There will be 10 interchanges along the whole motorway as listed in Table 3-5. Interchange carriageways will be generally 2-lanes and design speeds will depend on the curve radius and vary from 40 to 80 km per hour. A typical interchange carriageway will have a width of 10.5 m comprising:

- 2 x 3.75 m lanes;
- 1 x 1.00 m shoulders on the right;
- 1 x 2.00 m shoulders on the left, and
- 2 x 1.00 m crash barrier strip.

Table 3-5 Interchanges along the RoW

District	Neighbourhood	Motorway KM	Interchange Name
Arnavutkoy	Hastane (Hadimkoy)	41+315	Hadimkoy
	Deliklikaya	44+930	Deliklikaya
Basaksehir	Basak (Ikitelli-1)	59+455	Basaksehir
	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	48+825	Bahcesehir
	Samlar	47+580	Bahcesehir 2
	Kayabasi	56+000	Olimpiyat
Catalca	Nakkas	36+540	Yesilbayir
Avcilar	Firuzkoy	4+205	Antikkent
		5+015	Ispartakule
Basaksehir	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	0+690	Tatarcik

[11] KGM Technical Specifications for Highways 2013[11], Page 4.

3.3.6 Underpasses, Overpasses and Culverts

Underpasses, overpasses and culverts of different diameter size are planned to ensure the free passage of farm roads, wildlife and any kind of water course beneath the Motorway. The distance between underpasses/overpasses/culverts will depend on the local land use and requirements.

Considering the approved zoning plans and existing access roads information received from IBB, all accesses in the above-mentioned areas on the south-axis axis are provided within the scope of the Project. In summary, all existing and planned crossings of the Motorway have been provided throughout the Project. These development plans have been submitted by Nakkaş Otoyol A.Ş to KGM and KGM to the Ministry of Transport and Infrastructure. Then, the Ministry of Transport and Infrastructure suspended these plans over the district municipalities and collected all objections. After the zoning plan revision was made at the necessary points, the final version of Project became clear.

Further, Nakkaş Otoyol A.Ş. may provide additional underpasses if necessary (based on the stakeholder engagements) to ensure that no severance will occur.

The locations of the underpasses and overpasses along the RoW are shown in Figure 3-5, and the further details of the underpasses, overpasses and culverts are listed in Table 3-6, Table 3-7 and Table 3-8.

Table 3-6 List of Underpasses

No.	Neighbourhood	Motorway KM	Location
1	Hastane (Hadimkoy)	39+848	Main Road
2	Hastane (Hadimkoy)	41+299	K02 Hadimkoy Intersection
3	Hastane (Hadimkoy)	41+299	K02 Hadimkoy Intersection
4	Omerli	42+704	Main Road
5	Kayabasi	54+176	Main Road
6	Basak (Ikıtelli-1)	57+480	Main Road
7	Basak (Ikıtelli-1)	58+325	Main Road
8	Basak (Ikıtelli-1)	58+562	Main Road
9	Basak (Ikıtelli-1)	59+366	Main Road
10	Nakkas	36+541	K01 Yesilbayir Intersection
11	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	0+536	Bahcesehir Connection Road / K09 Tatarcik Intersection
12	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	0+685	Bahcesehir Connection Road / K09 Tatarcik Intersection
13	Firuzkoy	1+337	Bahcesehir Connection Road / K09 Tatarcik Intersection
14	Firuzkoy	4+144	Bahcesehir Connection Road / K10 Antikkent Intersection
15	Firuzkoy	4+126	Antikkent Intersection
16	Firuzkoy	4+385	Antikkent Intersection
17	Arnavutköy	45+164	Deliklikaya Intersection
18	Arnavutköy	45+179	Deliklikaya Intersection

Source: Rönesans

Table 3-7 List of Culverts

No.	Neighbourhood	Motorway KM	Location
1	Hastane (Hadimkoy)	38+033	Main Road
2	Hastane (Hadimkoy)	38+480	Main Road
3	Hastane (Hadimkoy)	38+902	Main Road
4	Hastane (Hadimkoy)	39+883	Main Road
5	Hastane (Hadimkoy)	40+127	Main Road
6	Hastane (Hadimkoy)	40+495	Main Road
7	Omerli	41+846	Main Road
8	Yesilbayir	40+993	Main Road
9	Hastane (Hadimkoy)	41+299	Hadimkoy Intersection
10	Hastane (Hadimkoy)	41+299	Hadimkoy Intersection
11	Hastane (Hadimkoy)	41+299	Hadimkoy Intersection
12	Omerli	42+445	Main Road
13	Omerli	44+650	Main Road
14	Sazlibosna	45+179	Deliklikaya Intersection
15	Sazlibosna	45+179	Deliklikaya Intersection
16	Sazlibosna	46+021	Main Road
17	Sazlibosna	46+847	Main Road
18	Samlar	48+947	Bahcesehir Koprulu Intersection
19	Samlar	49+481	Main Road
20	Samlar	49+682	Main Road
21	Basaksehir	53+296	Main Road
22	Kayabasi	53+862	Main Road
23	Kayabasi	54+179	Main Road
24	Basaksehir (Ikitelli-2)	57+171	Main Road
25	Basaksehir (Ikitelli-2)	57+360	Main Road
26	Basaksehir (Ikitelli-2)	57+552	Main Road
27	Basaksehir (Ikitelli-2)	57+821	Main Road
28	Nakkas	36+411	Main Road
29	Nakkas	0+466	Yesilbayir Connection Road
30	Nakkas	1+035	Yesilbayir Intersection
31	Nakkas	1+035	Yesilbayir Connection Road
32	Nakkas	1+224	Yesilbayir Intersection
33	Nakkas	1+224	Yesilbayir Intersection
34	Nakkas	1+224	Yesilbayir Intersection
35	Nakkas	1+224	Yesilbayir Intersection
36	Nakkas	1+224	Yesilbayir Intersection
37	Nakkas	1+224	Yesilbayir Intersection
38	Nakkas	36+541	Yesilbayir Intersection
39	Nakkas	36+541	Yesilbayir Intersection

No.	Neighbourhood	Motorway KM	Location
40	Karaagac	7+239	Karaagac Intersection
41	Tahtakale (Ispartakule)	1+337	Tatarcik Intersection
42	Tahtakale (Ispartakule)	1+337	Tatarcik Intersection
43	Tahtakale (Ispartakule)	1+337	Tatarcik Intersection
44	Firuzkoy	4+522	Bahcesehir Connection Road
45	Firuzkoy	1+706	Bahcesehir Connection Road
46	Firuzkoy	1+125	Bahcesehir Connection Road
47	Firuzkoy	1+300	Bahcesehir Connection Road
48	Sazlibosna	46+494	Main Road
49	Sazlibosna	47+513	Main Road
50	Samlar	48+152	Main Road
51	Firuzkoy	4+159	Antikkent Intersection
52	Firuzkoy	4+159	Antikkent Intersection
53	Firuzkoy	4+159	Antikkent Intersection
54	Firuzkoy	4+159	Antikkent Intersection
55	Firuzkoy	4+159	Antikkent Intersection

Source: Rönesans

Table 3-8 List of Overpasses

No.	Neighbourhood	Motorway KM	Location
1	Hastane (Hadimkoy)	39+602	Main Road
2	Hastane (Hadimkoy)	40+699	Main Road
3	Hastane (Hadimkoy)	41+297	K02 Hadimkoy Intersection
4	Hastane (Hadimkoy)	41+431	K02 Hadimkoy Intersection
5	Ömerli	41+872	Main Road
6	Deliklikaya	45+274	K03 Deliklikaya Intersection
7	Deliklikaya	44+436	Main Road
8	Sazlıbosna	47+453	Main Road
9	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	48+602	K04 Bahcesehir Intersection
10	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	48+602	K04 Bahcesehir Intersection
11	Samlar	48+936	K04 Bahcesehir Intersection
12	Kayabasi	52+981	Main Road
13	Kayabasi	54+896	Main Road
14	Kayabasi	55+767	K05 Olimpiyat Intersection
15	Basak (Ikıtelli-1)	57+998	Main Road
16	Nakkas	36+000	Main Road
17	Nakkas	37+273	Main Road
28	Firuzkoy	3+118	Bahcesehir Connection Road

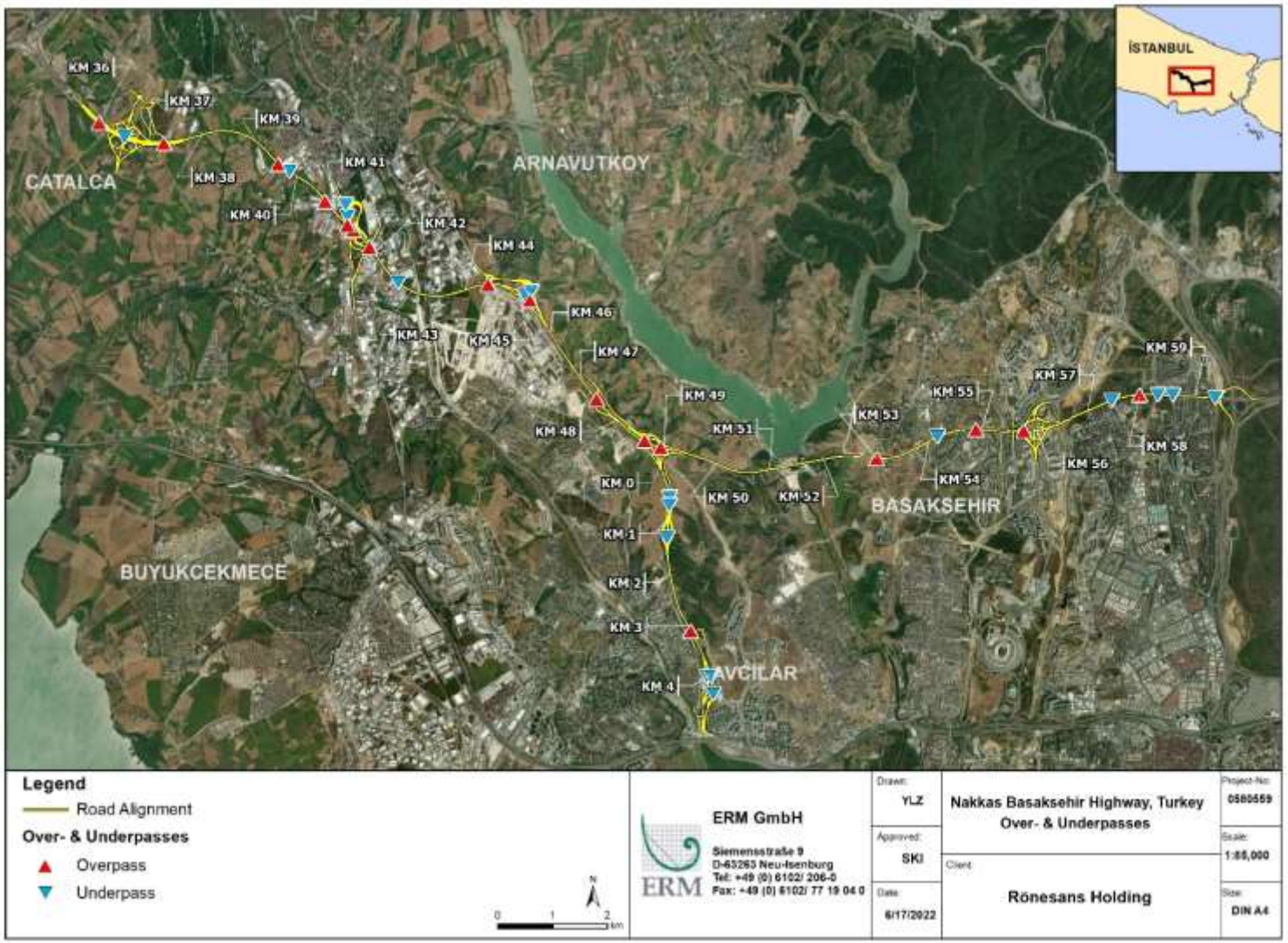


Figure 3-5 Map of the Project's Over & Underpasses

3.3.7 Retaining Walls and Mechanically Stabilized Earth Walls

Retaining walls and Mechanically Stabilized Earth (MSE) walls will be built in sections of the motorway to ensure soil and slope stability and the prevention of rock fall. Current investigations conducted by Nakkaş Otoyol A.Ş. design team showed that approximately 10 km retaining walls and MSE walls in total will be needed along the whole motorway.

3.3.8 Toll Booths

The number of toll booths has not been specified at the current stage. Preference will be given to hybrid / free pass system (an open system with cameras instead of a closed system with barriers), in order to avoid vehicles slowing and stopping at the tolls.

3.3.9 Service Stations and Rest Areas

There are no service stations/rest areas planned as part of the existing road design. If in future, there are any design changes or other factors which will require service stations/rest areas to be constructed, these will be thoroughly evaluated by Nakkaş Otoyol A.Ş. as per the Design Change Management Procedures (Annex 1) and appropriate mitigation measures will be employed. Aspects such as all vulnerability and gender topics will be considered during design and operations of the service stations/rest areas as well as other ES issues as per PR (e.g. disability access, EV charging provision, etc).

Corresponding documentation will be prepared to supplement the ESIA in line with Turkish regulations and Lender's standards, and – depending on the type and location of impact – will be available for review by the affected public.

3.3.10 Drainage

The drainage of roads is necessary to remove surface and subsurface waters without damaging the sub- and super-structure of the road and to provide a safe traffic flow. Therefore, a drainage system will be created consisting of ditches, canals, pipes, manholes and discharge structures.

3.3.10.1 Motorway Drainage

The hydraulic design of the motorway will be in accordance with AASHTO Motorway Drainage Principles with drainage designed to remove surface and subsurface waters without damaging the sub- and super-structure of the road and to provide for safe traffic flow. The groundwater level in roadbeds will be at least 150 cm below ground level to ensure an efficient drainage system, and adequate subsurface drainage will be provided for achieving this depth if necessary.

The drainage system will ensure the following:

- safe and fast removal of surface water from the road;
- collection of water coming from the median and side slopes to prevent water entering the motorway;
- retaining water from nearby land before entering the motorway;
- controlling groundwater levels to prevent the softening of subsurface layers below the motorway (which may lead in winter to frost shattering due to penetrating water);
- collection of water infiltrating through the pavement; and
- controlling groundwater level to maintain slope stability.

These functions will be handled with two different systems, surface drainage and subsurface drainage:

- Surface drainage conveys rainfall water via the drainage system structures from the road surface or adjacent land to a suitable river. This is a routine operation for keeping the road operating safely.

The drainage elements to be used in this system include different types of ditch and asphalt kerb, collecting pipe and cross discharge structures.

- Subsurface drainage aims to quickly remove rainfall water from the road by a suitably graded slope in grading and by drainpipes under the surface at drainage ditches on the road edges and median. The collected drainage water is then conveyed to collecting pipes (or if possible, directly) to the point of discharge at nearby suitable stream or river.

3.3.11 Lighting and Electrical Supply

The majority of the Motorway will have no lighting; however, lighting will be provided for the following facilities:

- Sazlıdere Cable Stayed Bridge;
- Interchanges; and
- toll plazas (if any).

All electrical applications will be powered by local electricity supply. In case of a power cut of the local electricity supply, power for the bridge will be provided from diesel generators.

Two different energy centres will be built at the base of each pylon of the bridge and each energy centre will include one generator to be at the level of 400 KW.

All lighting systems will be in accordance with the International Commission of Illumination (CIE).

3.3.12 Traffic Management Systems

The traffic control system will consist of traffic lights, Closed Circuit Television (CCTV), traffic direction matrices (MTS), traffic velocity matrices (VTS), and variable message signs (VMS) like warning flashers, billboards for road information, and road blocking barriers.

Automated systems and communication links will be used for obtaining, recording and reporting for traffic flow, weather and road conditions, as well as traffic incidents.

3.3.13 Overhead Transmission Lines (OHTLs)

Some portions of the OHTLs require displacement whilst some will need design changes as summarized in Table 3-9 Overhead Transmission Lines and presented in Figure 3-6.

Table 3-9 Overhead Transmission Lines

Location	Activity	Status as of December 2022
KM 54+000 – KM 59+000	Displacement Works	Completed
KM 49+500	Re-design and Heightening Works	Not started
Bahcesehir Connection Road	Re-design and Heightening Works	Not started

Activities related with OHTLs may have the following key potential environmental, social, health and safety impacts during construction and operation stages. Further details with regard to impacts and mitigation measures of OHTLs are provided in following chapters and in ESMMP as listed in Table 3-10.

Table 3-10 Key Potential Impacts of OHTLs (Construction and Operation)

Subject	Potential Impacts	Relevant ESIA Chapters
Land Use	■ Impact on land use between Km 54+000 – Km 59+000 ■ Limited access to the area under the towers between Km 54+000 – Km 59+000 ■ Damages to existing structures and properties between Km 54+000 – Km 59+000. ■ Disruption in services.	■ Chapter 4.4.8.2 ■ Chapter 6.3.2.2
Landscape and Visual	■ Impacts on viewers, namely residents of dwellings between Km 54+000 – Km 59+000. ■ Loss of value of the impacted household and businesses structures between Km 54+000 – Km 59+000.	■ Chapter 6.1.8
Community Health and Safety	■ Passage of high voltage and potential health effects due to electric-magnetic field between Km 54+000 – Km 59+000. ■ Noise from OHTL due to Corona effect between Km 54+000 – Km 59+000. ■ Risk of tower failures. ■ Risks to public during tower parts stringing activities.	■ Chapter 6.3.4
Occupational Health and Safety	■ Risk of tower failure resulting in occupational accidents. ■ Accidents during tower erection (working height). ■ Working with live power lines.	■ Chapter 6.3.3
Biodiversity	■ Disturbance to Flora and Fauna at Km 49+500 and at Bahcesehir Connection Road. ■ Birds roosting or nesting on transmission towers and lines and risk of electrocution of threatened species.	■ Chapter 6.2.4
Waste	■ Pollution due to scrap materials (towers and cables) generated by removal of the existing OHTLs.	■ Chapter 6.1.5

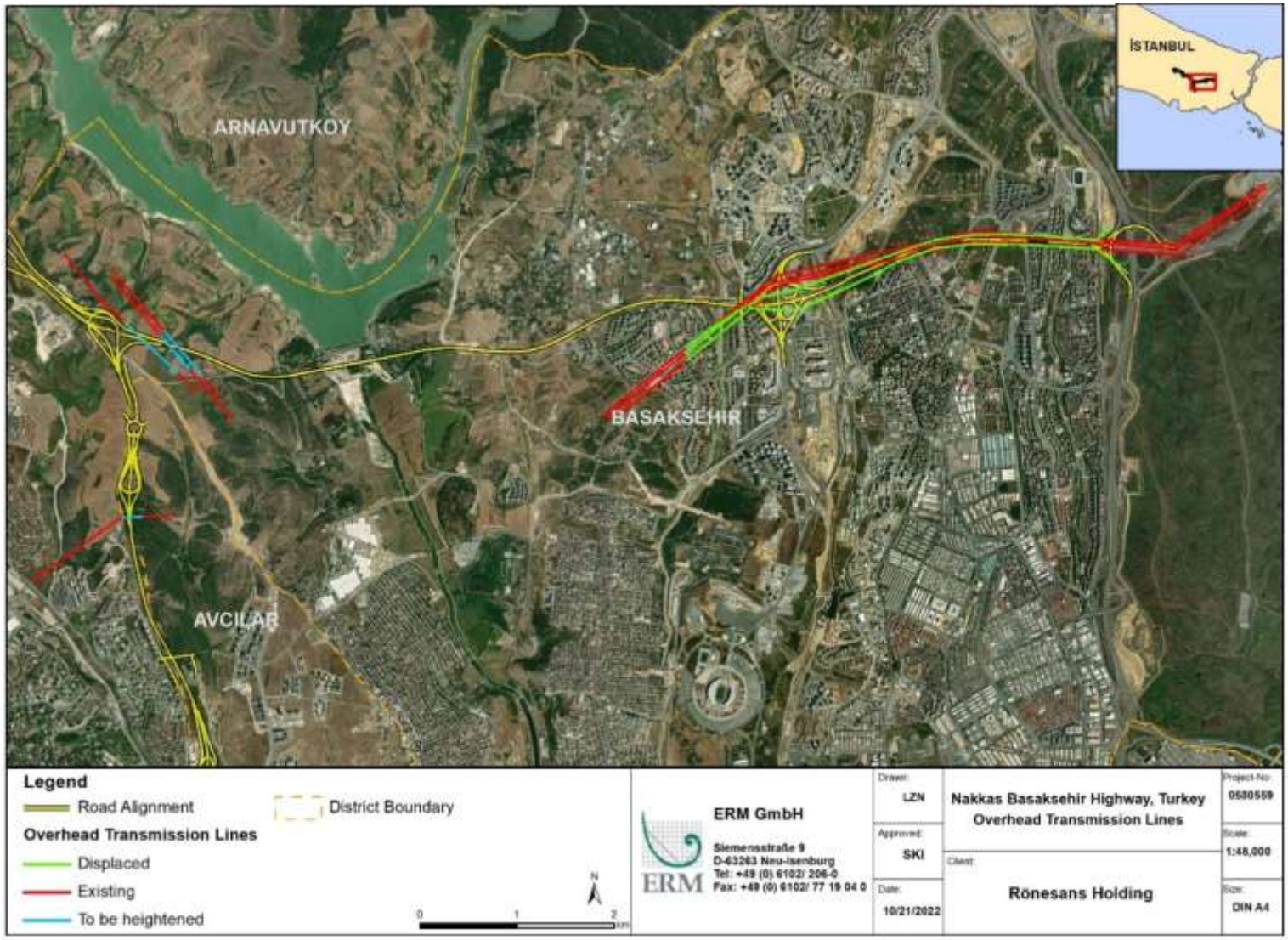


Figure 3-6 Status of Overhead Transmission Lines

3.3.14 Design Changes Considering Environmental & Social Aspects

The BOT Contract signed between the KGM and Nakkaş Otoyol A.Ş. on 13 April 2021 was based on the Project route and design approved by the KGM at the BOT tender phase.

Following the execution of the BOT Contract and having Design Workshop with ESIA team in July 2021; Nakkaş Otoyol A.Ş. Project designers have made some modifications in the route alignment, in design and construction methodologies to avoid or minimize the potential environmental and social aspects in line with international E&S standards and best practices.

These design changes and modifications are summarized in Table 3-11.

Table 3-11 Design Changes to the Project to Avoid or Minimise E&S impacts

Subject	Design Change and Modifications	Positive E&S Impacts of the Design Change
KM 59 – Campsite	Construction of Campsite at KM 59 has been cancelled	■ Decrease in land take ■ Decrease in land disturbance ■ Decrease in environmental disturbance ■ Decrease in interaction of the workers with the community
Design Change at Yesilbayir Connection Road	Yeşilbayır Connection Road has been completely removed in the Final Design.	■ Avoidance of Büyükçekmece Important Bird Area (IBA) ■ Significant decrease in land take ■ Significant decrease disturbance on agricultural lands ■ Decrease in civil works ■ Decrease in usage of construction materials ■ Decrease in carbon emission ■ Decreasing civil works, construction materials, carbon emission and expropriation

Subject	Design Change and Modifications	Positive E&S Impacts of the Design Change
Toll Systems	Using hybrid / free pass system (an open system with cameras instead of a closed system with barriers), which avoids vehicles slowing and stopping and thereby reducing carbon emissions	■ Reduced waiting time ■ Decrease in congestion and traffic jam ■ Decrease in carbon emission ■ Improved service quality for users and reduced electricity consumption (single toll plaza consumes 8,500 kWh/month, and unlighted gantry 5,500 kWh/month)
O&M Centres	■ Using solar panels[12] with glass overlay in the O&M centres which would allow generating clean energy from the sun. ■ Harvesting rainwater for sanitary usage within the O&M centres and recycling for reuse.	■ Decrease in carbon emission ■ Efficient management of natural resources
	Using Supervisory Control and Data Acquisition (SCADA) and Building Management System (BMS) systems to manage all electrical and mechanical systems at the O&M centres which would reduce water and energy consumptions compared to manually controlled systems.	■ Efficient management of natural resources
Road Strip Painting	Using road striping paints made from soy oil rather than petroleum and using a low-Volatile Organic Compound (VOC) option for striping parking lots and roads (subject to the Guarantor's assessment whether that it complies with quality standards under specification requirements).	■ Decrease in air pollution
Lighting	Replacing c. 2.500+ sodium lights with LEDs (incl. temporary lights during construction and permanent lights within the scope of the project) which would reduce energy consumption by c. 37.5 % (20+ MW) during the project lifetime. This would also have advantages in terms of lifecycle and replacement bulbs required as the lifetime for LEDs are approximately six times more than those of sodium lights. The following measures will be subject to illumination calculation results and external approval by KGM.	■ Reduce energy consumption ■ Reduce bulb consumption and bulb wastes
Asphalt	Usage of Stone Mastic Asphalt which has the following advantages in comparison with conventional asphalt types such as noise absorption, less hydroplaning, good low temperature performance, slow aging and durability to premature cracking of asphalt, stability against permanent deformation (rutting) and high wear resistance.	■ Noise reduction ■ Resilience to Climate Change (high temperatures) ■ Increased road safety

[12] Since the capacity of the solar panels planned to be used during the operation period is less than 5 MW, https://techselector.com/turkey-en/ has been checked and it has been confirmed that the potential PV supplier is in the approved GTS list. Prior to contracting stage, the supplier will be checked again on against labour risks to ensure they are compliant with the Lenders' requirements and has high E&S and quality standards in line with the Supply Chain Management Plan during bidding process.

Subject	Design Change and Modifications	Positive E&S Impacts of the Design Change
Plan and Profile Alignment Change all along the RoW	Plan and profile of alignment have been changed to reduce large amount of excavation	■ Decrease in storage of dump material ■ Decrease in expropriation
Underpasses and Overpasses	Underpasses and overpasses have been changed according to the updated city development plans and based on the stakeholder feedback as defined in Chapter 3.3.6. Provision of lighting at underpasses (where the underpasses serve also for pedestrian crossings)	■ Compliance with city development plans ■ Safe passage for pedestrians and vehicles ■ Secure passage considering the potential risks related with Gender Based Violence and Harrassment
Plan and Profile Alignment Change all along the RoW	Edge of motorway platform have been re-designed with retaining wall instead of cut and fill slope	■ Decrease in damage to current infrastructures and buildings ■ Decrease in expropriation
Piling Method	Piling activities will be carried out by the bored pile method instead of vibrex method which creates disturbance and vibration in the ground. The piles will work as friction piles, and only drilling will be done on weak, loose ground without entering the solid rock.	■ Avoidance of vibration
Re-Use of Excavation Material	Excavated materials from the earthworks with suitable quality will be reused (app. 47 % of the excavated materials) as fill material in road construction works. This will minimise the land to be required for the storage of excavated materials and amount of material to be extracted from external borrow sites.	■ Decrease in land take ■ Decrease in environmental disturbance ■ Decrease in amount of aggregates supply
Interchange Design Change at KM 41+300	Hadımköy interchange has been changed according to the current infrastructures and industrial facilities. The original design was complex with 8 different connections which was not able to provide compliance with superelevation in the motorway. In addition, the original design would require the demolishment of of bread factory located in the interchange. Design team revised the design by reducing number of connections.	■ Avoidance of demolitions of current infrastructures and industrial facilities ■ Avoidance of demolishing bread factory ■ Improving the road safety by complying with superelevation
Interchange Design Change at KM 44+930	Deliklikaya Interchange has been shifted towards north to minimise the amount of excavation at this location and connect the Motorway to an existing road for improved access to the Deliklikaya Industrial Region.	■ Decrease in land take ■ Decrease in excess excavated material and decrease in dumpsite area requirements ■ Improved accessibility to the Deliklikaya Industrial Region for future expansions.
Interchange Design Change at KM 48+825; 0+690 (Bahçeşehir Connection Road)	The location of the Tatarcık Interchange has been shifted towards north to improve accessibility of the interchange.	■ Improved accessibility

Subject	Design Change and Modifications	Positive E&S Impacts of the Design Change
Design Change at KM 48+825; 3+000 (Bahçeşehir Connection Road)	The multi-storey residential building complex at around KM 3+000 have been avoided.	■ Avoidance of demolitions of multi-storey residential building complex
Design Change at KM 48+825; 4+000 – 5+000 (Bahçeşehir Connection Road)	The modifications in this part have been made to consider the traffic intensity and flows from different directions. The existing TEM Motorway infrastructure has been considered for the optimisation of operational traffic. This change has also avoided the Ancient City of Spradon.	■ Avoidance of traffic interruptions on TEM road during construction. ■ Avoidance of impacts on cultural heritage (Ancient City of Spradon)
Plan and Profile Alignment Change KM 51+400	Plan and profile of cable stayed bridge have been changed and length of the bridge was reduced.	■ Decrease in civil works, ■ Decrease in usage of construction materials ■ Decrease in carbon emission
Design Change at KM 54+500	Edge of motorway platform have been redesigned with retaining wall instead of slope cutting which was affecting the public park.	■ Consideration of the grievances and feedback of residents in design ■ Avoidance of demolitions of current parking/resting area and facilities.
Design Change at KM 59+000	The viaduct has been designed as balanced cantilever bridge instead of conventional viaduct with large amount of columns causing unsightly view and occupation of green field.	■ Decrease in amount of viaduct columns ■ Decrease in social impact ■ Decrease in land take
Design Change at KM 59+000	'Installation of noise barrier on the viaduct[13].	■ Decrease noise and light at residential buildings which are very close to the viaduct.

[13] Additional noise barriers will be needed at other sections of the RoW as detailed in “Chapter 6.1.7 Noise and Vibration”

3.3.15 Design Safety Audit

Nakkaş Otoyol A.Ş. appointed J.B. Barry & Partners, in partnership with BTY to conduct Road Safety Audit (RSA) in accordance with the requirements of EU Directive on Road Infrastructure Safety Management (Directive 2008/96/EC).

The summary of the audit findings[14] and further actions agreed to be considered during detailed design of the Project are presented in Table 3-12 Design Safety Audit Findings and Further Actions

Table 3-12 Design Safety Audit Findings and Further Actions

Subject	Audit Finding	Further Actions by Nakkaş Otoyol A.Ş. Design Team
Mainline Speed Limit	A design speed of 120km/h is currently proposed for the mainline. It is understood that the national speed limit will be increased for motorways up to a maximum of 140km/h. It is unclear how this speed limit will be applied to the proposed scheme. The Audit Team are concerned that the geometry of this motorway is designed for a design speed limit of 120km/h, the proposed geometry may not support higher vehicle speeds than this design speed The likelihood and severity of all single and multiple vehicle collisions is greatly exacerbated by higher speeds increasing the risk of fatality.	In the letter submitted by KGM, it is requested to increase the operating speed in the sections that provide the 140 km/h design speed on the BOT highways. In parts that do not provide 140 km/h operating speed, 130 km/h or 120 km/h speed limit traffic signs are requested. An official letter is being prepared to be submitted to KGM regarding the possibility that the operating speed cannot be increased to 140 km/h for KMO8. In this letter, it is briefly explained why the operating speed of the highway cannot be increased to 140 km/h and which standards the current design has. As a result, 140 km/h design speed will not be followed in motorway design.
Safety Barrier Design in Median	The Audit Team have concerns regarding the performance and containment level of median safety barrier. The location and performance of the safety barriers in the median needs to have consideration for the available width, the positioning of ancillary elements, in particular lighting columns and signage, and at structures. Failure to allow for the above parameters could result in an increase in the severity of collisions.	Based on KGM standards, double-faced barriers are only used in barriered toll station areas. The design speed is reduced to 30 km/h with appropriate traffic signs in these areas. As a result, considering low speed in this specific area, there is no major risk in terms of RSA.
Roadside Hazards	The Auditors are concerned that roadside features, including safety/crash barriers, lighting columns and signage columns, present a significant hazard to vehicles who leave the road.	Nakkaş Otoyol A.Ş. will adopt the philosophy of Forgiving roadsides in Motorway design will be followed as much as possible without any conflict with local standards. The number of posts and guardrails will try to be minimized during the Detailed Design Stage. Note that, guardrail types are defined according to EU standards and deflection space is considered during the design. All guardrails are EU certified and their performance are proved by collision test.
Operational Maintenance	Locations and means for maintenance personal to safely access the median is unclear. It is important that the future operational maintenance requirements for the proposed motorway scheme are identified prior to progression of the detailed design. Failure to design now for the future maintenance required could result in collisions between maintenance personnel / vehicles and high-speed motorway traffic.	In detailed drainage project design phase, rainwater will not be carried by collector pipes in the median area as much as possible. Design studies are carried out to keep the need for maintenance at a minimum level and to comply with KGM standards during the operation phase. The design team will provide information and documents about the project to the maintenance-operation team.

[14] Stage 1 Road Safety Audit Report, J.B. Barry & Partners, in partnership with BTY

Subject	Audit Finding	Further Actions by Nakkaş Otoyol A.Ş. Design Team
		Maintenance vehicles can park in the median emergency barrier areas during especially low traffic volume times. Then, maintenance team can do periodic clean works. Design confirmation will be taken from O&M team before detailed design completed.
Roadside Advertisement	Observations during the site visit indicate that advertising hoardings are a feature alongside some existing roads. The Audit Team have concerns that the advertising structures along the proposed motorway present a hazard and the advertising is a distraction to drivers.	According to KGM requirements, commercial advertisement signs will be located at least 200m distance with a traffic signs in order to prevent distraction of drivers. In general, the pole height of advertisement panel is at least 10m from the ground and they located at cut areas rather than near shoulder lane.
Toll Collection Stations	Barrier-controlled toll collection system will be adopted at a number of the Toll Stations. Toll barrier systems require vehicles to stop to pay toll and will affect traffic speed and capacity on the motorway network. This disruption to traffic flow is likely to lead to greatly increase the number of rear end shunt type collisions and other road safety issues arising traffic queues and variance in speed of vehicles approaching the toll stations.	Barriered toll collections are necessary at specific points on Motorway due to operational and financial reasons. There are 2 barriered toll collections on Main Road and 1 barriered toll collection on connection road. The other 4 barriered toll collections are on the ramp of intersection where the design speed is lowered considerably. The rest of tolls are free flow type. Note that, the number of toll lanes is calculated according to the traffic volume in order to avoid traffic congestion in the barriered toll station areas. By means of new technology vehicle passing through the toll plaza becomes faster than conventional types.
Combined Diverging / Emerging Lengths (K01 & K05)	Auxiliary acceleration/ deceleration lanes separate from the mainline traffic are proposed to facilitate merging and diverging at interchanges. If high volumes, and/or if vehicles are travelling at high speeds (maintain motorway mainline speeds), while using these auxiliary lanes, it may create a dangerous environment with conflicting weaving patterns. i.e. an overlap occurs between vehicles decelerating on exiting the motorway and vehicles accelerating on entering the motorway. There is a high risk of collision along these weaving sections of road where drivers are required to look ahead, to the side and behind in order to merge/diverge with adjacent traffic safely.	The typical problem for cloverleaf intersections is mentioned. However, in order to overcome this problem in the KMO8 project, a service road parallel to the main road was designed for the entrances and exits in the intersection area during the preliminary design phase. Service roads are separated from the main road with barriers. The design speed on service roads is 70 km/h.
Interim layout for Yeşilbayir Interchange (K01)	The proposed Yesilbayir Interchange is to be constructed as part of the proposed motorway however the proposed link road to the south will not be constructed at this time - consequently part of the interchange will not be operational when the motorway is opened. There is a danger of driver confusion if this provisional link is designed for in the short-term resulting is possible collisions.	A two-stage permanent traffic sign and marking project will be prepared in the detailed design phase. In the first stage, traffic detailed projects will be prepared according to the situation where the southern part of Yeşilbayır Connection Road is not constructed. In the second phase, traffic detailed projects will be prepared according to the situation where the TEM connection of the Yeşilbayır Connection Road is completed.

Subject	Audit Finding	Further Actions by Nakkaş Otoyol A.Ş. Design Team
Şehir Hastanesi (City Hospital) Interchange (K05)	Some of the radii on the slip road loops to/from the mainline appear to be very tight and may lead to sudden reduction of speed with subsequent excessive braking. There is also a risk of high body vehicles over- turning or some vehicles veering off the carriageway or into an adjacent lane. There is also a risk of wide HGV's encroaching onto the adjacent lane whilst negotiating the loop and striking another vehicle or roadside features.	The radius of the junction loops cannot be increased in order to provide access to all directions within the expropriation boundary. Traffic safety will be provided for drivers in the intersection area with appropriate traffic markings and signs. The lane width has been increased in the detailed design projects for narrow horizontal curves and each lane width is 4.25 m in accordance with KGM specifications. Horizontal alignments are appropriate for the design speed.
Antikkent Interchange (K042)	At two locations, the Design Team has increased the vertical alignment from the nominal maximum of 5.0% to +7.7% on the K3 ramp and to -6.5% on the K4 ramp at the Antikkent interchange and to 6.5% at the Bahçeşehir Connection Road. The Audit Team are concerned that excessive steep vertical gradients could lead to an increase in collisions especially where they coincide with horizontal curvature.	Many different types of interchange, related to Antikkent region, have been designed and submitted to KGM during the preliminary design phase. Since there are several constraints (such as existing road connections etc.) that have to be considered in the design, some parameters slightly exceeded the standard limits. After studying several alternatives, KGM has chosen the most advantageous directional type considering traffic circulation. As a result, KGM accepted steep vertical gradients in this region. That's why the gradients remain substandard. Traffic safety mitigation will be provided with appropriate traffic signs and markings (speed limit signs, rumble strip, etc.) during the detailed design phase.
Toll Station Locations (K05 and K04 - K042)	It is proposed to locate a toll station in close proximity to a change in horizontal alignment at 2 locations (at Ch 54,000 near the Şehir Hastanesi Interchange (K05) and at Ch 200 between the Bahcesehir (K04) and Tatarcik Interchanges (K41)). This change the horizontal alignment may hinder forward visibility at a location where vehicles will be decelerating and may need to come to an abrupt stop if there is queuing in advance of the toll. There is a possibility that an approaching driver travelling at speed may not see or expect a queue to develop on the mainline especially if they are behind a high-sided vehicle. This increases the risk of 'rear-end' type collisions.	The minimum required stopping sight distance is provided at every point of the highway according to the AASHTO and KGM standards. The horizontal and vertical design of the highway is prepared in such a way that the driver can stop without any damage when encountering any obstacle. In addition, there will be traffic signs indicating that drivers must slow down for the barrier toll station.
Proximity of Toll Station to Interchange	For northbound vehicles, the toll between Tatarcik (K4) and Bahcesehir (K04) Interchanges is located approximately 500m after the merge of the slip road from Tatarcik (K4). The proximity of the slip lane and the toll results in potential conflict during weaving / merging manoeuvrers between vehicles merging and vehicles on the mainline slowing and changing lane ahead of the toll plaza. This increases the risk of 'rear-end' and 'side swipe' type collisions.	According to KGM standards, the distance between the physical and geometric nose is 115 meters. The distance between the geometric nose and barrier is 500 meters. The required minimum stopping sight distance is provided based on design speed of connection road and K4 ramp.

Subject	Audit Finding	Further Actions by Nakkaş Otoyol A.Ş. Design Team
Pedestrian Facilities on Local Road Network	The Audit Team have concerns about the lack of pedestrian facilities on local roads where a diversion or connection to the existing local road network is required. Inadequate and inappropriate pedestrian facilities, including narrow footpaths, lack of suitable crossing points, inappropriate use of tactile paving, result in a risk of pedestrian being struck by vehicles.	Design of the side roads is the responsibility of the Municipality, but the recommendations will be considered where possible in the development of the detailed design.

3.4 Construction

This chapter provides further information on the following aspects of construction:

- Project Activities;
- Project Schedule;
- Associated Facilities;
- Temporary Construction Facilities;
- Existing Utilities (sewage, water, electricity);
- Type and Number of Construction Vehicles and Equipment;
- Working Hours during construction; and
- Employment during construction.

3.4.1 Project Activities and Schedule

The Project activities are split into following two main phases as indicated in Table 3-13 and are planned to be conducted in line with the Project Schedule presented in Figure 3-8.

Early construction works started in August 2021. However, Nakkaş Otoyol A.Ş paused all construction activities (earthworks, relocation works, structures etc.) as of April 2022 and proceeded with the construction of “Cable Stayed Bridge Piers” and “Viaduct Piers” which did not require any further land take until September 2022. In September 2022, Nakkaş Otoyol A.Ş decided to pause all Project activities including construction of piers and demobilized a significant number of subcontractors.

The Project aims to restart the construction works by end of 2023 and complete the construction in three years. The locations where the early construction activities are carried out as of May 2022 is presented in Figure 3-7.

The Table 3-13 below provides the progress update on critical project activities as of July 2023.

Table 3-13 Project Phases

Phase	Tasks	Status
Pre-Construction Phase	ESIA studies	Completed
	Project Design Works	Ongoing
	Soil Surveys	Completed
	Drilling Works	Completed
	Surveying Works	Completed
	Development and Implementation of Resettlement Action Plan	Completed
	Land Consent and Lease Process in Accordance with the Turkish Expropriation Law and Lenders requirements	Ongoing
	Mobilization	Completed
Construction Phase	Stayed Cable Bridge Works	Paused
	Engineering Structures	Paused
	Earthworks	Paused
	Pavement	Not started
	Secondary Works (Electromechanical, Landscape, Signage, Guardrail, Fencing)	Not started
	Test and Commissioning	Not started

As per the current Project schedule, expropriation of affected parcels by KGM in line with the Expropriation Law is targeted to be completed by Q4 2024. RAP implementation has started with key items (e.g. identification of users of affected lands, information of owners and users of affected houses and businesses, etc.). Nakkaş Otoyol A.Ş in collaboration with KGM will continue RAP implementation throughout the 3-year construction period. Monitoring will continue throughout the RAP implementation. Following the post-implementation monitoring period of 2 years, a Completion Audit will be conducted by independent RAP consultant(s) to be approved by the Lenders and commissioned by Nakkaş Otoyol A.Ş. Detailed schedule of RAP activities (e.g. including relocation of affected structures, implementation of livelihood restoration and improvement measures, RAP monitoring), are presented in RAP – Section 2.6 (“Project Schedule”).

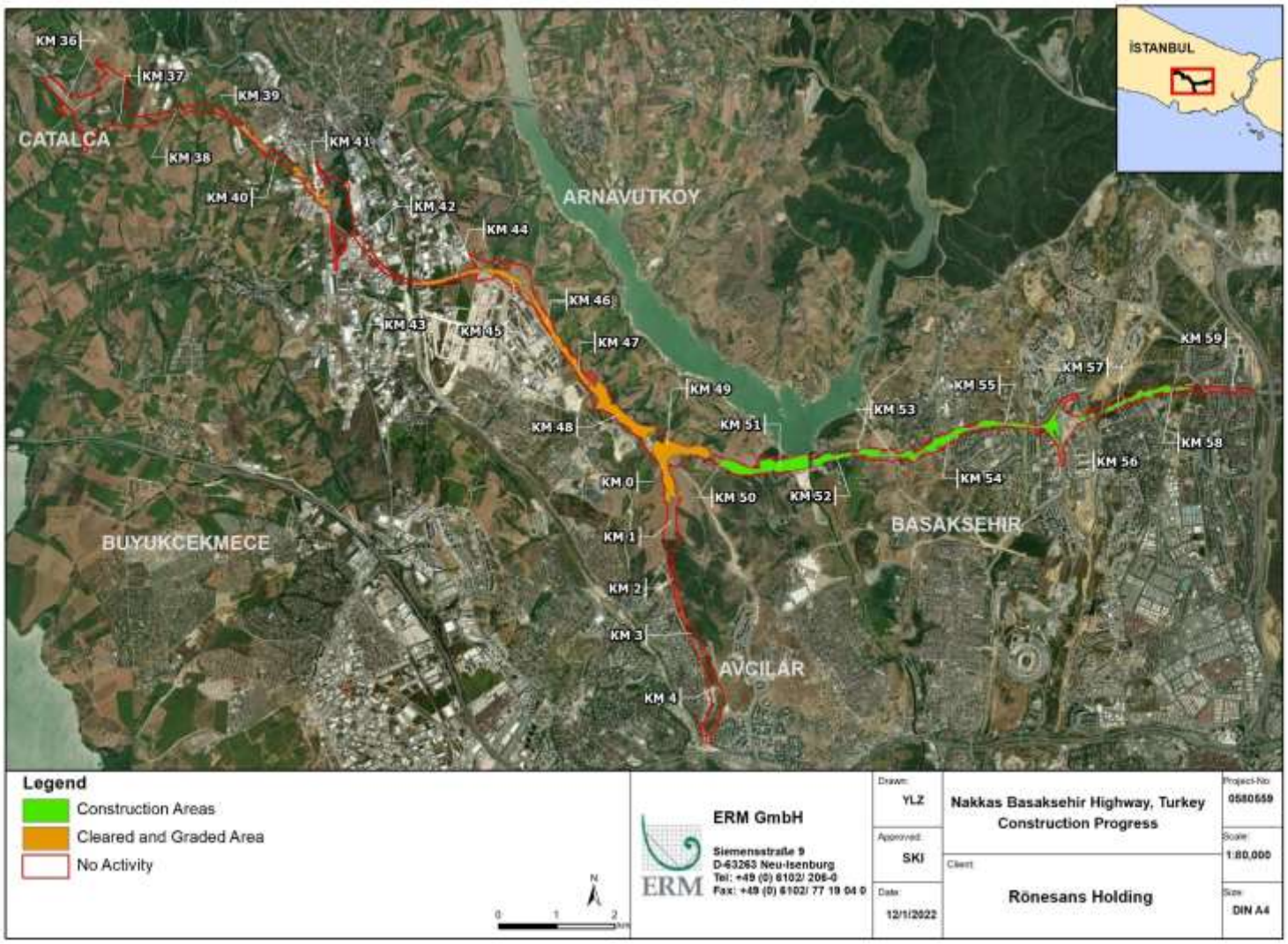
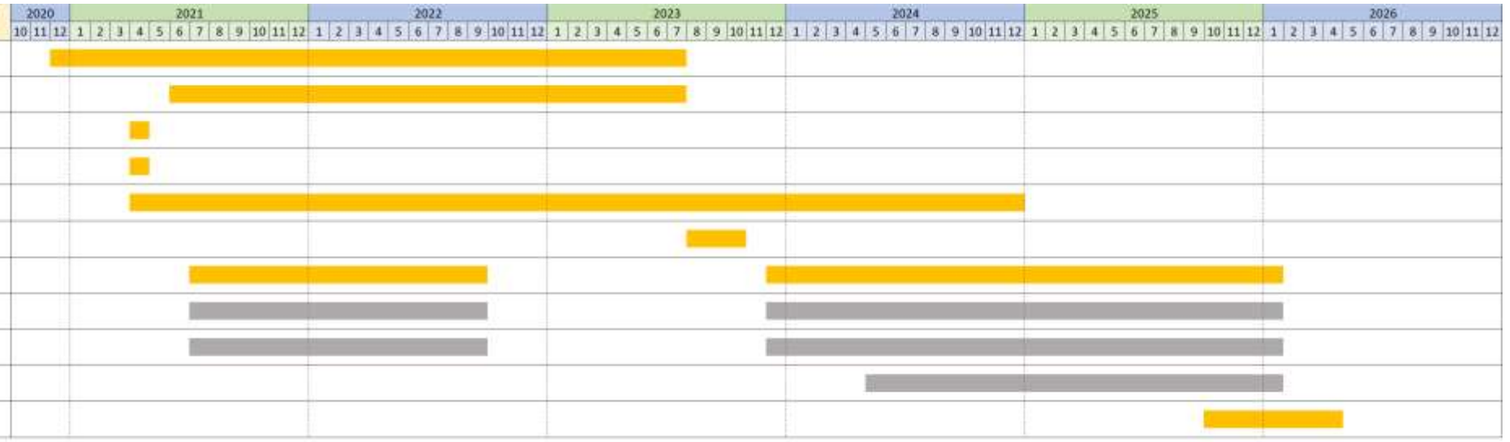


Figure 3-7 Map of the Project's Construction Progress

NAKKAS BASAKSEHIR MOTORWAY TIMELINE	Start	Finish	Duration (month)
Environmental and Social Impact Assessment	1 Dec 2020	30 Jul 2023	32
Resettlement Action Plan	1 Jun 2021	30 Jul 2023	26
Contract Signature	13 Apr 2021	13 Apr 2021	0
Site Delivery	20 Apr 2021	20 Apr 2021	0
Design & Engineering	Apr 2021	Dec 2024	45
Public Disclosure	Aug 2023	Oct 2023	2
Construction Works	Jul 2021	Jan 2026	48
• Stayed Cable Bridge & Approach Viaducts (KM 50+742 - KM 52+360)	Jul 2021	Jan 2026	48
• Section-2 Construction Works (KM 48+000 - KM 59+455)	Jul 2021	Jan 2026	47
• Section- 1 Construction works (KM 35+300 - KM 48+000)	May 2024	Jan 2026	21
Test & Commissioning	Oct 2025	Apr 2026	6



Source: Source: Rönesans

Figure 3-8 Project Schedule

3.4.2 Associated Facilities

Associated facilities (AFs) are defined by EBRD as *"facilities or activities that are not financed by EBRD as part of the project but which in the view of EBRD are significant in determining the success of the project or in producing agreed project outcomes. These are new facilities or activities: (i) without which the project would not be viable, and (ii) would not be constructed, expanded, carried out or planned to be constructed or carried out if the project did not exist[15]".*

IFC defines the AFs as "*the third-party facilities which are not funded as part of the Project and that would not have been constructed or expanded if the Project did not exist and without which the Project would not be viable. Associated facilities may include railways, roads, captive power plants or transmission lines, pipelines, utilities, warehouses, and logistics terminals*[16]." Currently there are no AFs in place since the final design has not been completed yet. In case there are AFs identified upon completion of the final design, Nakkaş Otoyol A.Ş. will ensure that the environmental and/or social risks and impacts arising from associated facilities are managed and mitigated in accordance with Turkish law, Good International Practice (GIP) and the objectives of the EBRD PRs and IFC PSs.

In case the AFs are not under control of Nakkaş Otoyol A.Ş. but carried out by third parties, Nakkaş Otoyol A.Ş. will assess the potential E&S risks and shall engage and collaborate with relevant third parties to manage and mitigate these risks.

Apart from E&S risks, if Nakkaş Otoyol A.Ş. identifies opportunities to enhance benefits, Nakkaş Otoyol A.Ş. shall spend efforts to influence on relevant third parties.

3.4.3 Temporary Construction Components

Temporary construction components will only be needed during the construction and will be reinstated to its original condition upon completion of the construction activities (see Figure 3-9). Nakkaş Otoyol A.Ş. will ensure that the environmental and/or social risks and impacts arising from temporary construction components are managed and mitigated in accordance with Turkish law, Good International Practice (GIP) and the objectives of the EBRD PRs and IFC PSs.

Different from Associated Facilities, these components will be financed as part of the Project component and Nakkaş Otoyol A.Ş. will have full control over the environmental and social performance. Therefore, below components are defined as Project components but not Associated Facilities.

These components include:

- Construction Camps;
- Quarries and Borrow Pits[17]
- Surplus Material Dumpsites.
- Concrete Plants;
- Asphalt Plants;
- Mechanical Plants; and
- Beam Production Facilities.

[15] EBRD E&S Policy 2019

[16] IFC Performance Standards on Environmental and Social Sustainability

[17] Quarries and borrow pits may be treated as AFs in case they will be expanded due to Project aggregate supply needs.

3.4.3.1 Permits and Licenses of Project Components

General permits and licences required for the temporay construction facilities are provided in Table 3-14 General Permit and Licenses. Nakkaş Otoyol A.Ş and EPC Contractor will ensure that relevant permits are in place prior to usage of the facilities.

Table 3-14 General Permit and Licenses

		Construction sites	Quarries	Crusher sites	Borrow pits for group I(a)	Handling and storage of explosives	Storage area (casting course)	Asphalt plant site	Concrete Plant
Permission of land ownership		x	x	x	x	x	X	x	x
Permission to establish facility site selection		-	-	-	-	-	-	-	-
Work place opening and work permit (GSM permits - Gayri Sıhhi Müessese)		x	x	x	x	-	X	x	x
Environmental Permit	Emission permit	x	x	x	x	x	-	x	x
	Dust permit	x	x	x	x	x	-	x	x
	Noise permit	x	x	x	x	x	-	x	x
	Wastewater discharge permit	x	-	-	-	-	-	-	-
Exploitation permit (Arama Ruhsatı)		-	x	-	-	-	-	-	-
Operation permit (Isletme Ruhsati)		-	x	-	x				-
Raw materials manufacturing permit (Hammade Üretim Izin Belgesi)		-	x	x	-	-	-	-	-
Permit for explosives		-	x	-	-	x	-	-	-
Renaturation project		-	x	-	x	-	X	-	-
Rehabilitation project (applicable for forest areas)		-	x	x	x	-	X	-	-
Environmental management plan		-	x	-	x	x	X	-	-

3.4.3.2 Construction Campsites

EPC Contractor has below listed 2 campsites in place which are already in use. There are currently no female employees accommodating at both campsites since there is rental assistance provided by EPC Contractor to the female employees. Access to the camps is tightly controlled and restricted to the Project workforce and approved visitors.

Both camps' wastewater is connected to the existing municipality sewage network, and water is supplied via existing water network as well. Camps' electricity is provided by electrical grid and back-up generators are used in case of failures electrical supply.

3.4.3.2.1 Sazlıdere Bridge Campsite

Sazlidere Bridge Campsite is located at KM 51 adjacent to the RoW and the site is surrounded by agricultural areas and greenhouse area. Sazlıdere creek is located 20 m to the east and Sazlıdere Dam is located 320 m to the north of the campsite.

The main purpose of the campsite is to serve for precast production and storage required for construction of Sazlidere Bridge and the Viaducts. The campsite is also used for EPC Contractor and subcontractors' workers accommodation purposes with a maximum capacity of 750 persons.

3.4.3.2.2 Olimpiyat Campsite

Olimpiyat Campsite is an existing campsite located at KM 56 used previously by Rönesans during the construction of Başakşehir Çam and Sakura City Hospital project between 2016 and 2020. The campsite is surrounded by roads (adjacent), residential buildings are located 195 m to northwest, and Başakşehir Çam ve Sakura Hospital is located 195 m to southeast. The campsite was designed in such way that they can accommodate a workforce of approximately 1,100 persons.

Campsite Inspection

Olimpiyat campsite is already in use by Nakkaş Otoyol A.Ş. and has been inspected by third-party consultant "Rina Turkey" in April 2022 against Workers' Accommodation Processes and Standards IFC & EBRD Guidance Note. A summary of the inspection findings are listed below[18]:

- During the employee interviews, it was noted that especially the newly arrived employees do not have full information about the operation and layout of the camp areas. It is recommended that the camp rules be posted and announced in writing at all camp sites (Laundry, dining hall usage rules, keeping the rooms clean, not carrying separate beds, etc.);
- Worker Accommodation Guidance of EBRD/IFC should also be taken into account in the risk analysis of dormitory conditions;
- Camp Emergency Plan (indicating the location of emergency equipment, assembly areas, identifying emergency teams, camp supervisor and phone number) should be posted in all camp areas;
- All camp sites must have an authorized Camp Supervisor;
- Camp management plan should be created before the camp becomes operational. All deficiencies regarding emergencies and fire safety must be completed before employees settle in the campsite. (E Block in Section-8; it was started to be used before the fire hydrant system was activated, emergency procedures were not completed. It was determined that approximately 200 people stayed in this camp area during the inspection. Accommodation started 3 days before the inspection.);
- Periodic technical inspection of fire hydrant and fire water systems should be done annually;
- Very old and neglected containers were used in some dormitories and toilets.

[18] Labour and Working Conditions Due Diligence Draft Report prepared by Rina Turkey, June 2022

Corrective Actions Taken

Based on the information received from Nakkaş Otoyol A.Ş; following corrective actions were taken as of 10.08.2022 for the identified non-compliances during the inspection:

- Fire extinguishers and fire equipment markings have been completed.
- A hand washing area was built, an automatic fire extinguishing system was installed in the hood in the kitchen, lamps were installed at the emergency exits.
- The evacuation plan, the location of the fire equipment and the camp plan which indicates the assembly areas has been completed and placed on the block entrances.
- The updated version of the emergency team list has been published.
- Exit or battery-operated lamps at emergency exits in camp blocks have been completed.
- The risk analysis for the campsite has been revised.
- The lamps in the E Block toilets were replaced.
- The fire hydrant system in the E Block campsite was commissioned.
- Grounding measurements and periodic checks of electrical installations were made in the dormitories.
- Fire extinguishing and evacuation drills were conducted.
- Suspended ceilings in toilets and bathrooms have been renewed.

Waste Management

The current waste management at Olimpiyat campsite is as follows:

- Domestic solid wastes are delivered to Başakşehir Municipality.
- Domestic wastewater is connected to the city sewer.
- Recyclable wastes are delivered to the Başakşehir Municipality. (Participated in the Zero Waste campaign).
- An agreement has been made with a licensed company (İSTAÇ) for the disposal of hazardous waste.
- An agreement has been made with a licensed company for the disposal of medical waste. (İstanbul Büyükşehir Belediyesi Çevre Koruma ve Kontrol Daire Başkanlığı-Atık Yönetimi Müdürlüğü).

3.4.3.3 Quarries and Borrow Pits

Material aggregate (manufactured sand, gravel and crushed stone) for concrete and asphalt, sub-base and fill will be supplied from third party suppliers in the region based on the availability of material, quality of materials, technical feasibility, environmental and social considerations, and commercial viability.

Quarries and borrow pits already used and planned to be used have been identified as listed in Table 3-15 Quarries and Borrow Pits.

Nakkaş Otoyol A.Ş will ensure that the EPC Contractor procures the aggregate from licensed and authorized sites or sources. A due diligence will be conducted by the EPC Contractor to the existing quarries to ensure permits are valid and operations follow national regulations and international guidelines. Relevant suggestions will be made to improve current standards of the quarries and will be monitored frequently.

Where new quarries and borrow pits need to be opened only for Project needs, Nakkaş Otoyol A.Ş will ensure that the EPC Contractor will obtain the necessary permits and licenses and conduct any necessary ESIAs in line with Turkish requirements. Nakkaş Otoyol A.Ş. will ensure that the environmental and/or social risks and impacts arising from new quarries and new borrow pits opened and operated by the EPC Contractor are managed and mitigated in accordance with Turkish law, Good International Practice (GIP) and the objectives of the EBRD PRs and IFC PSs.

Table 3-15 Quarries and Borrow Pits

No	Name of the Quarry	District	Distance to the RoW	New Quarry (NQ) or Existing Quarry Operated by Third Party Supplier (EQ)	Currently Used by the Project? (Yes/No)	Area [ha]	What will be used?	Usage Purpose	Duration of Usage by the Project (months)	Amount to be extracted by the Project (million ton)	Permit Date (Duration)	Permit Owner / Type of Permit
1	Ömerli Quarry (Used by concrete supllier AKCANSA)	Çekmeköy	87 Km	EQ	Yes	243,4	Limestone	Concrete Aggregate (100 years)	42	0,24	27.08.2017-27.08.2037	Koç Hafriyat Ve Madencilik Ltd. Şti. / Mining Operation Permit
2	Cebeci Quarry (Used by REC & concrete supplier AKCANSA)	Sultangazi	15,5 Km	EQ	Yes	449,48	Sandstone	Concrete Aggregate , Subbase & Base Corse, Capping Layer, Filter Aggregate, İmprovement Fill, Rock Fill	42	2,75	29.11.2018-29.11.2028	Kuzey Cebeci Madencilik Sanayi Ticaret Anonim Şirketi / Mining Operation Permit
3	Ayazağa Quarry (Used by concrete supplier BOGAZICI BETON)	Sarıyer	33 Km	EQ	Yes	160	Sandstone	Concrete Aggregate	42	1,2	23.07.2014-23.07.2034	İstmad Maden İşletmeleri ltd. şti. (Royalty Boğaziçi Beton A.Ş.) / Mining Operation Permit
4	Boğazköy Quarry (Used by REC and potantial usage by pavement supllier DANIS)	Arnavutköy	12,4 Km	EQ	Yes	75	Sandstone	Subbase & base corse, capping layer, filter aggregate, improvement fill, rock fill	33	1,05	24.02.2014-24.02.2024	Dalbay Taş İmalatı Sanayi Ve Ticaret Ltd. Şti. / Mining Operation Permit
5	Çiftalan Quarry (potantial usage by pavement supllier DANIS)	Eyüpsultan	29 Km	EQ	No	60,28	Sandstone	Bituminous asphalt aggregate	24	0,9	05.11.2018-05.11.2023	KGM / Mining Operation Permit
6	Sefaalan Quarry (potantial usage by pavement supllier DANIS)	Saray	64 Km	EQ	No	24,6	Basalt	Stone mastic asphalt aggregate	30	0,195	13.05.2020-13.05.2030	Koçer Yapı İnş. Mad. Taah. Tic. San.Ltd. Şti./ Mining Operation Permit
7	Hoşdere Borrow Pit (shall be used by REC)	Başakşehir	0,4 Km	New Borrow Pit	No	3.55	Limestone	Capping layer, rock fill	33	1,39	Under application evaluation	Not obtained yet

3.4.3.4 Surplus Material Dumpsites

The construction material requirements and the suitability of cut-fill requirements for the Project have not been finalized yet. However, based on the current calculations, the estimated excavation and fill volumes of the Project will be as presented in Table 3-16 :

Table 3-16 Amount Excavation

Amount of Excavation	Amount of Re-Usage	Amount Surplus Materia
19,9 million m^3	3,4 million m^3	16,5 million m^3

Surplus material dumpsites already used and planned to be used have been identified as listed in Table 3-17 Surplus Material Dumpsites.

Table 3-17 Surplus Material Dumpsites[19]

No	Name of the Dumpsite	District	Distance to the RoW	New Dumpsite or Existing Dumpsite Operated by Third Party	Currently Used by the Project? (Yes/No)	Area [ha]	Usage Purpose	Duration of Usage by the Project (months)	Amount to be stored by the Project (m3)	Permit Date (Duration)	Permit Owner / Type of Permit
1	Bolluca Dumpsite	Arnavutköy	14,8 Km	Existing	No	79.09	Unsuitable excavation and surplus materials storage	33	5,300,000	11.04.2022	KGM/Disposal
2	Mahmutbey Dumpsite	Başakşehir	8,5 Km	Existing	Yes	3	Unsuitable excavation and surplus materials storage	30	900,000	09.07.2021	KGM/Disposal
3	Pirinççi Dumpsite	Arnavutköy	8,7 Km	Existing	No	49.2	Unsuitable excavation and surplus materials storage	33	5,000,000	Under application evaluation (expected by September 2022)	Not obtained yet
4	Şamlar Dumpsite	Arnavutköy	6,5 Km	New	No		Unsuitable excavation and surplus materials storage	33	4,400,000	Under application evaluation (expected by September 2022)	Not obtained yet
5	Nakkaş Dumpsite	Çatalca	200 m	New	No	6.4	Unsuitable excavation and surplus materials storage	30	900,000	Under application evaluation (expected by December 2022)	Not obtained yet
6	Şahintepe Dumpsite	Başakşehir	Adjacent to the RoW at KM 51+400	New	Yes	11,86	Unsuitable excavation and surplus materials storage	10	300,000	Application process has been suspended since the site will not be used for further activities and will be reinstated to original ground conditions. Compensation/Expropriation will be carried out in accordance with Project requirements for the land that has already been used.	Not applicable

[19] Dumpsite No 6 has been included in ESIA studies (already been used).
Dumpsite No 5 has been located within ESIA study assessment corridor.(not used so far),
No 1-4 has not been included in ESIA, however a dule dilligence will be carried out by the Client.
30 months (approx) occupation is the estimated usage period until reinstatement of the dumpsites. The dumpsites will be handed over to relevant authorities after reinstatement.

3.4.3.5 Other Project Components

The below components are required during the construction activities.

- Campsites;
- Concrete Plants;
- Asphalt Plants;
- Mechanical Plants; and
- Beam Production Facilities.

These components already used and planned to be used have been identified as listed in Table 3-18 Other Construction Facilities.

Table 3-18 Other Construction Facilities

No	Name of the Facility	District	Location	Distance to the RoW	New Facility or Existing Facility Operated by Third Party	Currently Used by the Project? (Yes/No)	Area [ha]	Usage Purpose	Duration of Usage by the Project (months)	Expropriation/Rental Status	Permit Date (Duration)	Permit Owner / Type of Permit
1	Sazlidere Campsite, Asphalt Plants, Mechanical Plant, Batch Plant	Başakşehir/Şahintepe	KM 51+400	200 m	New	Yes (for campsite) No (for plants)	RegistrationArea: 20.04 Used Area: 14.76	Mobilisation & Camp Area	42	Şahintepe 1446/5 parcel Housing Development Administration of Turkey (TOKİ-Official institutions)-Consent (190.878,44 m2) Emlak Planlama Construction Corp. (EPP-semi-official institution) - Consent (522,79 m2) Artaş İnşaat (Construction Corp.) - Consent (8.790,62 m2) Private Property-Negotiating (36,41 m2)	TOKİ - 30.03.2021 EPP - 02.04.2021 ARTAŞ - 29.06.2021 Private - Negotiating	TOKİ-Official institution-(190.878,44 m2) EPP - Semi-official institution - (522,79 m2) Artaş İnşaat - Construction Corp. (Private) - (8.790,62 m2)
2	Olimpiyat Campsite	Başakşehir/İkitelli-2	KM 55+800	Within the RoW	Existing	Yes	5,5	Mobilisation & Camp Area	42	Under the rule and authority of the state /within ROW	20.04.2021, site access approval date by KGM	REC
3	Yeşilbayır Batch Plant	Arnavutköy/Yeşilbayır	KM 37+500 (North of RoW)	200 m	New	No	Permitted Area: 1,5	Production Of Concrete	24	Yeşilbayır 202/2 ve 4 parcels Housing Development Administration of Turkey (TOKİ-Official institutions)-Consent	31.08.2021	TOKİ-Official institutions
4	İkitelli-1 Asphalt, Mechanical Plant and Beam Production Facility	Başakşehir İkitelli-1	Outside of the RoW	3 Km	New	No	5.3	Production Of Asphalt & Subbase & Production Of Beams	28	İkitelli-1 2125parcel Ministry of National Defence (MSB)-Protocol is in progress (KGM-MSB)	Under application evaluation	Not obtained yet
5	Şahintepe Beam Production Facility	Başakşehir Şahintepe	KM 50+200	300 m	New	No	13.12	Production Of Beams	28	Şahintepe 1473/46, 47, 48, 49, 58, 60, 62, 63 ve 1475/28 ve 29 parcels Başakşehir Municipality - Negotiating	Under application evaluation	Not obtained yet
6	Şahintepe Beam Production Facility	Başakşehir Şahintepe	KM 50+300	300 m	New	No	6.5	Production Of Beams	28	Şahintepe 1476/5, 7, 11, 12 ve 1473/1 parcels Housing Development Administration of Turkey (TOKİ-Official institutions)-Negotiating	Under application evaluation	Not obtained yet

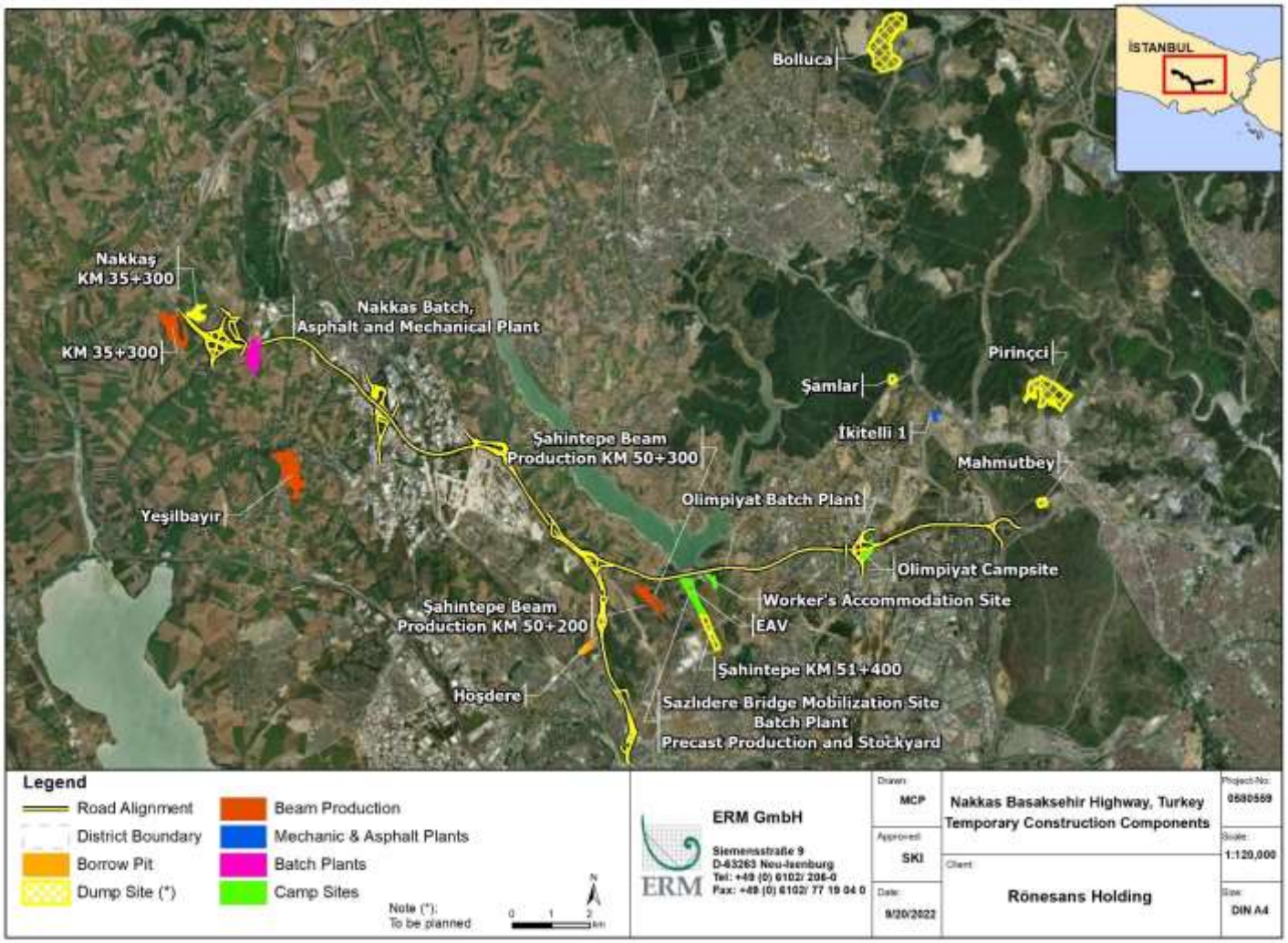


Figure 3-9 Temporary Construction Components

3.5 Existing Infrastructure

The main public utilities to be affected during the construction stage of the Project are:

- Natural gas distribution;
- Electricity network;
- Water and Sewerage;
- Telecom lines; and
- Storm water lines.

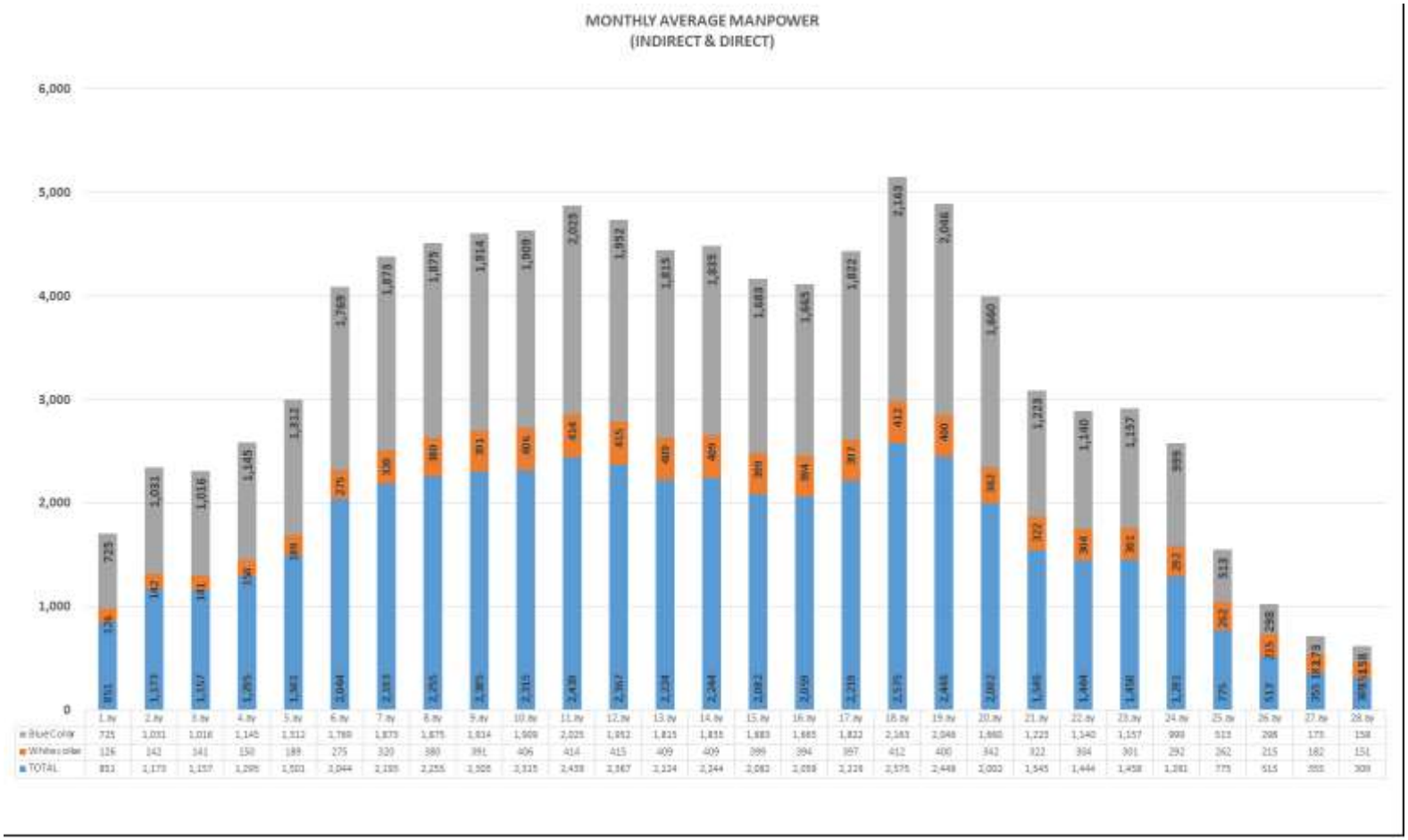
3.6 Construction Equipment

Below listed equipment types, quantities and capacities are subject to change to suit the site and project requirements and to meet the proposed road works program:

- Graders
- Dozer/Excavator
- Skid-steer loaders
- Cranes
- Trucks/Tippers as required
- Vibrating Rollers
- Water Tanker
- Double Drum Steel Roller
- Air Compressor
- Traffic Sign Boards/Signals
- Small Roller/Plate Compactor
- Asphalt Batching Plant
- Asphalt Pavers
- Pneumatic Tire Roller (PTR)
- Liquid Spray Tanker

3.7 Construction Employment

According to the current planning (based on figures provided by Nakkas Otoyol, Figure 3-10), It is estimated that an average of 1,900 personnel will be employed throughout the duration of the Project.



Source: Rönesans

Figure 3-10 Monthly Personnel Distribution

3.8 Operations and Maintenance

The BOT Contract was awarded to the Nakkaş Otoyol Yatırım ve İşletme A.Ş for 20 years including 3 years construction period, thus Nakkaş Otoyol Yatırım ve İşletme A.Ş is responsible for the detailed design, construction, and operation of the Motorway during the specified BOT Contract period. At the end of this period, responsibility for operation and maintenance of the Motorway and cable-stayed bridge will be transferred to KGM.

Nakkaş Otoyol A.Ş. is responsible as BOT contractor to manage, operate, maintain, and repair the Project components during the BOT contract period, apart from the approach roads which will be handed over to the local authorities after construction. The main structures and related facilities are:

- Sazlidere Cable Stayed Bridge;
- The motorway itself and all associated facilities located in the motorway's corridor;
- Toll plazas, management support buildings and all related facilities, equipment and systems;
- Maintenance facilities for the motorway and the bridge; and
- All signs related to the motorway and traffic safety.

A Maintenance Programme will be developed by Nakkaş Otoyol A.Ş. one year prior to operation and implemented as per the BOT Contract to assure that specified conditions are met upon the hand-back of the Sazlidere Cable Stayed Bridge and motorway to KGM at the end of the BOT Concession Period. The Maintenance Programme must be laid out in a detailed manual which provides *inter alia* the following information:

- specifies the routine examination and maintenance operations,
- provides procedures and control sheets, and
- defines the outline of the decisions to be made in case of deviations from required standards (only if approved by KGM) and
- procedures pertaining to response to unpredictable incidents.

Nakkas Otoyol A.Ş. will engage an "Operations and Maintenance Contractor" to undertake the operational phase of the Motorway Project (this Contract is not yet signed). The responsibilities of the O&M Contractor with respect to the maintenance and operation of the Project components, environmental protection and other relevant topics described in this ESIA Report will be embedded in the master service contract between Nakkas Otoyol A.Ş. and the O&M Contractor.

According to the current planning it is estimated that 164 personnel will be employed throughout the operation of the Project.

4. ESIA METHODOLOGY

The assessment for the Nakkaş-Başakşehir Motorway Project has followed a systematic process of predicting and evaluating the impacts the Project might have on the physical, natural, cultural, social and socio-economic environment, and identifying measures that Nakkaş Otoyol A.Ş. will need to take to avoid, reduce, remedy, offset or compensate for adverse impacts, and to provide benefits where possible.

The overall approach followed is shown schematically in Figure 4-1 and the key steps are described briefly in the subsequent chapters; further references are made to other parts of this ESIA Report in which the specific topics are more specifically addressed.

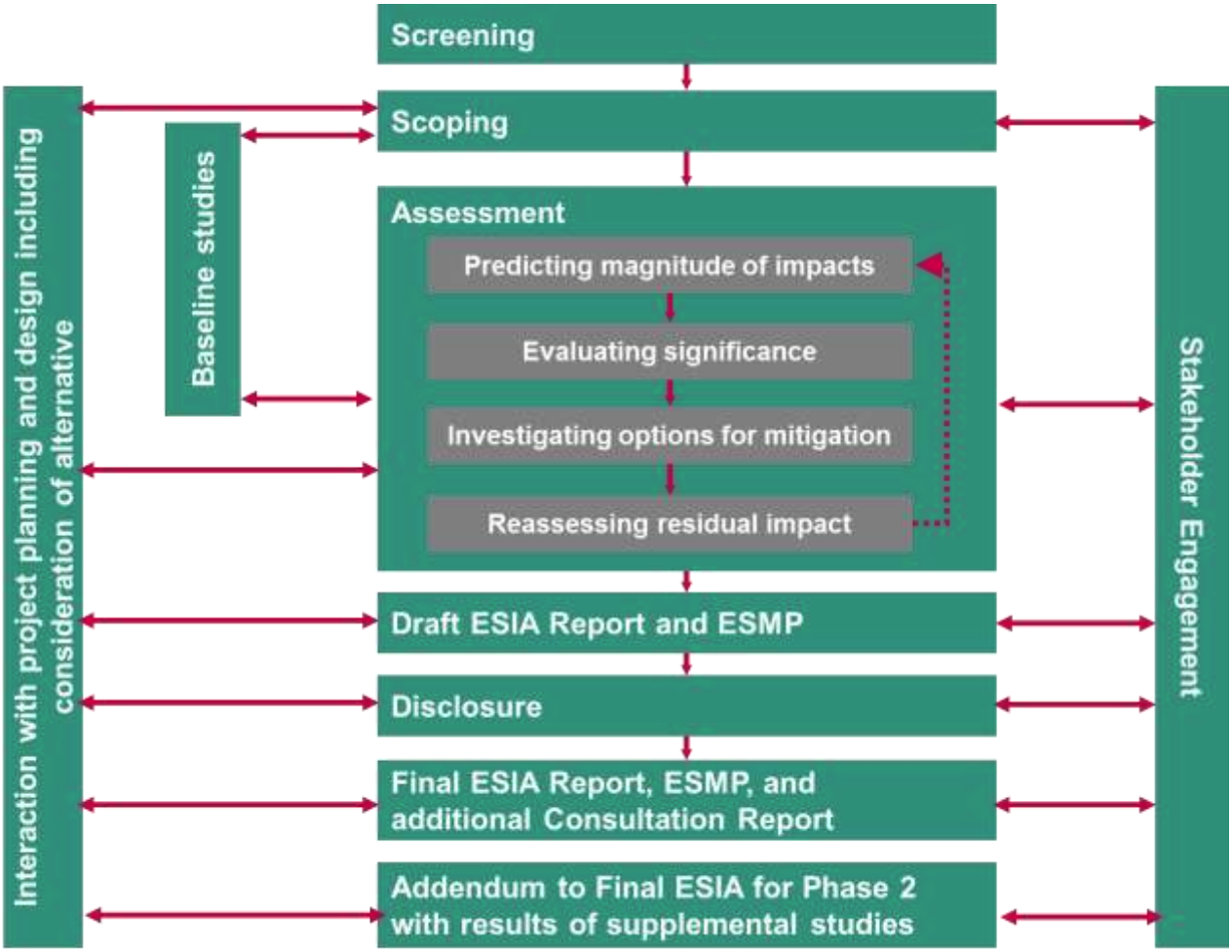


Figure 4-1 ESIA Approach

4.1 Screening

Screening is the first stage in impact assessment, in which the need and level of assessment required is determined for a particular project. As mentioned in Chapter 1 of this report, despite the Project being exempted from Turkish EIA regulation, the Screening process concluded that the Project is a Category A project (as per EBRD Environmental and Social Policy, 2019[20]) and an international ESIA is needed to be publicly disclosed to meet Lender's requirements.

[20] https://www.ebrd.com/environmental-and-social-policy.pdf

As a part of the ESIA studies, ERM screened and considered contextual human rights issues in country/project region to identify and assess the key risks within the contextual situation in Turkey focusing in the construction sector including labour context, local communities' rights, gender equality, gender based violence and harassment, use of force by public and private security, community safety, security, retaliation and reprisal risks. Measures to mitigate these risks are presented both in the ESIA and further details were provided in the management plans such as Community Health, Safety and Security Plan and Stakeholder Engagement Plan(SEP).

4.2 Scoping

The Scoping step intended to identify the likely significant impacts of the Project (i.e., the "key topics" of concern), and to define the appropriate approaches to be followed in the ESIA process for:

1. Gathering further baseline information to assess these impacts; and
2. Determining corresponding mitigation measures.

During this process, the "Project" itself was defined and which structures, installations, and activities to be included in the so called "Area of Influence" were established as described in Chapter 4.3. The Scoping process also involved obtaining input from local public and other stakeholders about their views and concerns on the Project as well as the contextual risks.

The Scoping phase for this Project was conducted from January to April 2021.

The Yesilbayir Connection Road was originally included in the Project design to connect the Nakkas-Basaksehir Motorway to the existing E80 Motorway (Trans European Motorway – TEM) through the Nakkas Interchange planned at KM 36+540. This connection road was designed at the time in consideration of a railway logistics centre planned by the Turkish State Railways Authority (TCDD). As this logistic centre was not included in TCDD's investment planning (cancelled at the feasibility stage), KGM decided that the Yesilbayir Connection Road would not be an essential component of the Nakkas-Basaksehir Motorway. This being the case, the Yesilbayir Connection Road was removed from the latest Project design. As such, the ESIA was amended to address the impacts associated with this design change, although the baseline remained unchanged as the route alignment had not been altered. The cancellation of the Yesilbayir Connection Road on the Project has reduced potential risks and impacts that would have been caused by the Project's land acquisition requirements as well as avoiding other environmental and social risks associated with construction and when the Motorway becomes operational.

4.3 Project Area of Influence

The "spatial scope", "study area" or "area of influence (AoI)" for the Project is used to describe the boundaries of the extent to which project impacts may be felt. The AoI to be assessed can vary depending upon the type of impact being considered and the attributes of the potentially affected receptors and may also extend across administrative. In each case, the AoI includes all areas within which significant impacts are likely to occur, taking into account the:

- physical extent of the proposed works, defined by the limits of land to be acquired or used (temporarily or permanently) by the Project; and
- nature of the baseline environment and manner in which impacts are likely to be propagated beyond the Project boundary.

The area of influence will encompass:

- The primary Project site and related facilities;
- Associated facilities whose viability and existence depend exclusively on the Project;
- Areas potentially impacted by extraction of raw materials or work camps where concrete products and bitumen or asphalt may be produced;

- Areas potentially impacted by cumulative impacts from further planned development of the Project;
- Areas potentially affected by impacts from unplanned but predictable developments caused by the Project.
- The Project Area of Influence has been defined in different distances (see Figure 4-2) depending on the type of the potential impacts of different topics taking also account of potential minor route changes.
- Biodiversity AoI was defined as up to 1 Km considering that noise and light creates disturbance to terrestrial fauna up to 500 m for most sensitive species during construction activities and up to 1 Km for the most sensitive species during operation.
- The Social AoI of the Project that has been defined to include the major communities potentially to be affected by the Project. The primary Project site which encompasses a corridor of 1 Km (being 500 m on each side of the Motorway centreline). The size of the corridor has been selected to accommodate for potential smaller changes in the Motorway routing during final design.
- Cultural Heritage AoI has been defined as 2 km mainly focusing within the RoW and the area which is considered as its impact area due to potential usage of the land outside of the RoW due to construction supporting facility usage purposes.
- Air Quality AoI has been defined as 4 km since the region is influenced by emissions from industrial areas located close to the start and end of the Project route, road traffic and house heating particularly at areas where coal is used.
- Noise AoI has been defined as 2 Km since route traverses both built up, industrial and rural areas. Besides residential buildings, there are also other noise sensitive receptors such as hospitals, schools, recreational areas, public parks, playgrounds and places of worship in the proximity of the Motorway alignment.

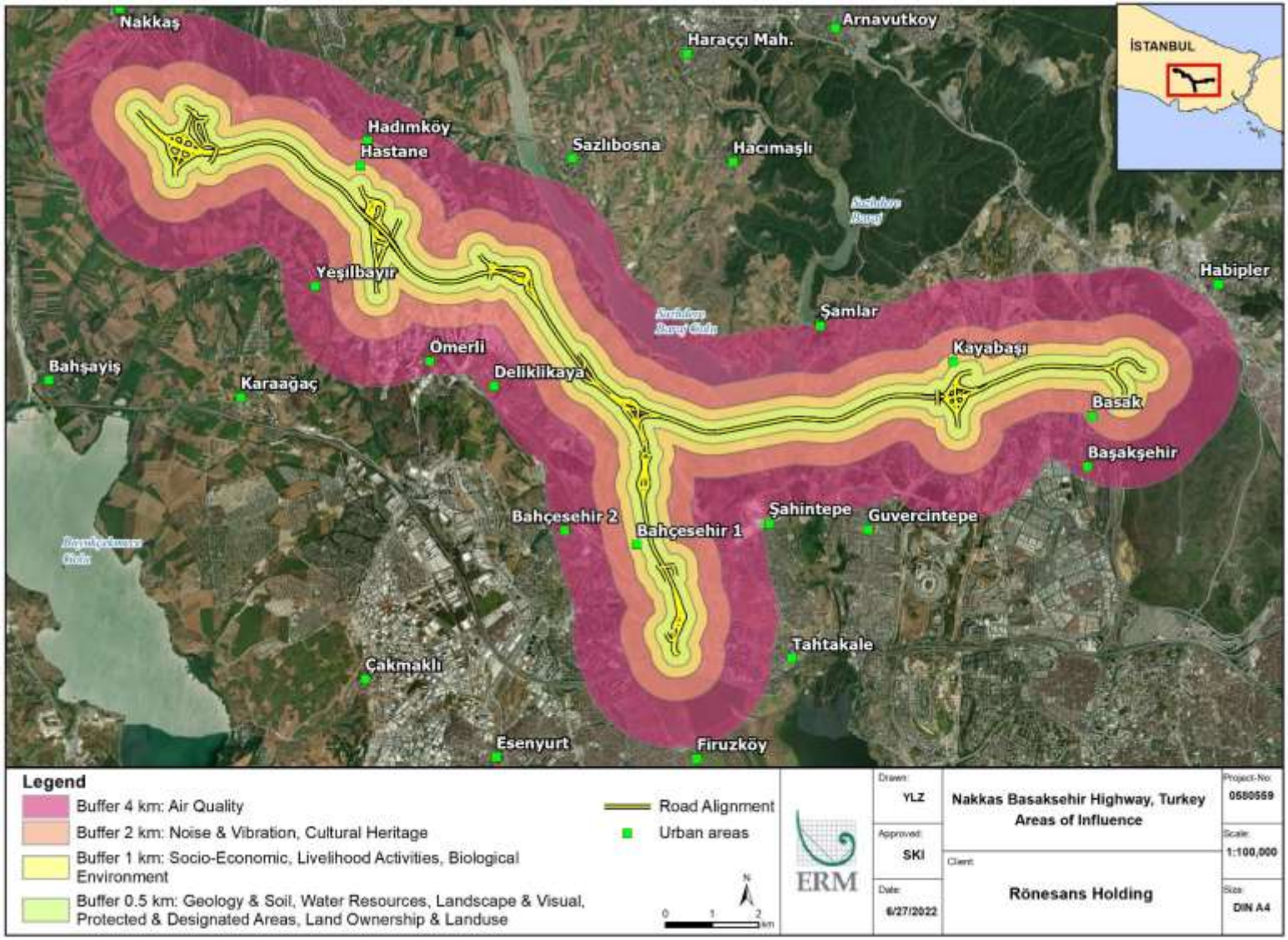


Figure 4-2 Map of Project's Areas of Influence

4.3.1 Baseline Studies

Note: In this ESIA Report there is no separate chapter focusing solely on the overall "Baseline Conditions" of the Project area; instead, the baseline conditions (and impacts and mitigation) are addressed specifically for each topic covered (e.g., air, water, land use, etc.). Therefore, please refer to the respective topic chapters in this ESIA Report for specific descriptions of the baseline methodology applied for that topic.

Throughout the sections, baseline conditions have been assessed with particular consideration for gender, human rights, and vulnerability.

To provide a baseline against which the impacts of the Project can be assessed, an important part of the ESIA has been to establish the conditions that would prevail in the absence of the Project, referred to as the "baseline". Baseline studies commenced in parallel with scoping, and initial baseline data was used to inform the scoping process. The baseline studies then continued in parallel to the impact assessment providing information to allow description and, where possible, quantification of impacts and to inform judgements about their significance.

Baseline information was collected from various sources, including e.g.:

- Documentation and information received from Nakkaş Otoyol A.Ş.;
- Existing public sources, such as government agencies, research organisations, publications and maps;
- Review of aerial photographs of the route and its surrounding area;
- Field studies designed to fill gaps in the existing data, where needed to enable assessment of impacts; and
- Questionnaires and interviews with stakeholders.

The baseline data collection for the Motorway were conducted from February to October 2021. An overview of these studies is provided in Table 4-1. Additional socio-economic surveys conducted for RAP in 2022 and the results of these additional studies were also used during preparation of this ESIA. These additional studies are presented in section 5.4.1.2.1 below.

Table 4-1 List of Field Surveys and Studies

Survey	Timeline	Reference to the report
Site reconnaissance visits by ESIA team	January – February 2021	Scoping Report
Preliminary Flora & Terrestrial Fauna Field Survey	February 2021	Chapter 5.3
Archaeological Field Survey (Tangible)	February 2021	Chapter 5.4.12
Baseline Noise Monitoring	March 2021	Chapter 5.2.6
Baseline Air Quality Monitoring	February – June 2021	Chapter 5.2.2
Seasonal Flora & Terrestrial Fauna Survey (Spring)	May 2021	Chapter 5.3
Migratory Birds Monitoring (Spring)	April – May 2021	Chapter 5.3
Aquatic Biodiversity Survey	May 2021	Chapter 5.3
Aquatic Biodiversity Survey	March – April – May – June 2021	Chapter 5.3
Soil Sampling along the Right of Way	June 2021	Chapter 5.2.3
Surface water Sampling	June 2021	Chapter 5.2.5
Archaeological Field Survey (Intangible)	June 2021	Chapter 5.4.12

Survey	Timeline	Reference to the report
Bat Surveys	July – August – September – October 2021	Chapter 5.3
Seasonal Flora & Terrestrial Fauna Field Survey (Autumn)	September 2021	Chapter 5.3
Migratory Birds Monitoring (Autumn)	August – September – October 2021	Chapter 5.3
Flora & Terrestrial Fauna Survey at quarries, stockyards and campsites	September 2021	Chapter 5.3
Governance and Administration	February – March 2021	Chapter 5.4.3.
Human Rights Risks and Impacts	March – April 2021	Chapter 5.4.4.
Demographic profile	February – March 2021	Chapter 5.4.5.
Land ownership and Landuse	March – October 2021	Chapter 5.4.6.
Ethnicity, Language and Religion	March – April 2021	Chapter 5.4.11
Employment and Occupation	March – April 2021	Chapter 5.4.7.
Livelihood activities	March – April 2021	Chapter 5.4.8.
Literacy and education	April – May 2021	Chapter 5.4.9.
Gender profile	April – May 2021	Chapter 5.4.
Health	April – May 2021	Chapter 5.4.10.
Access to basic infrastructure and services	April – May 2021	Chapter 5.4.4.4.
Vulnerable groups for (under poverty line, women headed households, elderly, disabled and Syrian refugee numbers at the neighbourhood levels).	May – September 2021	Chapter 5.4.11.
Scoping field study by the RAP Consultant (GEM)	July 2021	RAP
Community-level interviews by the RAP Consultant	August 2021	RAP
Business Interviews and Household Level Questionnaires by the RAP Consultant	September - October 2021	RAP
Rapid habitat survey and ground-truthing exercise completed by ERM in May 2022 (extended to consider all habitat within a 500m radius buffer of the road RoW),	May 2022	Chapter 5.3.3
Field investigation and business interviews by the Valuation Expert as part of the Valuation Review Study	12 November 2021	RAP
Field survey and formal/informal user interviews with informal and formal agricultural users of affected lands	11 – 12 June 2022	RAP
Business interviews on relocation planning	Throughout June 2022	RAP

Survey results have been detailed in each respective chapter and the full reports are attached as Annexes (as referred in the Table above).

4.4 Impact Assessment

ERM's standard Impact Assessment Methodology presented in Figure 4-3 follows international good practice as recognized and accepted by Equator Banks, IFC and other international lenders. The potential impacts of the Project (i.e. the interaction of elements of the physical, biological, cultural or human environment) are assessed against the baseline conditions of the Project's Area of Influence (to be further addressed in the ESIA Report).

The significance of an impact is assessed as a result of the impact magnitude (which depends on extent, duration and other impact factors) and the sensitivity characteristics of resources and receptors. The resulting impact significance is then defined in terms of Minor, Moderate or Major – or positive. For potential impacts that are found to be Major (and in some cases Moderate), one or more mitigation measures are recommended in line with the so-called "Mitigation Hierarchy" to either: avoid, minimise, mitigate or compensate for the impact so that the resulting residual impact significance is acceptable.

ERM has worked closely with Nakkaş Otoyol A.Ş. during the early stages of the Project so that the design already includes many technical measures to avoid/minimise impacts, (e.g. International Best Practices and Smart Design Solutions Tools). Such "embedded measures" are considered as part of the existing Project design and not specified again as mitigation measures – they are anyhow already planned/obligatory. Additional mitigation measures to be implemented are addressed in the chapters below of this ESIA Report.

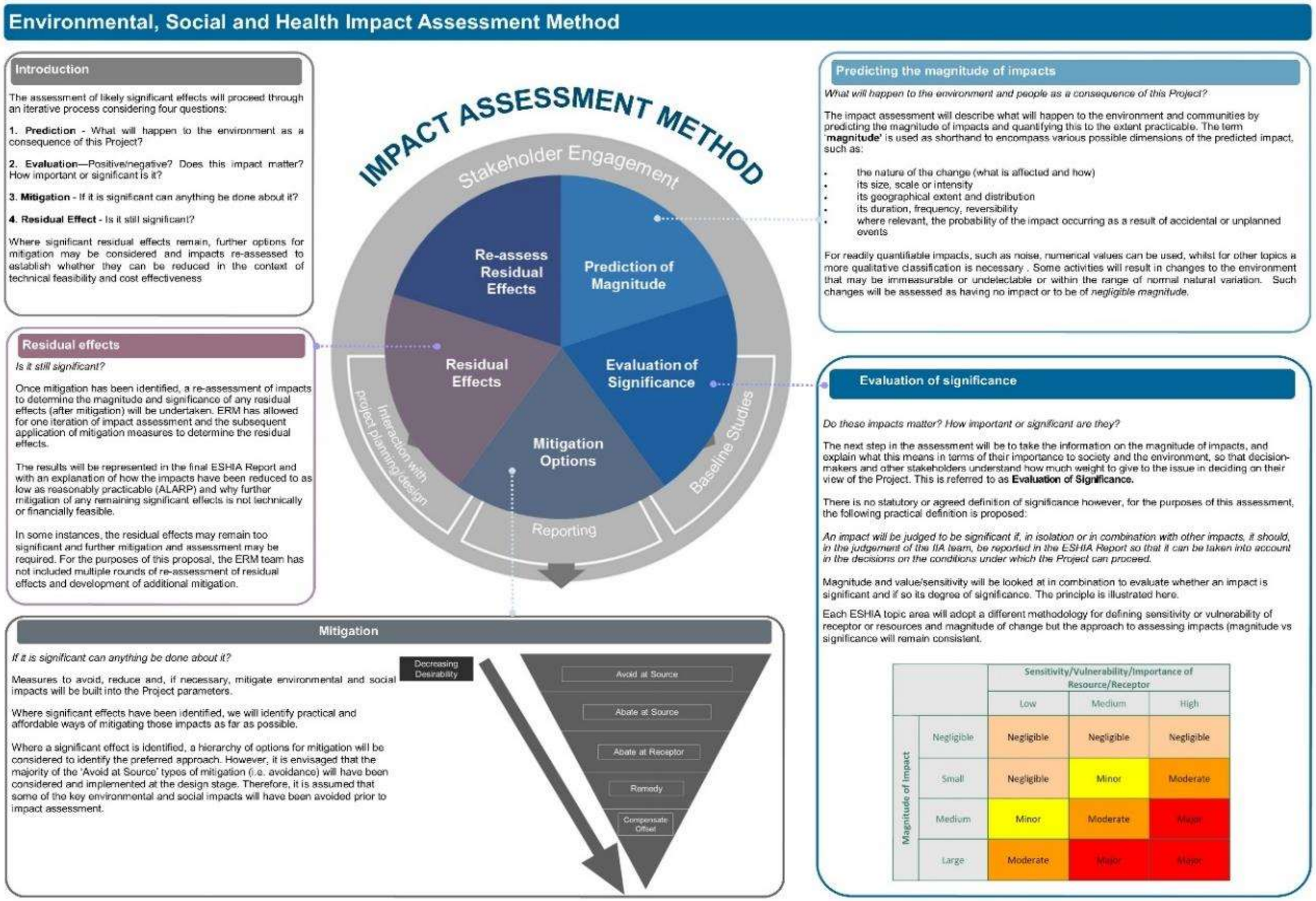


Figure 4-3 ERM Impact Assessment Methodology

4.4.1 Prediction of Magnitude

The magnitude of each impact was predicted as falling into one of the following designations: negligible, small, medium or large. The 'magnitude' encompasses various possible dimensions of the predicted impact, such as:

- extent (i.e. local, regional or international);
- duration (i.e. temporary, short-term, long-term or permanent);
- scale or size (no fixed designations);
- frequency (no fixed designations); and
- likelihood, for unplanned events only (i.e. unlikely, possible, likely).

Each ESIA topic area (e.g. noise, biodiversity, social, etc.) adopted a different methodology for defining the magnitude of change as appropriate to the discipline however, the designations used were consistent. For example, for readily quantifiable impacts, such as noise, numerical values were used to define its size, whilst for other topics, e.g. social impacts, a more qualitative classification was necessary.

In the case of positive impacts, no magnitude was assigned.

4.4.2 Sensitivity of Resources and Receptors

The sensitivity (or vulnerability/importance) of the impacted resource or receptor was also defined using one of the followings designations: low, medium or high. As per the magnitude rating, the definition for each designation varied on a resource/receptor basis. Where the resource is physical (for example, a water body) its quality, sensitivity to change and importance (on a local, national and international scale) are considered.

Where the resource/receptor is biological or cultural, its importance (for example, its local, regional, national or international importance) and its sensitivity to the specific type of impact are considered.

Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. The sensitivity definition for each resource/receptor is defined in more detail in the individual topic assessment chapters.

4.4.3 Evaluation of Significance

Once the magnitude of the impact and sensitivity of the resource/receptor has been characterised, the impact significance is assigned using the significance matrix presented in Figure 4-4.

For impacts resulting from unplanned events (typically accidents, such as a major fuel spill or other event that cannot be reasonably foreseen), the above methodology is applied but likelihood is also considered when assigning the magnitude designation, as classified in Figure 4-4.

Table 4-2 Definitions for Likelihood Designation for Unplanned Events

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

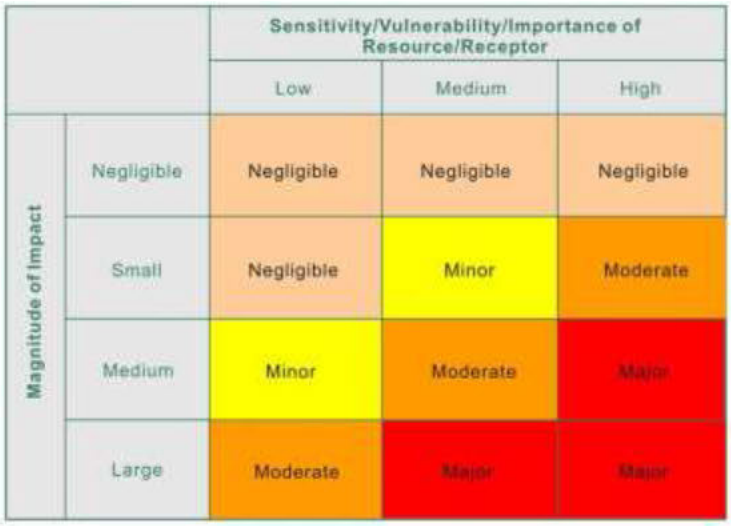


Figure 4-4 Impact Significance Matrix

Table 4-3 provides context for what the various impact significance ratings signify.

Table 4-3 Context of Impact Significance

Significance Designation & colour code	Significance Context
Negligible	A resource/receptor (including people) will not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/vulnerability/importance. In either case, the magnitude should be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors.
Positive	There will be a beneficial impact to a resource/receptor. (*Note: no magnitude is assigned for positive impacts).*

4.4.4 Identification of Mitigation Measures

Where significant impacts were identified (i.e. those with a minor, moderate or major rating), mitigation measures have been developed to find practical ways of addressing negative impacts and enhancing positive impacts. The key objective was to mitigate impacts to a level that is 'as low as reasonably possible'.

A hierarchy of mitigation options is considered, with avoidance at the source of the impact as a priority and compensatory measures or offsets to reduce the impact significance as a last resort. The mitigation hierarchy is presented in Figure 4-5. The preference is to avoid the impact at source, and least desirable option is to provide compensation or an offset for residual impacts that cannot be further reasonably avoided.

4.4.5 Embedded Design Controls

In addition to the KGM Technical specifications, design standards and codes listed in Chapter 3.3.1; ERM provided early-stage recommendations to the Nakkaş Otoyol A.Ş. project designers via holding a workshop in June 2021.

The recommendations listed in Table 4-4 were defined based on the following guidance:

- international best practices;
- requirements of IFC EHS Guidelines for Toll Roads;
- requirements of IFC EHS Guidelines for Construction Materials Extraction, and
- requirements of IFC General EHS Guidelines.

The ESIA team continued working with Nakkaş Otoyol A.Ş. and its wider team during the ESIA process to gather information on the design, construction, and operation of the Project. As the potential impacts were investigated, the results were discussed with the designers, and where feasible, mitigation measures were integrated into the Project design.

Nakkaş Otoyol A.Ş. committed to continuing this process of working with environmental and social specialists during the construction stage as well to keep the impacts as low as is reasonably practicable. A Design Change Management Procedure (DCMP) was also developed by ERM together with Nakkaş Otoyol A.Ş. as a part of this ESIA process. The purpose of the DCMP is to manage the potential E&S impacts of any future changes to the route or other design aspects will be appropriately evaluated and – as applicable – the mitigation hierarchy will be applied for any required mitigation measures.

Table 4-4 Recommendations for Design of Roads

Subject	International Best Practices
Geology, Soils and Contaminated Land	■ Optimize the road design to limit the gradient of the access roads to reduce runoff-induced erosion, and provide adequate road drainage based on road width, surface material, compaction and maintenance. ■ Consider the geological investigation studies' findings on "Soil Instability" and "Erosion" and "Seismic Risks", and incorporate the mitigation measures into the design.
Surface and Groundwater	■ Locate the Project elements to minimize risks to important sources of groundwater and to ensure surface waters and water supplies are not impacted. ■ Design the culverts to maintain the natural riverbed width and the natural riverbed level. ■ Design the structures to minimize the obstruction of the natural water flows to maintain free passage for fish and other aquatic species, as well as terrestrial animals using the stream banks for passage beneath the roadway. ■ Adopt appropriate measures for stream and river crossings, such as viaducts and bridges, for which the placement of piles and other foundation structures in the waterbed will be avoided if possible. ■ Implement sustainable road drainage and storm water management practices in accordance with international guidelines (such as the AASHTO Motorway Drainage Guidelines) to minimize impacts of road drainage on surrounding water resources (e.g. Sazlidere Creek). Such practices will include, e.g. measures to slow peak runoff flow (retention basins, rock/riprap), reduce sediment load, and increase infiltration, including vegetated swales (planted with salt-resistant vegetation), filter strips, terracing, check dams, detention ponds or basins, or infiltration trenches. ■ Design the channels keeping the existing channel hydro morphology and any bank/bed protection to be sympathetic to the existing form.
Resource and Wastes	■ Select the aggregate sources (quarries and borrow pits) and surplus material dumpsites considering the potential E&S impacts of extraction, processing and transport.
Biodiversity and Conservation	■ Wherever possible, avoid critical terrestrial and aquatic habitat (e.g. forests) when siting the roads and supporting facilities. ■ Try to minimize removal of native plant species and replanting of native plant species in disturbed areas. ■ Wherever possible, avoid working in or near watercourses will be avoided (by avoiding locating structures within water bodies) to the extent possible.
Noise and Vibration	■ Wherever possible, consider designing the road below the level of the surrounding land. ■ Consider using road surfaces that generate less pavement/tire noise such as stone-matrix asphalt. ■ Consider the installation of noise barriers along the border of the right-of way (e.g. earthen mounds, vegetation, etc.) where passing through sensitive receptors cannot be avoided. ■ Locate the campsites and associated plants (e.g. crushers, mixers, loaders, generators, compressors, etc.) as far as feasible from residential areas and other sensitive receptors to reduce noise disturbance.

Subject	International Best Practices
Socio-Economic	■ Consult with provincial and local administrations about the implications of changes in regional accessibility and the implications for local development plans and zoning policies. ■ Consult with local people, affected landowners/users and businesses at early stage which may be affected by the Project and consider if the impacts are avoidable by micro-design changes. ■ Consult with vulnerable groups. ■ Consult with civil society institutions
Displacement of Existing Land Use, Property and People	■ Avoid impacts in design. ■ Minimise the area of land take, expropriation and demolition required for the Project. ■ Identify the utilities to be displaced in early stage (such as irrigation lines, electrical lines, wells, telecom lines, powerlines, etc.) and incorporate into design. ■ Engage with the Project affected people during design phase to get their feedback on the locations of the underpasses and overpasses to minimize the potential upcoming severance problems that may be difficult to manage once they are constructed. ■ If additional locations are identified – through public consultation, comments – where the issue of severance affects people significantly, it will be assessed where additional passages can be incorporated in the design.
Archaeology and Built Heritage	■ Engage with authorities based on the preliminary archaeological findings along the RoW. This will help the Project design team to understand if any route changes would be required to avoid the potential impacts on cultural heritage or other measures instructed by the authorities would be adequate (such as relocation of the assets which will not affect the route alignment). ■ Engage with communities to identify tangible and intangible cultural heritage.
Road Safety	■ Consider the usage of a real-time warning system with signage to warn drivers of congestion, accidents, adverse weather or road conditions, and other potential hazards ahead. ■ Design roads and bridges to minimize the accumulation of drifting snow on the roadway
Gender Friendly Design	■ Consider the “Workers’ Accommodation Processes and Standards IFC & EBRD Guidance Note” during the design of the campsites. ■ Consider the provision of safe, secure and separate living spaces for male and female employees. ■ Consider the provision of lighting around Project sites, at underpasses (where the underpasses serve also for pedestrian crossings) including around latrines and access routes.
Resource Efficiency and E-mobility	■ Consider optimal resource use (e.g. rainwater collection, re-using treated water, solar PVs) at campsites, etc.
Universal Access	■ Consider universal access principle ensuring accessibility to people with disabilities and other vulnerabilities. ■ Consider underpasses to be well lit, accessible, and safe for people with disabilities.

Embedded controls (i.e., physical or procedural controls that are planned as part of the Project design and are not added in response to an impact significance assignment), were considered as part of the Project (i.e. prior to the impact assessment stage of the ESIA Process). Accordingly, they are not described as mitigation measures in the individual topic assessment chapters.

THE MITIGATION HIERARCHY FOR PLANNED PROJECT ACTIVITIES
Avoid at Source; Reduce at Source Avoiding or reducing at source is designing the project so that a feature causing an impact is designed out (eg, a waste stream is eliminated) or altered (eg, reduced waste volume).
Abate on Site This involves adding something to the design to abate the impact (eg, pollution controls).
Abate at Receptor If an impact cannot be avoided, reduced or abated on-site then measures can be implemented off-site (eg, noise or visual screening at properties).
Repair or Remedy Some impacts involve unavoidable damage to a resource. Repair essentially involves restoration and reinstatement type measures.
Compensate/Offset in Kind Where other mitigation approaches are not possible or fully effective, then compensation, in some measure, for loss or damage might be appropriate.

Source: ERM 2020

Figure 4-5 Hierarchy of Options for Mitigation

4.4.6 Unplanned Events

This ESIA considers the impacts that are expected to result from planned activities on the physical, biological and the socioeconomic environment. It also considers cumulative impacts and impacts from unplanned events such as accidents.

These are different to impacts that would reasonably be predicted to occur in the normal course of activities (including the application of in-built control measures) during construction and operations.

4.4.6.1 Evaluation of Likelihood

Unplanned and accidental events, including natural hazards have the potential to occur during Project activities and therefore the evaluation of impacts for unplanned and accidental event takes into account the likelihood of the event occurring into the impact magnitude.

For unplanned events (e.g., accidental release of hazardous materials) the likelihood of the impact occurring is taken into consideration in deriving the magnitude rating. The likelihood of an impact occurring as a result of an unplanned event is expressed as a probability and is designated using a qualitative scale (or semi-quantitative, where appropriate data are available), according to the attributes described in Table 4-5 Definitions for Likelihood Designation for Unplanned Events).

Table 4-5 Definitions for Likelihood Designation for Unplanned Events)

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

4.4.7 Assessment of Residual Impact

Following the identification of mitigation measures, impacts are re-assessed to determine their residual impact. This is essentially a repeat of the impact assessment steps discussed above, albeit with a consideration of the assumed implementation of the mitigation measures.

However, it has to be noted that not all residual impacts can be fully mitigated. Due to the nature of the impact and the type of receptor, some impacts will remain as “moderate” despite implementation of mitigation measures.

4.4.8 Consultation and Stakeholder Engagement

A standalone Stakeholder Engagement Plan (SEP) has been developed for the Project, which will be publicly disclosed and made available for further questions, comments, and suggestions, as well as updated throughout the Project’s lifecycle.

Like the overall ESIA process, also the stakeholder engagement process was conducted in a two phased approach:

- during Scoping phase; and
- during Impact Assessment phase.

Several meetings and interviews were conducted respectively in each phase by Nakkaş Otoyol A.Ş., ERM&ACE and GEM to inform the key stakeholders about the Project. The feedback gathered from these consultation meetings have been considered during ESIA studies and Project design.

4.4.8.1 Engagements during the Scoping Phase

Details of engagements undertaken as part of the Scoping studies from April to June 2021 (aligning with the Project’s planning phase) are summarised in Table 4-6 below. Further planned stakeholder engagements are detailed in SEP.

Table 4-6 Details of Engagements undertaken during Scoping Phase

External Stakeholders	Party Leading the Engagement	Title	Topics of Discussion	Month	Mode of Engagement and Tools
Ministry of Environment and Urban Planning	Nakkaş Otoyol A.Ş.	Deputy General Manager	■ Information on the Project and planned Project Activities ■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	Face to face meetings
İstanbul Metropolitan Municipality City Planning Directorate and ISKI Fire Department	Nakkaş Otoyol A.Ş.	City Planning Manager	Same as above	April 2021	Face to face meetings
İstanbul Metropolitan Municipality Fire Department	Nakkaş Otoyol A.Ş.	Head of Fire Department	Same as above	April 2021	Face to face meetings
İstanbul Governorship	Nakkaş Otoyol A.Ş.	Deputy Governor	Same as above	April 2021	Face to Face meetings
İstanbul Provincial Directorate of Environment	Nakkaş Otoyol A.Ş.	-	■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	-
İstanbul Provincial Disaster and Emergency Directorate	Nakkaş Otoyol A.Ş.	Provincial Director	Same as above	April 2021	Face to Face meetings
İstanbul Provincial Health Department	Nakkaş Otoyol A.Ş.	Deputy Head of Investments	Same as above	April 2021	Face to Face meetings
İŞKUR – Başakşehir	Nakkaş Otoyol A.Ş.	Branch Manager	Same as above	April 2021	Face to Face meetings

External Stakeholders	Party Leading the Engagement	Title	Topics of Discussion	Month	Mode of Engagement and Tools
General Directorate of Motorways (KGM)	Nakkaş Otoyol A.Ş.	Chief Engineer	Presentation held by Nakkaş Otoyol A.Ş. HSE Manager to inform KGM about Project Environmental and Social requirements in line with Lenders standards.	April 2021	Face to Face meetings
İstanbul Provincial Directorate of Culture and Tourism	Nakkaş Otoyol A.Ş.	Deputy Manager of Museums	■ Information on the Project and planned Project Activities ■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	Face to Face meetings
District Governors of Başakşehir	Nakkaş Otoyol A.Ş.	District Governor	Same as above	April 2021	Face to Face meetings
District Governors of Arnavutköy	Nakkaş Otoyol A.Ş.	District Governor	Same as above	April 2021	Face to Face meetings
District Governors of Büyükçekmece	Nakkaş Otoyol A.Ş.	District Governor	Same as above	April 2021	Face to Face meetings
District Governors of Çatalca	Nakkaş Otoyol A.Ş.	District Governor	Same as above	April 2021	Face to Face meetings
Başakşehir Municipality	Nakkaş Otoyol A.Ş.	Deputy of Mayor	Same as above	April 2021	Face to Face meetings
Arnavutköy Municipality	Nakkaş Otoyol A.Ş.	Deputy of Mayor	Same as above	April 2021	Face to Face meetings
Büyükçekmece Municipality	Nakkaş Otoyol A.Ş.	-	■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	-

External Stakeholders	Party Leading the Engagement	Title	Topics of Discussion	Month	Mode of Engagement and Tools
Çatalca Municipality	Nakkaş Otoyol A.Ş.	Deputy of Mayor	■ Information on the Project and planned Project Activities ■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	Face to Face meetings
Avcılar Municipality	Nakkaş Otoyol A.Ş.	-	■ Submission of Project Information Brochure ■ Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	Official letter
Başakşehir Muhtars	Nakkaş Otoyol A.Ş.	■ Bahçeşehir 1 Mahallesi ■ Bahçeşehir 2 Mahallesi ■ Şamlar Mahallesi ■ Kayabaşı Mahallesi ■ Şahintepe Mahallesi ■ Ziya Gökalp Mahallesi	■ Information on the Project and planned Project Activities ■ Submission of Project Information Brochure Submission of formal letter requesting feedback on the topics to be considered during ESIA studies	April 2021	Face to Face meetings
Arnavutköy Muhtars	Nakkaş Otoyol A.Ş.	■ Deliklikaya Mahallesi ■ Ömerli Mahallesi ■ Yeşilbayır Mahallesi ■ Hadımköy, Mahallesi ■ Sazlıbosna Mahallesi	Same as above	April 2021	Face to Face meetings
Büyükçekmece Muhtars	Nakkaş Otoyol A.Ş.	Karaağaç Mahallesi	Same as above	April 2021	Face to Face meetings
Çatalca Muhtars	Nakkaş Otoyol A.Ş.	■ Nakkaş Mahallesi ■ Bahşayiş Mahallesi	Same as above	April 2021	Face to Face meetings
Avcılar Muhtars	Nakkaş Otoyol A.Ş.	■ Firuzköy Mahallesi ■ Tahtakale Mahallesi	Same as above	April 2021	Face to Face meetings

External Stakeholders	Party Leading the Engagement	Title	Topics of Discussion	Month	Mode of Engagement and Tools
İşkur Başakşehir	ERM and ACE	Branch manager and employment expert	Local Employment	April 2021	Interview via Phone Calls
Başakşehir and Arnavutköy District Agriculture Directorates	ERM and ACE	Directors	Agriculture and animal husbandry in the region	April 2021	Interview via Phone Calls
■ İstanbul Governorship ■ Social solidarity foundations of district governorships[21] ■ Social aid departments of district municipalities[22]	ERM and ACE	-	Information request on vulnerable groups at the neighbourhood levels: ■ Households below poverty line, ■ Women and children headed households, ■ Elderly, disabled ■ Syrian refugees	May – June 2021	Interview via Phone Calls
Başakşehir Muhtars	ERM and ACE	■ Bahçeşehir 1 Mahallesi ■ Bahçeşehir 2 Mahallesi ■ Şamlar Mahallesi ■ Kayabaşı Mahallesi ■ Şahintepe Mahallesi ■ Ziya Gökalp Mahallesi	■ Profile of neighbourhood ■ Livelihood Resources and Economic activities ■ Agriculture and Animal Husbandry ■ Land Acquisition ■ Employment and Procurement ■ Infrastructure and Services ■ Information Disclosure and Engagement ■ Vulnerable Groups ■ Problems of Neighbourhood ■ General Attitude Towards Project	April 2021	Interview via Phone Calls

[21] Interview requests were not accepted by the relevant authorities

[22] Interview requests were not accepted by the relevant authorities

External Stakeholders	Party Leading the Engagement	Title	Topics of Discussion	Month	Mode of Engagement and Tools
Arnavutköy Muhtars	ERM and ACE	■ Deliklikaya Mahallesi ■ Ömerli Mahallesi ■ Yeşilbayır Mahallesi ■ Hadımköy, Mahallesi ■ Sazlıbosna Mahallesi	Same as above	April 2021	Interview via Phone Calls
Büyükçekmece Muhtars	ERM and ACE	Karaağaç Mahallesi	Same as above	April 2021	Interview via Phone Calls
Çatalca Muhtars	ERM and ACE	■ Nakkaş Mahallesi ■ Bahşayiş Mahallesi	Same as above	April 2021	Interview via Phone Calls
Avcılar Muhtars	ERM and ACE	■ Firuzköy Mahallesi ■ Tahtakale Mahallesi	Same as above	April 2021	Interview via Phone Calls

4.4.8.2 Engagements during the ESIA and Construction Phase

ERM, ACE, Nakkaş Otoyol A.Ş. and GEM Sustainability applied various modes of engagement and tools due to ongoing COVID restrictions in Turkey in 2021, to obtain more feedback of potentially affected communities and incorporate this feedback into the impact assessment process. ESIA team followed EBRD's Guidance on Stakeholder Engagement during COVID 19 restrictions as provided in Table 4-7:

Table 4-7 Details of Engagements undertaken during ESIA and Construction Phase

External Stakeholders	Party Leading the Engagement	Topics of Discussion	Month	Mode of Engagement and Tools
Nature Association (Doğa Derneği)	Nakkaş Otoyol A.Ş.	■ Information sharing regarding the Project, including the background of the Project ■ Feedback request to understand expectations from the Project	August 2021	Formal letter
WWF (Doğal Hayatı Koruma Vakfı)	Nakkaş Otoyol A.Ş.	Same as above	August 2021	Formal letter
Turkey Global Environmental Organization (GEO)	Nakkaş Otoyol A.Ş.	Same as above	August 2021	Formal letter
TEMA Foundation (TEMA Vakfı)	Nakkaş Otoyol A.Ş.	Same as above	August 2021	Formal letter
Headmen of the affected settlements	■ Nakkaş Otoyol A.Ş. ■ ERM ■ GEM	■ Information sharing regarding the Project, including the background of the Project ■ Details of land identified for the Project (temporary and permanent) and the process and timelines of acquisition and their rights under the law ■ Resettlement and land acquisition process ■ Understanding of the socio-economic profile of landowners and the details of income generated ■ Grievance Mechanism related information ■ Generic discussion to understand expectations from the Project	August 2021 October 2021 December 2021	■ Face to face meetings ■ Telephonic interactions in case Covid related precautions exist or face to face meeting is rejected. ■ Community level questionnaires (with headmen of the affected settlements)
Commercial enterprises including affected factories, local businesses	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings ■ Interviews with the commercial enterprises and businesses (including affected factories)
Land Owners	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings ■ Household level questionnaires

External Stakeholders	Party Leading the Engagement	Topics of Discussion	Month	Mode of Engagement and Tools
Land Users	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings ■ Household level questionnaires
Land Owners/Users (Women meetings/interviews)	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings
Vulnerable persons affected from project-related land acquisition	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings
Other Governmental stakeholders	■ Nakkaş Otoyol A.Ş. ■ GEM	Same as above	August 2021	■ Face to face meetings
Residences along the RoW-Head of Aşiyan Residences	■ Nakkaş Otoyol A.Ş.	■ Information sharing regarding the Project, including the background of the Project ■ Grievance Mechanism related information ■ Detailed information was also provided about the duration of construction works and potential impacts on the residences (such as parking lot entrance and exit directions, roads to be closed to traffic and pedestrian roads, community safety and landscaping works, etc.). ■ Details of land identified for the Project (temporary and permanent) and the process and timelines of acquisition and their rights under the law ■ Resettlement and land acquisition process	December 2021	■ Face to face meeting
Residences along the RoW-Head of Yeniköy Residences	■ Nakkaş Otoyol A.Ş.	Same as above	December 2021	■ Face to face meeting
Residences along the RoW-Head of Hisar Residences	■ Nakkaş Otoyol A.Ş.	Same as above	December 2021	■ Face to face meeting
Residences along the RoW-Head of Salacak Residences	■ Nakkaş Otoyol A.Ş.	Same as above	December 2021	■ Face to face meeting
Residences along the RoW-Technical Staff of Aşiyan Residences	■ Nakkaş Otoyol A.Ş.	Information about the overhead transmission lines displacement works to be carried out at their residences at KM 59+000.	January 2022	■ Face to face meeting

External Stakeholders	Party Leading the Engagement	Topics of Discussion	Month	Mode of Engagement and Tools
Sular Valley Mass Building Management	■ Nakkaş Otoyol A.Ş.	Same as above	January 2022	■ Face to face meeting
Residences along the RoW-Technical Staff of Yeniköy Residences	■ Nakkaş Otoyol A.Ş.	Same as above	January 2022	■ Face to face meeting
Residences along the RoW-Technical Staff of Hisar Residences	■ Nakkaş Otoyol A.Ş.	Same as above	January 2022	■ Face to face meeting
Sular Valley Mass Building Management	■ Nakkaş Otoyol A.Ş.	Same as above	January 2022	■ Face to face meeting
Residences along the RoW-Head of Kayaşehir 1st Zone	■ Nakkaş Otoyol A.Ş.	■ Information sharing regarding the Project, including the background of the Project ■ Grievance Mechanism related information ■ Detailed information was also provided about the duration of construction works and potential impacts on the residences (such as parking lot entrance and exit directions, roads to be closed to traffic and pedestrian roads, community safety and landscaping works, etc.). ■ Details of land identified for the Project (temporary and permanent) and the process and timelines of acquisition and their rights under the law ■ Resettlement and land acquisition process	February 2022	■ Face to face meeting
Residences along the RoW-Head of Kayaşehir 8th Zone	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting
Residences along the RoW-Head of Kayaşehir 2nd Zone	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting
Residences along the RoW-Head of Kayaşehir 4th Zone	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting
Başakşehir Municipality Public Relations Manager	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting

External Stakeholders	Party Leading the Engagement	Topics of Discussion	Month	Mode of Engagement and Tools
Residences along the RoW-Head of 15th Zone 1st Section	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting
Residences along the RoW-Head of Emlak Konut Başakşehir Residences 1st Section	■ Nakkaş Otoyol A.Ş.	■ Same as above	February 2022	■ Face to face meeting
Basaksehir District Governorate	■ Nakkaş Otoyol A.Ş.	■ Same as above	March 2022	■ Face to face meeting
Residences along the RoW-Head of Vadiyaka Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	March 2022	■ Face to face meeting
Residences along the RoW-Head of Temizkent Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	March 2022	■ Face to face meeting
Residences along the RoW-Head of Şirin Köyüm Çayyaka Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	March 2022	■ Face to face meeting
Residences along the RoW-Head of Özkaymak Residences	■ Nakkaş Otoyol A.Ş.	■ Information about overhead transmission lines displacement works to be carried out at their residences.	April 2022	■ Face to face meeting
Residences along the RoW-Head of Yeniköy Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	April 2022	■ Face to face meeting
Residences along the RoW-Head of Hisar Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	April 2022	■ Face to face meeting
Residences along the RoW-Head of Asiyan Residences	■ Nakkaş Otoyol A.Ş.	■ Same as above	April 2022	■ Face to face meeting
Doga Dernegi (Representative of Birdlife International in Turkey)	■ Nakkaş Otoyol A.Ş. ■ ERM	■ Consultation Request on Project risks/impact relate to bird species and IBAs (particularly from the perspective of a planned cable-stayed suspension bridge	August 2022	■ E – mail
Birdlife International Headquarter	■ Nakkaş Otoyol A.Ş. ■ ERM	■ Same as above	August 2022	■ E – mail

4.4.9 Key Issues Raised During Initial Stakeholder Engagements

There has been several meetings with key stakeholders during the ESIA preparation. Their feedback was recorded during engagements which have been considered during ESIA studies and incorporated into the Project design.

There will be a serious of disclosure meetings to seek for further feedback from all relevant stakeholders during the ESIA disclosure period. Their feedback will be assessed and incorporated into the final ESIA where relevant. A separate Public Consultation and Disclosure Report will be prepared and disclosed at the end of the 60 days ESIA disclosure period. Post disclosure, in line with the SEP commitments, the stakeholder engagement process will continue during the construction and operation of the Project.

The ESIA will be updated based on the stakeholder feedback after 60 days ESIA disclosure process to address this and any other stakeholder issues.

Feedback received from stakeholders during ESIA preparation is summarised below:

4.4.9.1 Information Disclosure and Engagement

There were mixed responses with regard to the the information disclosure and engagement among Muhtars. Muhtars of Başakşehir and Arnavuköy were aware about the Project on the northern routes where the bulk of the project will be carried out; however, Muhtars of Avcılar were less aware of the southern ends of the route.

Some of them knew about the route, whilst some heard about it through newspapers (mostly reading about the urgent expropriation decision), internet and statements of authorities and municipalities.

Some of the stakeholders stated that they received information from real estate brokers or lawyers looking for business opportunities during the land acquisition process.

4.4.9.2 Land Acquisition and Resettlement

Land ownership varies in different neighbourhoods. In some neighbourhoods of Başakşehir and Arnavutköy, the landowners along the route of the motorway are mostly people not residing in that neighbourhood. Empty lands were mostly sold to people outside of the village and neighbourhoods. Muhtars stated that they mostly do not know the owners.

Another issue is that in most of the villages, agricultural lands are mostly rented for farming purposes, and some locals have also rented treasury land through payment (ecrimisil). Some of the rural and remote areas in the north-western and south-western parts also accommodate unofficial users without any official contract. Unofficial small-scale barns and small-scale greenhouses also exist along the route.

There are also meadows in some villages and neighbourhoods where there is farming and animal husbandry. However, almost all the Muhtars stated that they are not really used anymore. Cattle is mostly kept in barns and fed with fodder, and the sheep flock herders prefer to graze their livestock on empty lands. Couple of Muhtars also stated that they received letters of change of status for meadows in their villages and that they will consent to that.

The expropriation process conducted by KGM in accordance with the Expropriation Law of Türkiye involves disclosure of information and consultation with the PAPs as described in the RAP – Section 6.1 (“Disclosure of Information and Consultation "). For the Project, Accelerated Expropriation Decisions were published in the Official Gazette of Türkiye on 3 November 2020[23] and 4 September 2021[24]. As the Decisions include the list of parcels (with lot and parcel number) to be expropriated in each

[23] https://www.resmigazete.gov.tr/eskiler/2020/11/20201104-13.pdf

[24] https://www.resmigazete.gov.tr/eskiler/2021/09/20210904-5.pdf The Proposed plan to organise public meetings in each settlement in the project area is subject to COVID-19 restrictions. If the organisation of such public meetings is not considered appropriate due to safety considerations the approach will be redefined.

neighbourhood in line with Article 27 of the Expropriation Law, expropriation information is publicly available to all stakeholders including the PAPs. Based on the Accelerated Expropriation Decisions, KGM has the right to initiate court cases in line with the construction schedule and depending on the current expropriation budget available for payment to right holders – prioritising the parcels that are required for construction relatively earlier than other parcels. On the other hand, in this Project, KGM has prioritised negotiated settlements through Article 8 (purchasing method) under the Expropriation Law.

As indicated in the RAP, based on reconciliation negotiation meetings held by KGM in line with Article 8, to date, agreement has been reached with the owners/shareholders of 176 parcels based on November 2021 Valuation (out of 1,239 private parcels) and disagreement has been established through execution of official disagreement memorandums for 8 parcels based on November 2021 Valuation.

In consideration of the agreement and disagreement levels (per Article 8 of the Expropriation Law) and outcomes of the engagement with the PAPs, KGM has decided to update the Valuation Report in November 2022 based on the valuation update study which was conducted by a national engineering firm appointed by Nakkaş Otoyol A.Ş. (in September 2022) with the approval of KGM. The valuation update study is required to take into consideration Lenders requirements for full replacement cost, taking the current market prices, landmark court decisions, precedent sales values, current building unit prices published by the Ministry of Environment and Urbanisation, etc. into consideration as required by KGM's Technical Specifications for the Services to be Procured for the Valuation of Immovables issued in February 2019 (referred to as Valuation Technical Specifications") and in line with KGM's internal procedures on valuation.

As indicated in the RAP, based on reconciliation negotiation meetings held by KGM in line with Article 8, to date, in total (affected and non-affected private parcels), consent agreements have been reached for 373 parcels (176 parcels acquired in 2021-2022 based on November 2021 Valuation and 197 parcels acquired in 2023 based on December 2022 Valuation)(out of 1,239 private parcels) and disagreement has been established through execution of official disagreement memorandums for 8 parcels based on November 2021 Valuation and 3 parcels based on December 2022 Valuation.

Based on the updated Valuation for the Project, KGM will initiate and undertake Article 8 process (purchase method) prioritising negotiated settlement with the owners/shareholders of the parcels to be expropriated in the next phases of the Project, with support to be provided by Nakkaş Otoyol A.Ş. to ensure adequate information of owners/shareholders regarding the process, their legal rights and further assistance to be provided by the Nakkaş Otoyol A.Ş. through RAP.

As part of RAP preparation, informal and formal agricultural users of affected parcels in affected settlements have been identified based on field surveys and interviews conducted with the settlement heads, leader farmers and other farmers in the settlements along the full alignment. Since June 2022, Nakkaş Otoyol A.Ş. has been engaging with the users of the affected parcels for the planning of community-level and household-specific livelihood restoration and/improvement measures, which are further detailed in RAP – Section 5.7 on "Livelihood Restoration, Improvement and Assistance".

Also, Nakkaş Otoyol A.Ş. has been engaging with the owners of the affected businesses (including tenants) and their employees since 2021 (including engagement done by the RAP Consultant of Nakkaş Otoyol A.Ş. in 2021 and 2022) to provide up-to-date information on the Project, land acquisition and RAP studies and collect information on the land and structure ownership, relocation planning (e.g. alternative locations, if any – with their advantages/disadvantages), anticipation for workforce loss/reduction, relocation assistance requirements, anticipation for relocation costs for different items (e.g. assembly, disassembly, moving, improvements required at the replacement structure, cost of temporary business interruption, etc.). Key issues identified as part of the business interviews are presented in RAP – Section 4.2.7.3 and have been reflected to the livelihood restoration, improvement and assistance measures designed for the affected businesses and their employees (please see RAP – Section 5.7 on "Livelihood Restoration, Improvement and Assistance" for details).

4.4.9.3 Animal Husbandry

Scoping stage calls did not reveal concise data. However, outcome of the calls indicated that the cattle is kept in barns and fed with fodder. Only sheep flocks are grazed and move around on empty lands and probably meadows. During the site visit it was also observed that sheep flocks were grazing especially around Sazlıdere dam and at the southern ends of the route.

4.4.9.4 Local Employment and Procurement

İSKUR branch office representatives stated that they were disappointed for not being contacted about the opportunities during the construction of Başakşehir Çam Sakura City Hospital. It was stated that the sub-contractors did not hire locals but rather brought their previous employees with them.

They claimed that no one was employed from Başakşehir during the operation stage of the hospital. It is not clear to what extent this claim is valid since Rönesans records indicate that 30% of the workers of hospital construction were residing at their homes, not campsites.

Some of the Muhtars in Başakşehir also noted that their residents worked at the construction of the hospital. Some of the Muhtars noted that people in their neighbourhood would not be interested in temporary works, they are more interested in permanent positions. But some other noted that there are many people who lost their jobs due to closures owed to the pandemic so they would be very interested in finding jobs, even temporarily. It is important that job opportunities are more widely advertised and Muhtars are informed and the İşkur database is used.

4.4.9.5 Health and Safety

Stakeholders contacted during scoping were comfortable about health and safety measurements and management of construction impacts. Some of them also noted that the Başakşehir Hospital construction did not disturb communities. However, linear construction could be different and necessary measures should be taken especially for sensitive receptors and buildings/housing areas very close to the construction site.

4.4.9.6 Utilities, services, problems of the Neighbourhoods

Almost in all neighbourhoods there was no reported problem on utilities, especially electricity, gas, water supply as well as services as the region hosts educational, health and sports facilities. Scoping calls did not report any land-based conflicts and any other major problems either. The biggest problem mentioned by the majority of Muhtars was the lack of zoning plans in some areas which prevents some local owners from constructing on their land. Couple of neighbourhoods reported that residents are disturbed of animal husbandry (odour) within urban settlements. In general, agriculture and animal husbandry are declining as the area continues to urbanize fast.

Based on the information received from Nakkaş Otoyol A.Ş., the community didn't have concerns on relocation of the overhead transmission lines except Head of Özkaymak Residences located at Km 58+700.

Head of Özkaymak Residences expressed that the new route of the overhead transmission line was close to the residents and the residents were concerned about exposure to radiation.

4.4.9.7 General Attitude towards Project

In general, host communities and local stakeholders seemed positive about the Project. Local residents and businesses already suffer from traffic in the area, and they are positive towards projects that would increase mobility and efficiency.

4.4.10 Public Disclosure of Draft ESIA

Following the compilation and submission of the ESIA to the Lenders for their consideration, the ESIA will be subject to public comment through disclosure. Consultation will take place through a disclosure process, and the availability of ESIA will be published in mass media and announced in local media of the four districts. Nakkaş Otoyol A.Ş. will organise Public Meetings in all the districts in the Project area to also disclose the Resettlement Action Plan.[25]

Prior to commencement of the ESIA disclosure process all engaged stakeholders will be informed of the public hearings and community meetings venues and where they can access the copies of the ESIA. All meetings will be conducted in Turkish also having English and Arabic speaking interpreters for participants that require translation during the meetings.

ESIA Disclosure Programme has been detailed in SEP. This programme took into account the latest COVID-19 related measures and strategies to disclose the ESIA in coordination with KGM and traditional authorities. The programme outlines in detail the stakeholders to be engaged, engagement methodologies and dates and venues. Moreover, the grievance mechanism will be disseminated in the affected communities during the ESIA and Resettlement Action Plan disclosure period. The Project ESIA package including RAP, SEP, GLAC, Community information leaflet and NTS will be disclosed both in English and Turkish. Community leaflet, grievance mechanism and project benefits and entitlements for migrant workers will be translated into Arabic as well.

A Public Disclosure and Consultation Report will be prepared by Nakkaş Otoyol A.Ş. after the ESIA disclosure is over.

The ESIA will be updated based on the stakeholder feedback after 60 days ESIA disclosure process to address this and any other stakeholder issues.

Nakkaş Otoyol A.Ş. will continue to engage with Stakeholders during construction and operation of the Project as set out in the SEP. At any time, interested persons can provide comments/queries to Nakkaş Otoyol A.Ş. via following channels:

- Free Telephone Hotline within Turkey (available 7/24): **0 800 655 10 00**
- Project website at www.nakkasotoyolu.com
- ´Community Liaison Chief: Mr. Baran Demirpence via e-mail: baran.demirpence@ronesans.com or via mobile phone: +90 538 682 68 94

[25] The Proposed plan to organise public meetings in each settlement in the project area is subject to COVID-19 restrictions. If the organisation of such public meetings is not considered appropriate due to safety considerations the approach will be redefined.

5. ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Introduction

It is important to gain an understanding of the physical, biological, and social attributes of the Project Area of Influence (AoI) and provide a clear baseline description. The description of the baseline environment is essential in that it represents the conditions before the construction of the Project. The description of the baseline environment therefore provides a description of the current or *status quo* environment against which social and environmental impacts of the Project are assessed and future changes monitored.

The baseline information presented in this chapter has been collected between via desktop studies, supplemented with numerous field surveys and consultation with stakeholders within Project AoI as described in Chapter 4.3. and as listed in Chapter 4.4.8.

The Yesilbayir Connection Road was originally included in the Project design to connect the Nakkas-Basaksehir Motorway to the existing E80 Motorway (Trans European Motorway – TEM) through the Nakkas Interchange planned at KM 36+540. This connection road was designed at the time in consideration of a railway logistics centre planned by the Turkish State Railways Authority (TCDD). As this logistic centre was not included in TCDD's investment planning (cancelled at the feasibility stage), KGM decided that the Yesilbayir Connection Road would not be an essential component of the Nakkas-Basaksehir Motorway. This being the case, the Yesilbayir Connection Road was removed from the latest Project design. As such, the ESIA was amended to address the impacts associated with this design change, although the baseline remained unchanged as the route alignment had not been altered. The cancellation of the Yesilbayir Connection Road on the Project has reduced potential risks and impacts that would have been caused by the Project's land acquisition requirements as well as avoiding other environmental and social risks associated with construction and when the Motorway becomes operational.

The Chapters are organised as follows:

- Physical Environment:
  - Climate
  - Air Quality
  - Geology and Soil
  - Resources and Wastes
  - Surface and Groundwater
  - Noise and Vibration
  - Landscape and Visuals
- Biological Environment:
  - Protected and Designated Areas
  - Habitats
  - Flora
  - Fauna
  - Aquatic Ecosystems
  - Invasive Species
- Socio-Economic:
  - Governance and Administration

- Human Rights including labour context, local communities' rights, gender equality, gender-based violence and harassment, use of force by public and private security, community safety, security , retaliation, and reprisal risks. Gender Based Violence and Harassment.
- Public Infrastructure
- Local Traffic
- Demographic Profile
- Land ownership and Land Use
- Economy and Employment
- Supply Chain
- Livelihood Activities
- Community Health, Safety and Security
- Vulnerability
- Occupational Health and Safety
- Tangible and Intangible Cultural Heritage

5.2 Physical Environment

5.2.1 Climate

5.2.1.1 Methodology and Information Sources

The ESIA team used the secondary data relating to the existing and future climate in the area in order to frame the "Baseline Climate Assessment" and "Future Projections of Climate Change".

Overview of historic climate (such as temperature and precipitation) and extreme weather conditions (such as floods) were gathered through the following sources which outline past and present climate in Turkey and within the specific region of focus:

- GERIC Climate Service Centre Germany (2016) Climate-Fact-Sheet Turkey
- Climate-data.org (2021) İstanbul Climate
- Meteoblue (2021), University of Basel, Switzerland
- The Global Facility for Disaster Reduction and Recovery (GFDRR) Think Hazard
- The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report open-source data from the Coupled Model Inter-comparison Project (CMIP5)
- World Bank, Climate Change Knowledge Portal

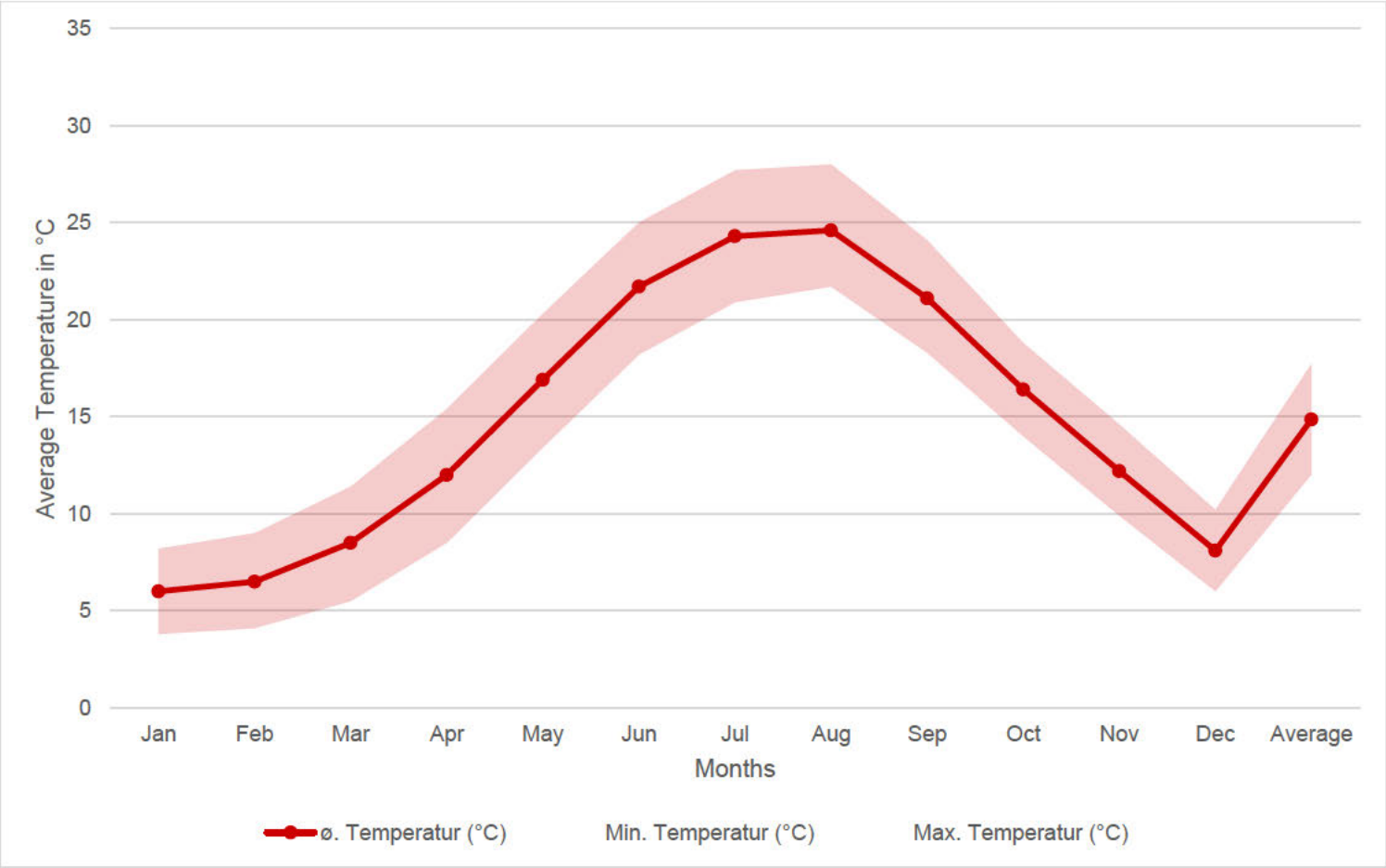
5.2.1.2 Climate Features of the Project Area

According to the Köppen-Geiger Climate-Classification, the Project area is generally classified as Hot-summer Mediterranean Climate (Csa). Typical features of the Csa climate type are:

- Dry summers with average monthly temperatures in excess of 22.0 °C during its warmest month with less than 30 mm of precipitation; and
- Wet winters with an average in the coldest month between 18 and −3 °C and at least three times as much precipitation in the wettest month of winter as in the driest month of summer.

5.2.1.3 Temperature

The monthly temperature in İstanbul averages 15 °C throughout the year. June – September are the warmest months of the year with temperature averages above 20 °C. January is the coldest month with average temperature of 3.8 °C. Figure 5-1 shows the temperature fluctuations throughout the year.



Source: Climate-data.org, 2021[26]

Figure 5-1 Average Monthly Temperature in İstanbul

[26] Climate-data.org (2021) İstanbul Climate. Available at: https://en.climate-data.org/asien/tuerkei/İstanbul/İstanbul-715086/ .The baseline data mentioned here were collected in the 30-year period between 1991 and 2021.

Observed[27] mean annual temperature over the past 30 years has increased at a statistically significant rate of approx. 0.5 °C per decade in Turkey.

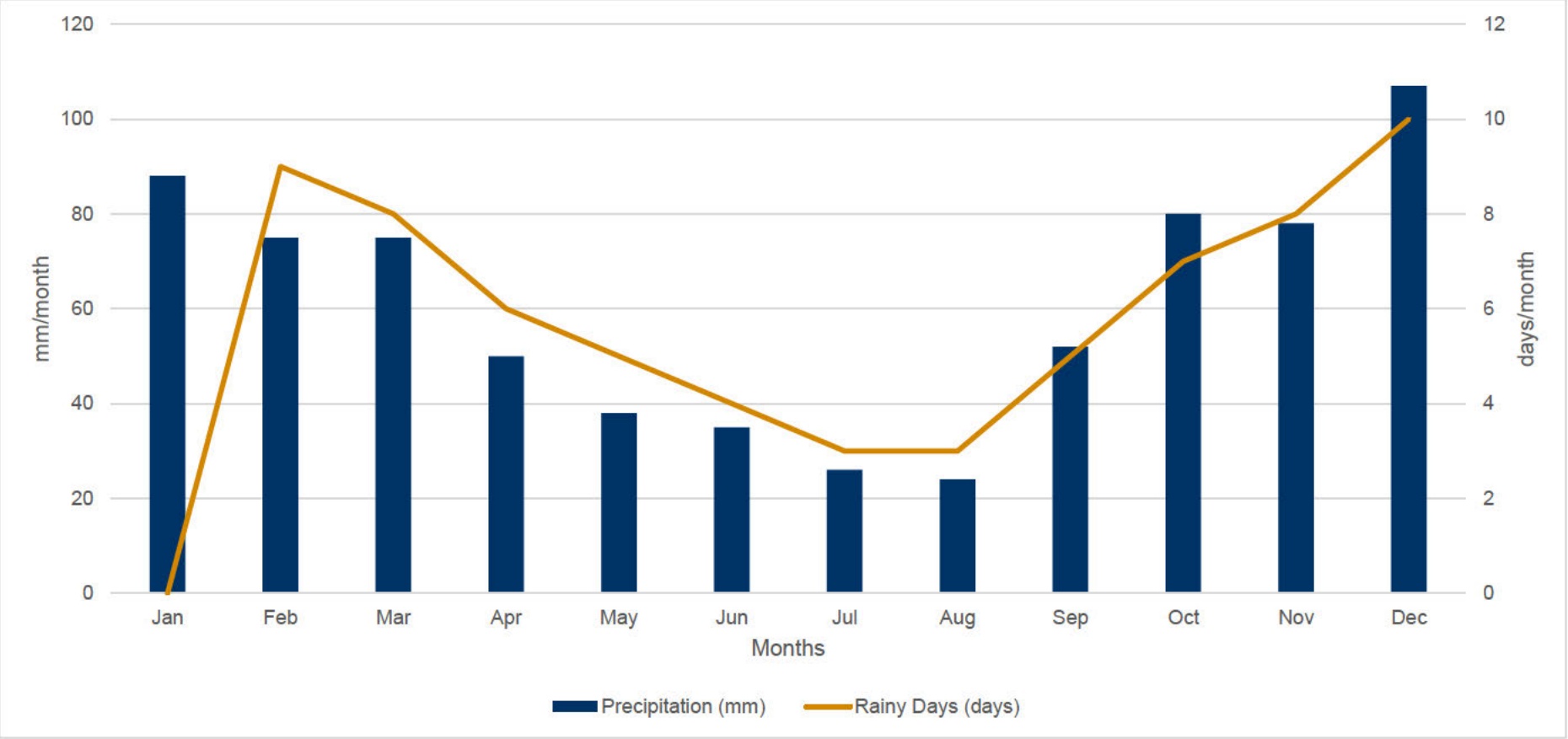
5.2.1.4 Precipitation[28]

The average annual precipitation in İstanbul amounts to 728 mm. This corresponds to a monthly average of about 61 mm. The driest months are July and August, with approx. 25 mm of rain. The greatest amount of precipitation occurs in December, with an average of 107 mm. The rainy days per month are on average 6 days. During the year, a month has on average between 0 and 10 rainy days. Figure 5-2 shows the average monthly values for rainfall and rainy days in İstanbul.

Due to dry summers and mild to cool, wet winters, İstanbul has some humid months during the winter months from November until February. The most humid month is January with 79 % relative humidity.

[27] GERIC Climate Service Center Germany (2016) Climate-Fact-Sheet Turkey.

[28] Data on precipitation stems primarily from Climate-data.org (2021) Istanbul Climate.



Source: Climate-data.org, 2021[29]

Figure 5-2 Average Monthly Precipitation and Rainy Days in İstanbul

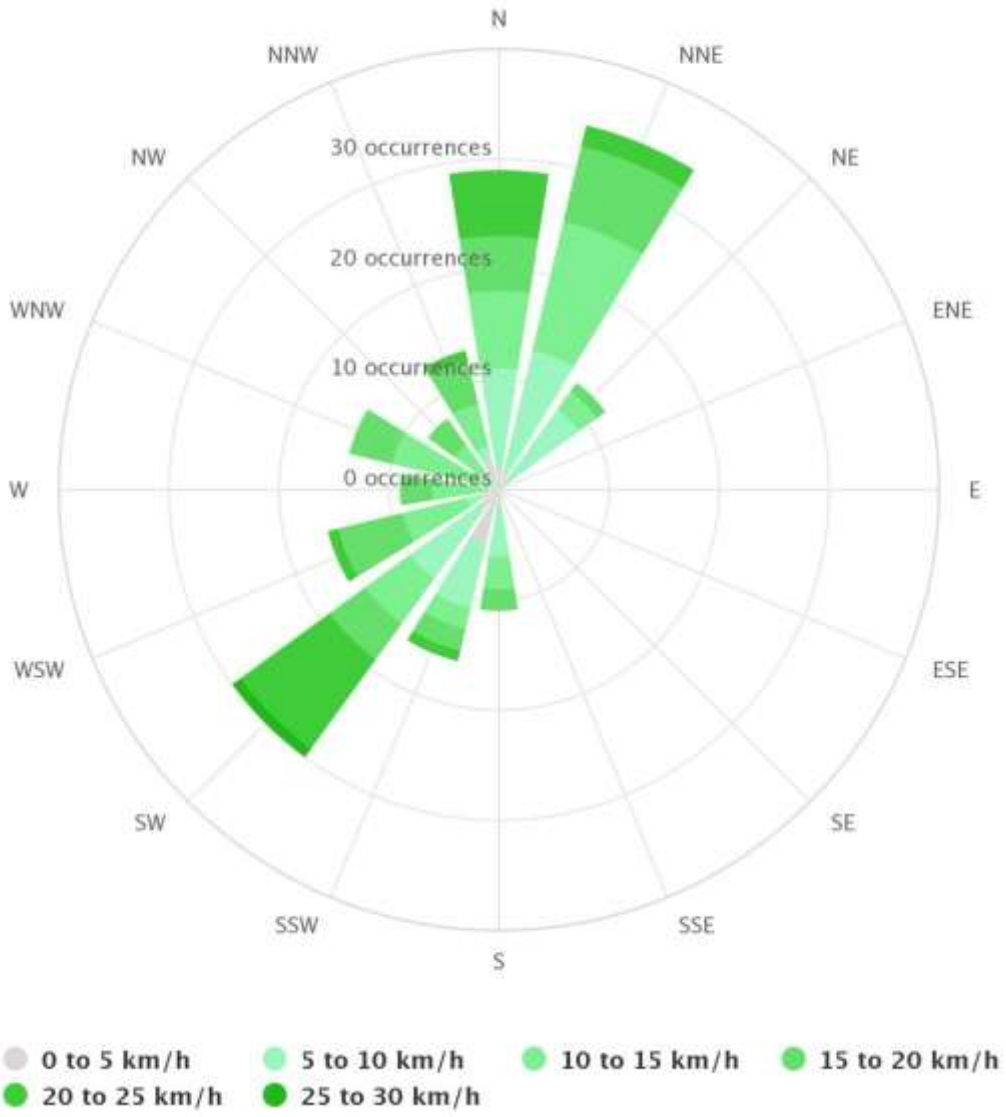
[29] Climate-data.org (2021) İstanbul Climate. Available at:https://en.climate-data.org/asien/tuerkei/İstanbul/İstanbul-715086/

A slight increase in annual precipitation has been observed[30] over the past 30 years, while that for the oceanic area is somewhat stronger than for the continental zone.

5.2.1.5 Wind

The wind rose in Figure 5-3 for İstanbul shows the relative intensity and direction of wind occurrence over the year.

Almost no change of the annual mean wind speed was observed over the last 30 years or is projected for the future. Confidence in these findings is medium[31].



Source: meteoblue, 2021[32]

Figure 5-3 Wind rose for İstanbul

[30] GERIC Climate Service Center Germany (2016) Climate-Fact-Sheet Turkey.

[31] GERIC Climate Service Center Germany (2016) Climate-Fact-Sheet Turkey.

[32] Meteoblue (2021) Available at:https://www.meteoblue.com/en/weather/archive/windrose/İstanbul_turkey_745044 [18.06.2021]

5.2.1.6 Extreme Weather Events and Natural Hazards

In general, Turkey has been subject to several types of extreme weather events in recent years stemming from a combination of increasing average temperatures and more frequent drought conditions. For example, a heat wave in the Eastern Mediterranean during the summer of 2021 (including the hottest month of May in Turkey in past 50 years) supported the spread of several 100 wildfires across southern Turkey destroying some 1700 km² of forests[33].

Whilst the Project area in Istanbul did not suffer directly from the 2021 wildfires, the area is subject to wildfire risks and several other kinds of natural hazards as listed inTable 5-1.

Some sections of the Motorway are located in close proximity (less than 1km) of water courses. For instance, the RoW runs in certain sections along the Küçükçekmece and Sazlıdere dam lake. Nevertheless, in the Project region the risk of flash flooding is considered medium, whilst river flood and urban flood are considered low. And given the distance of several kilometres to the Marmara Sea, the risk of coastal flooding is very low/negligible. The Istanbul area has potentially rainfall patterns, terrain slope, geology, soil, land cover and earthquakes that make localized landslides (and resulting flash-flooding) an infrequent hazard phenomenon (considered as a medium hazard).

In the Project area water scarcity is a medium hazard, which means that there is up to 20% chance droughts will occur in the coming 10 years.

Extreme heat hazard in the Project area is classified as low based on current information. This means that there is between a 5% and 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years. But there is a greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year.

Table 5-1 Relevant Natural Hazards in the Project area

Hazard	Hazard Level Valuation
Extreme heat	**Medium**
Wildfire	**High**
River flood	**Low**
Urban flood	**Low**
Coastal Flood	**Very low**
Landslides/Flash Flooding	**Medium**
Water scarcity	**Medium**

Source: Think Hazard, 2021[34]

5.2.1.7 Climate Change Scenarios

ERM uses national climate projections data when assessing the impact of climate change on climate hazards for the Project location. The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report open-source data from the Coupled Model Inter-comparison Project (CMIP5) is the source of data used in the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) to assess these future changes. The IPCC model provides a series of 'Representative Concentration Pathways' (RCPs), which are a series of scenarios that vary depending on the basis of the projected greenhouse gas (GHG) emissions over the next century. With increasing projected GHG emissions, there is the potential for a change in the climate conditions at a given area (e.g. precipitation and/or temperature changes).

[33] https://en.wikipedia.org/wiki/2021_Turkey_wildfires

[34] The Global Facility for Disaster Reduction and Recovery (GFDRR) Think Hazard. Available at: https://thinkhazard.org/en/report/3056-turkey-İstanbul [18.06.2021]

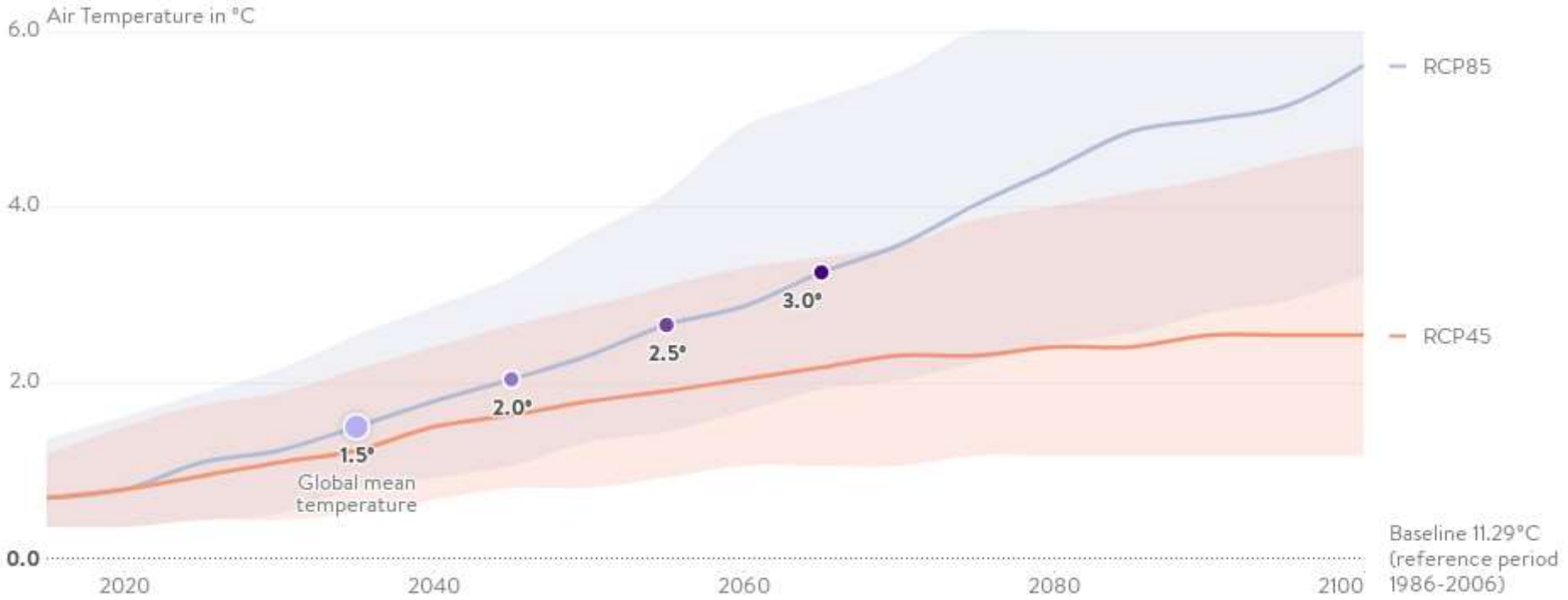
The Task Force on Climate-related Financial Disclosures (TCFD) recommends that two scenarios are used for this type of assessment, one for a future projected 'business as usual' climate change scenario (RCP 8.5) and an additional scenario reflecting a lower emissions outcome. For such assessments, ERM utilises the RCP 4.5, as this aligns most closely with the goals of the Paris Agreement. Table 5-2 describes the two RCP scenarios used for this assessment.

Table 5-2 Representative Concentration Pathways

RCPs	Scenario
4.5 (medium-low emission)	Intermediate pathway requiring that CO_2 emissions start declining by approximately 2045 to reach roughly half of the levels of 2050 by 2100.[35]
8.5 (BAU – high emission)	Pathway where emissions continue to rise throughout the 21st century (business-as-usual – BAU – scenario). Suggesting society does not make efforts to reduce GHG emissions and therefore reflect the worst-case scenario for the physical impacts of climate change.

The following Figure 5-4 shows that the absolute changes in temperature in Turkey at different global warming levels based on the RCP 4.5 and RCP 8.5 scenarios compared to the reference period 1986-2006 will increase. As expected, there is a rapid temperature rise for the RCP 8.5 high emission scenario. Temperature is projected to increase on average by 1.1°C in 2030 in the RCP 4.5 scenario and 1.2°C in the RCP8.5 scenario. In the year 2060 with the RCP 4.5 an increase on average of 2.0 °C is predicted and with the RCP 8.5 an increase of 2.9°C.

[35] Many plant and animal species will be unable to adapt to the effects of RCP 4.5 and higher RCPs.

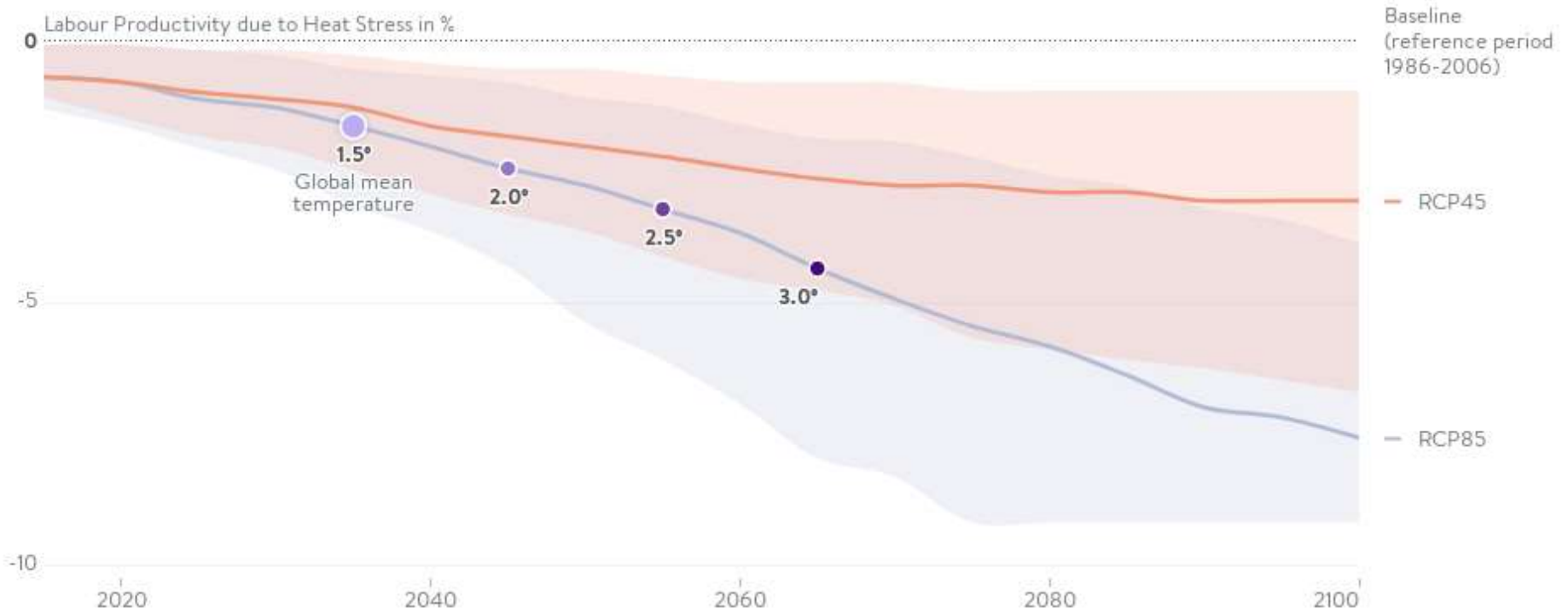


Source: Climate Analytics[36]

Figure 5-4 Projected absolute change in temperature in Turkey over time

[36] Climate Analytics, based on ISIMP Models. Available at: http://climate-impact-explorer.climateanalytics.org/impacts/

The projected change in labour productivity in Turkey due to heat stress can be seen in Figure 5-5. The labour productivity is expected to decrease as global warming increases. The model shows that with global warming level of around 1.5°C, the productivity of employees drops by mean 1.7 % compared to the reference period.



Source: Climate Analytics

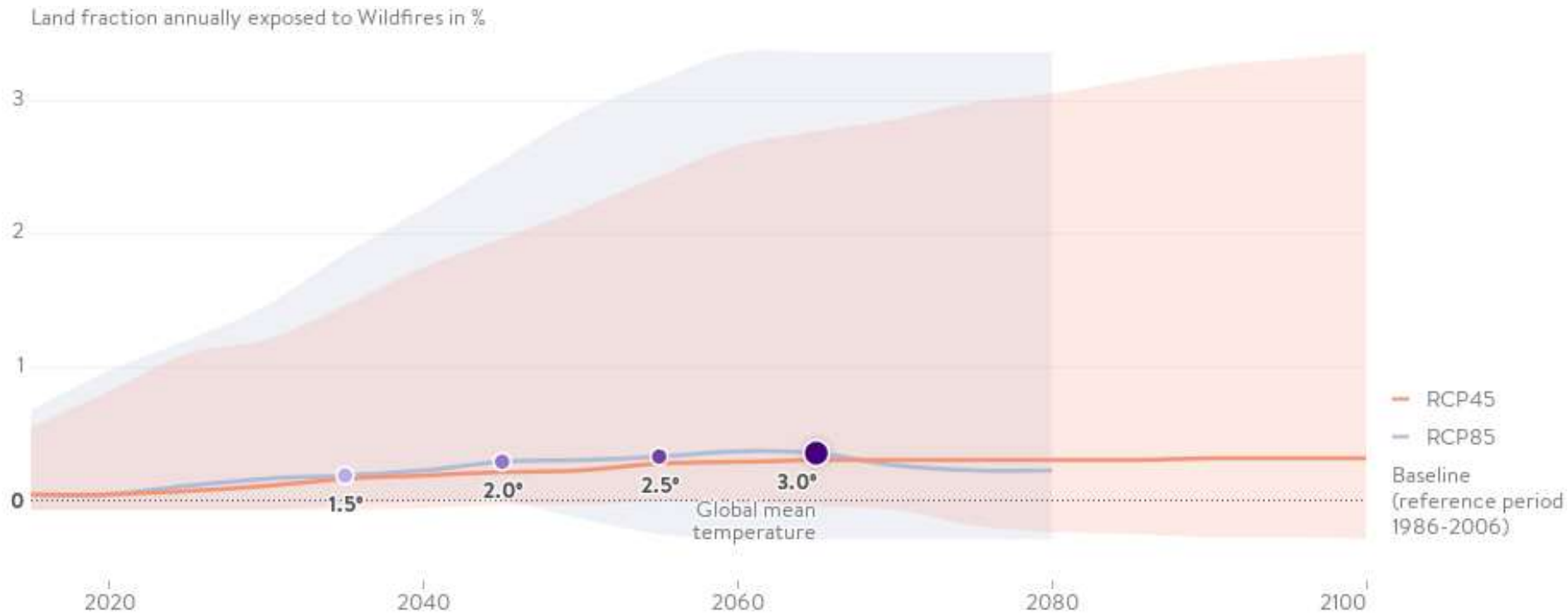
Figure 5-5 Projected Change in Labour Productivitiy due to Heat Stress in Turkey over time

Figure 5-6 shows how changes in land fraction exposed to wildfires each year (expressed in percent) will develop over time based on different global warming levels compared to the reference period 1986-2006 based on the RCP8.5 and RCP4.5 scenarios.

Wildfires depend mostly on two factors soil moisture deficit and availability of fuel (vegetation). [37] Land fraction annually exposed to wildfires describes the land area fraction, within a grid cell of 0.5° resolution, burnt on average at least once a year by wildfires. Climate Analytics obtained these results with established simplified global vegetation models.

The land fraction exposed to wildfires is projected to increase 0.1 % with RCP 4.5 and 0.2 % with RCP 8.5 compared to the in 2030 it is predicted to increase 0.3 % with RCP 4.5 and 0.4 with RCP 8.5 in 2060.

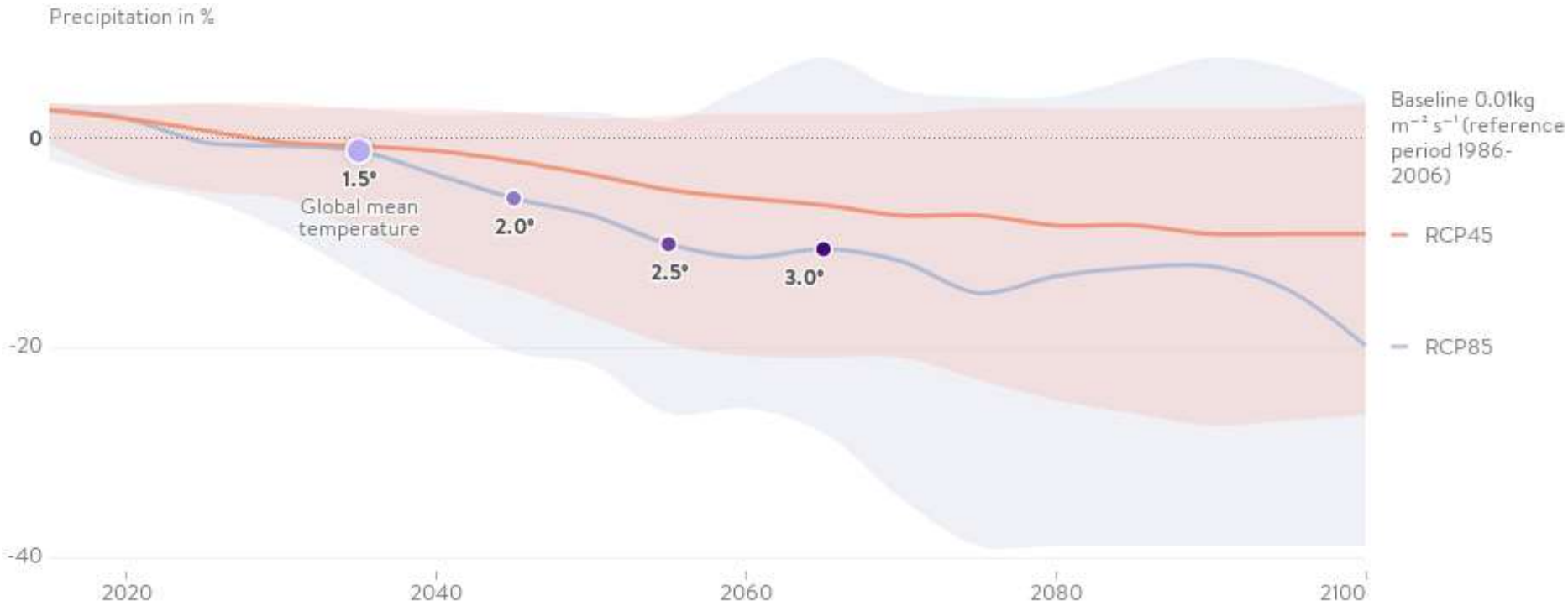
37 O, S., Hou, X. & Orth, R. Observational evidence of wildfire-promoting soil moisture anomalies. Sci Rep 10, 11008 (2020). https://doi.org/10.1038/s41598-020-67530-4.



Source: Climate Analytics

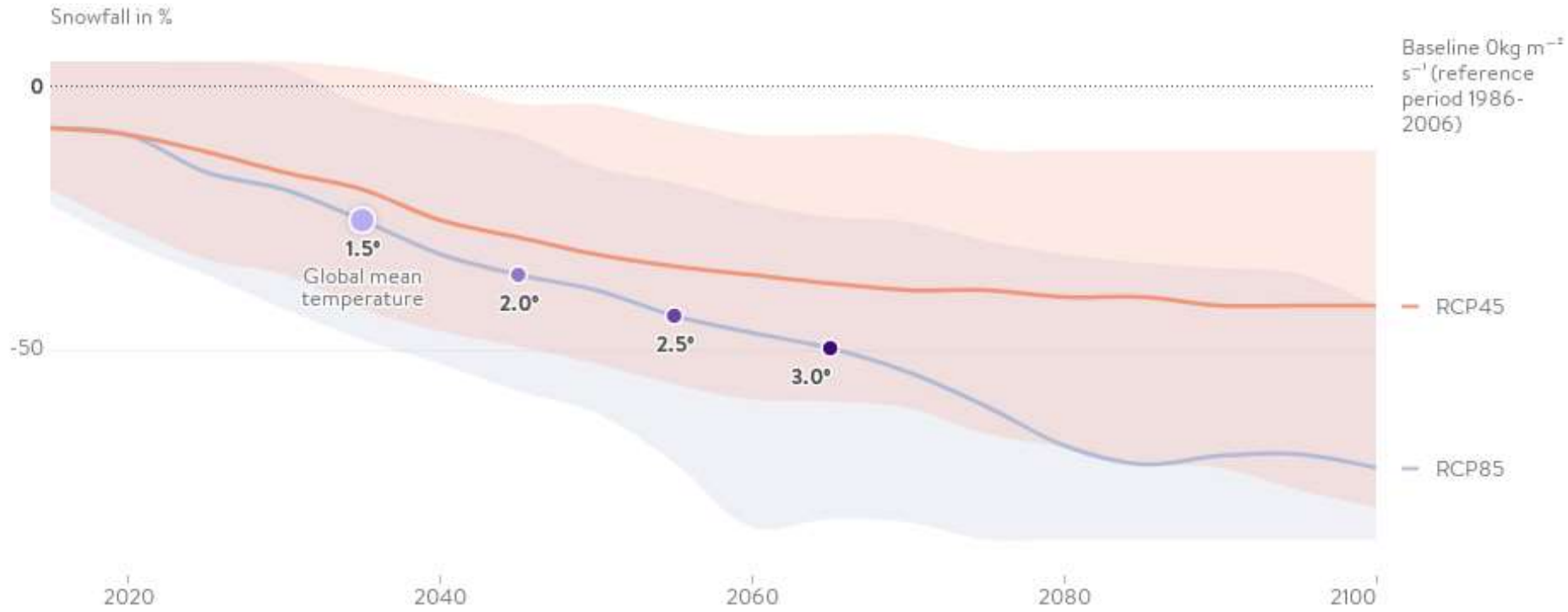
Figure 5-6 Projected Change in Land fraction exposed to Wildfires in Turkey over time

The Figure 5-7 shows changes in precipitation compared to the baseline based on the RCP 4.5 and RC P8.5 scenarios. For instance, in 2030, with the RCP 4.5 the average precipitation will decrease 0.5 % and with RCP 8.5 the decline will be 0.8 %. In 2060, the decrease is significant with -5.9 % and -11.4 %. The decrease is even stronger predicted for snowfall (see Figure 5-8), with the RCP4.5 snowfall will decline 16.4 % by 2030 and 35.9 % by 2060. With the RCP8.5 snowfall in Turkey is projected to decline 19.8 % by 2030 and 46.6 % by 2060.



Source: Climate Analytics

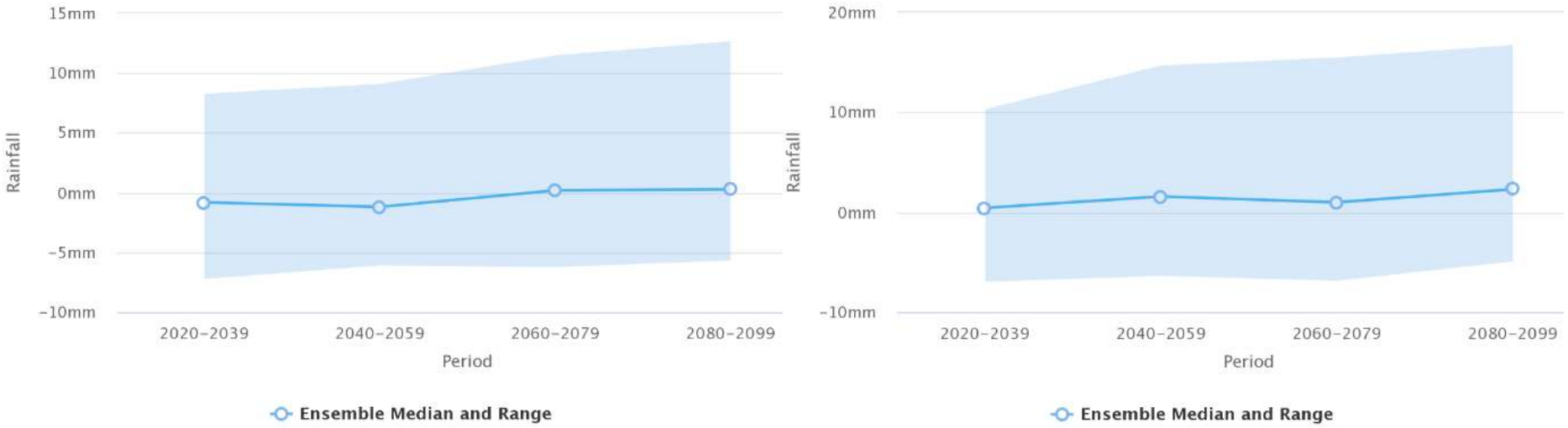
Figure 5-7 Projected Relative Change in Precipitation in Turkey over time



Source: Climate Analytics

Figure 5-8 Projected Relative Change in Snowfall in Turkey over time

The following Figure 5-9 shows the projected change in maximum daily rainfall in İstanbul at different global warming levels based on the RCP 4.5 and RCP 8.5 scenarios compared to the reference period 1986-2006. There are only minimal changes in precipitation forecasted. It is projected to decrease on average by 0.82 mm between 2020 and 2030 in the RCP 4.5 scenario and increase 0.43 mm in the RCP8.5 scenario. In 2060-2079 with the RCP 4.5 an increase on average of 0.18 mm and with the RCP 8.5 an increase of 0.99 mm is predicted.

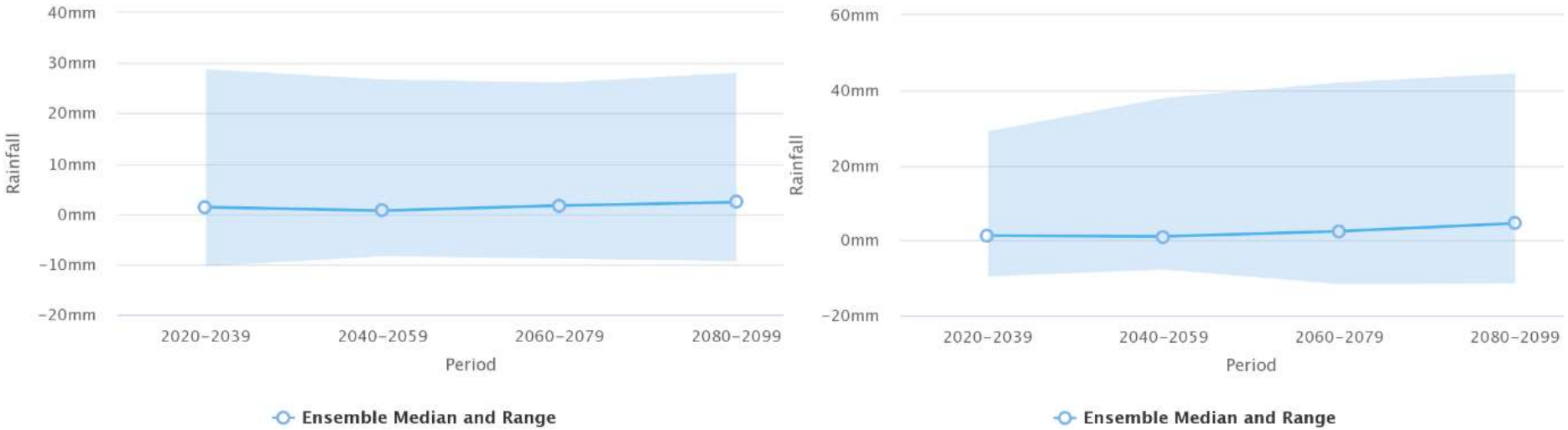


Source: World Bank[38]

Figure 5-9 Projected Change in Maximum Daily Rainfall for İstanbul with RCP4.5 (left) and RCP8.5 (right)

[38] World Bank, Climate Change Knowledge Portal. Available at: https://climateknowledgeportal.worldbank.org/country/turkey/climate-data-projections [Retrieved 05.07.2021]

Figure 5-10 illustrates the projected change in maximum 5-day rainfall in İstanbul for the two different RCP 4.5 and 8.5 scenarios compared to the reference period 1986-2006. In the period from 2020 to 2039, the average median projected in the RCP 4.5 forecasts an increase of 1.35 mm and increase of 1.25 mm for the same period in the RCP 8.5 scenario. The change in maximum 5-day rainfall is forecasted to increase by an average of 1.67 mm in the RCP 4.5 scenario for the period from 2060 until 2079 and increase by 2.42 in the RCP 8.5 scenario.



Source: World Bank[39]

Figure 5-10 Projected Change in Maximum 5-day Rainfall for Turkey in İstanbul with RCP 4.5 (left) and RCP8.5 (right)

[39] World Bank, Climate Change Knowledge Portal. Available at: https://climateknowledgeportal.worldbank.org/country/turkey/climate-data-projections [Retrieved 05.07.2021]

5.2.1.8 Climate Resilience Approach of the Project

Nakkas Otoyol A.S appointed a third-party consultant BTY to to assess the physical resilience of the Project against climate risks in line with the greenhouse gas emission (GHG)-based scenarios and to address and minimize project-specific climate change vulnerabilities with the appropriate Project and design standards, and hereby to contribute climate adaptation actions of Turkey in the end.

In line with the materiality assessment and characteristics of Project components, it is concluded that material climate risks are extreme heat, landslide/extreme mass movement and floods. In some section of the design, extreme wind and wildfire is also considered as critical.

Adaptation measures for climate risks are reviewed and further suggestions have been provided where applicable the Project in Technical Due Diligence Report Version 1.1 | July 29, 2022, prepared by BTY as listed below:

- Extreme Heat:
  - Stone Mastic Asphalt (SMA) will be used instead of Asphalt Wearing Course. Using an SMA asphalt mix type can mitigate the impact of high temperatures as SMA offers superior durability and resistance to deformation compared to conventional asphalt. The Project uses an SMA in current design.
  - For further improvement of SMA, a polymer-modified bitumen (PMB) binder can be used to contribute asphalt material performance. This would cause the unit cost increase over conventional asphalt mixes. It can be considered as an adaptive measure along with the stone mastic asphalt.
  - The pavement temperature can be 5-10°C higher than the air temperature. Therefore, if the peak air temperature is 50°C it will likely exceed the softening point of wearing the course mix. PMB's generally have higher softening points than standard bitumen so again this would be a mitigating measure.
  - The O&M Company could include additional SCRIM and Roughness surveys after prolonged periods of high temperature to ensure pavement performance properties (such as skid resistance and surface roughness) are still within operational limits. The areas that are likely to be impacted are junctions or anywhere with slower-moving and turning traffic.
- Flood:
  - Increasing hydraulic culvert discharge and drainage system capacity is main possible measures to be taken. In the current design, both these measures have been adopted.
  - Including sub-soil drainage along the ditch line adjacent to the embankment can mitigate risks of flood.
  - Drainage design period is a significant mitigating factor. The drainage has been designed for 1 in 500-year flood events which mitigates the risk.
  - More regular inspections of the road drainage are another mitigating factor. If any of the drains get blocked it will increase the likelihood of flooding, therefore additional O&M climate resilience provisions can be considered.
- Landslide/Extreme Mass Movement:
  - Reducing the steepness of the embankments and benching them is a significant mitigating factor for landslides and extreme mass movement. Both these measures have been adopted in current design.
  - Planting vegetation on the slopes will also be a mitigating factor for landslides/extreme mass movement. Especially, periods of drought followed by extreme precipitation will increase landslide risk. Vegetation is critical in this situation.

- Avoiding high-filled embankments is one of the main measures in areas with high amounts of fill. Use of geogrids in areas with high amounts of fill can provide mechanical stabilisation.
- Lime stabilisation of excavated clay material prior to reuse on-site can be considered as a mitigating factor.

- Extreme Wind:
  - Increasing wind speed design parameters for viaducts and the cable stayed bridge can be considered as mitigating factor. Both these measures have been adopted in current design.

5.2.2 Air Quality

5.2.2.1 Methodology and Information Sources

In general, air quality in the region is influenced by emissions from industrial areas located close to the start and end of the Project route, road traffic and house heating particularly at areas where coal is used. Baseline conditions will be related to existing sources of emissions; these will be both manmade and natural. Emissions of NO_2 will primarily be influenced by human activity and are strongly associated with combustion processes and will therefore be elevated in urban areas and industrial areas. Emissions of PM_{10} and $PM_{2.5}$ are influenced by both manmade and natural sources.

In rural areas natural sources are likely to predominate particularly as the conditions are arid and therefore windblown dust is an important source. In urban areas, manmade sources, particularly combustion sources, are also important sources of particulate matter alongside natural sources.

ESIA team initially reviewed the following secondary data to understand the currently available air quality data in the AoI:

- **İstanbul Metropolitan Municipality Air Quality Monitoring Centre:** The nearest air quality monitoring station to the Project route is Başakşehir station located approximately at 2 km distance to the south of KM 57 of the Project route. The air quality parameters that are monitored at the Başakşehir station include PM_{10}, SO_2, CO, NO_2, NO_X and O_3.
- **MoEUCC Continuous Monitoring Centre:** MoEUCC uses an air quality index which classifies ambient air quality into 6 categories from 1 (good) to 6 (hazardous). The index is based on the concentrations of five pollutants (i.e., PM_{10}, SO_2, CO, NO_2, and O_3). Air quality index (established based on the measurements of the monitored air quality parameter concentrations – data retrieved on 01 March 2021) was defined as “good” for the Başakşehir station.

Upon the completion of the review of the available data, additional baseline survey was required to take into account that there is little existing baseline information available, given the size of the study area.

A pragmatic approach has been taken to the baseline monitoring and 12 monitoring locations were defined. The monitoring programme was designed to reflect both areas where baseline conditions are likely to be elevated, and those locations where there is the possibility for significant impacts in the future due to the implementation of the Project.

Air quality measurements were conducted by the ESIA team between February and June 2021. Locations of the air quality baseline measurements (see Figure 5-11) were selected by air quality experts based on a site visit of the Project route and surroundings to ensure appropriate representation of the features in the area.

Air quality baseline data collection within the scope of the ESIA study covered the following measurements:

- NO_2, SO_2, VOC, BTEX for 60-days (with two 30-day periods) at 12 locations;
- PM_{10} and $PM_{2.5}$ for 30 days (one period) at 12 locations;
- Dust deposition for 60-days (with two 30-day periods) at 12 locations.

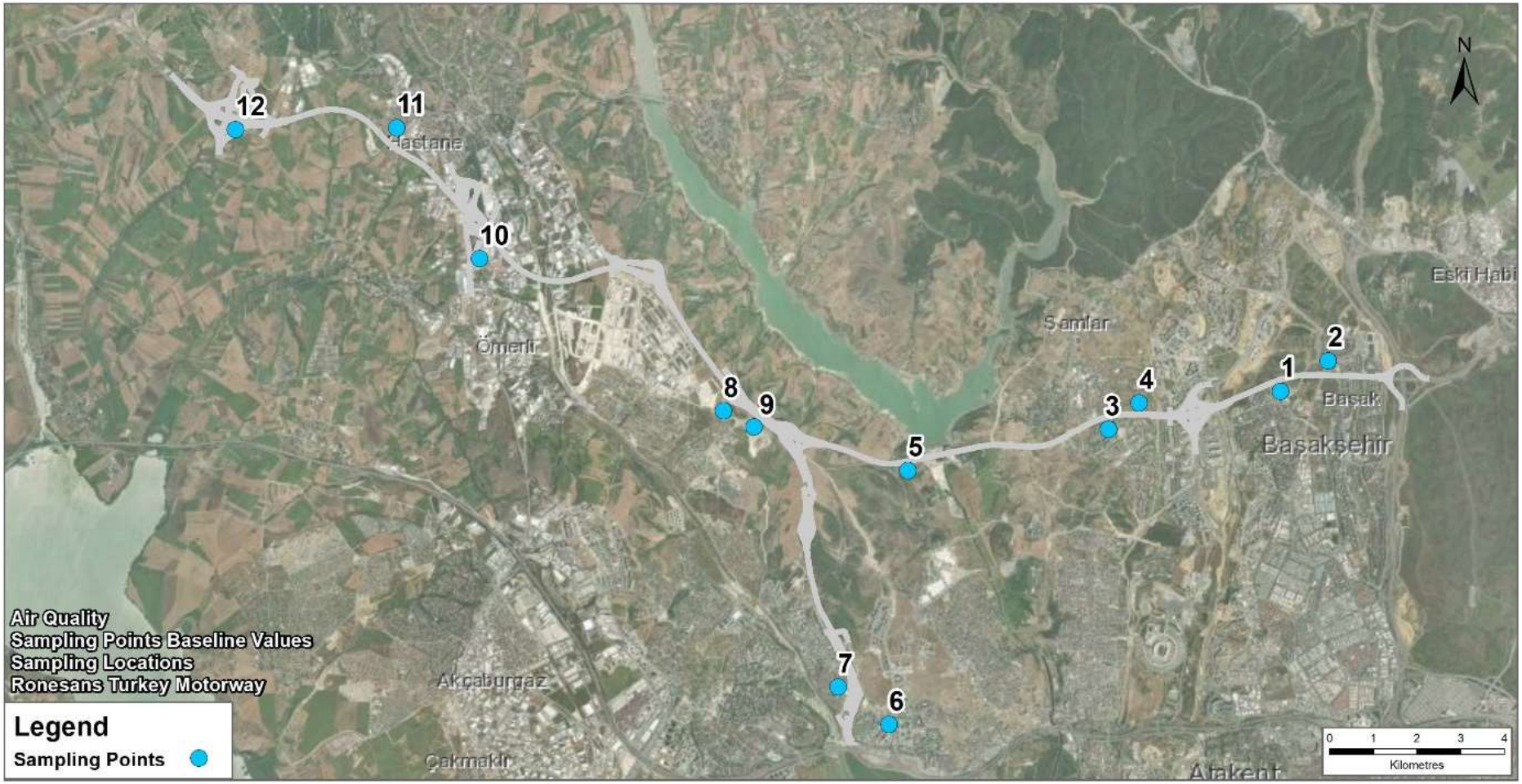


Figure 5-11 Air Quality Measurement Locations Along the Project Route

5.2.2.2 Air Quality Standards

As part of this AQIA projected results from traffic modelling and dust assessment are assessed against relevant air quality standards (AQS). These standards refer to human health impacts of air quality as well as dust deposition/soiling as a nuisance to humans and as an impact to vegetation.

The AQS relevant to this assessment are set out in Table 5-3. These values originate from the Air Quality Assessment and Management Regulation (HKDYY) regulations in Turkey that entered into force in 2008[40]. Turkey has opted to align with the more stringent European Union AQS and will adopt these values by latest 2024. As the Project will come into operation by 2025 the Turkish and EU AQS will be aligned by that time and as such the relevant AQS for this Project are the EU AQS.

Table 5-3 Air Quality Standards

Pollutant	Averaging Period	Statistic	Value (µg/m3)
NO_2	Annual mean		40
NO_2	1 hour mean	Not to be exceeded more than 18 times per year	200
PM_{10}	Annual mean		40
PM_{10}	24 hour mean	Not to be exceeded more than 35 times per year	50
$PM_{2.5}$	Annual mean		25

5.2.2.3 Air Quality Features of the Project Area

Baseline monitoring for NO_2, PM_{10} and $PM_{2.5}$ was conducted as part of the ESIA assignment along the length of the Motorway at 12 locations. The data is summarised in Table 5-4 and Figure 5-12 to Figure 5-16, which show the 12 locations colour coded to indicate the concentrations in relation to the air quality standards (the full data set is provided in a separate report included as Annex 6).

In the figures the blue/green colour-coding indicates values of 0 – 25 % of the AQS, yellow/orange >25 % of the AQS and red exceeding 100 % of the AQS.

The NO_2 Annual Mean baseline measured along the route is shown in Table 5-4 and Figure 5-12. The airshed can be considered **undegraded** for the entire route, as none of the sampling points exceed the AQS of 40µg/m^3. The highest concentrations can be seen at Sites 6 and 10 with values close to the standard, Sites 1, 4, 11 and 14 show values of 30µg/m^3 and above. Site 6 is located very near to an existing motorway (E80) and surrounded by built up areas, while Site 10 is located within a built up area north of Ömerli, which likely accounts for the higher concentrations at these sites. The other sites are located near to either built up areas or existing roads.

The PM_{10} baseline exceeds the AQS at several location. This is not unexpected, given that natural sources of emissions such as airborne dust from open land will have a considerable influence on the baseline.

The baseline continuous monitoring data demonstrate that the baseline conditions are highly variable across the study area. PM_{10} concentrations are elevated across the region and are in excess of the annual mean air quality standard. The fact that this is the case irrespective of the land use and is also the case at the more rural monitoring site at Istanbul, suggests that this is predominantly as a result of natural sources, rather than manmade sources. This is consistent with the somewhat arid nature of much of Turkey. However, it should be noted that in rural areas farming activities, particularly arable activities, can lead to the emission of substantial quantities of particulate matter.

[40] Istanbul Metropolitan Municipality, Air Quality Assessment And Management Regulation https://havakalitesi.ibb.gov.tr/Icerik/mevzuat/turkiye-standartlari

The $PM_{2.5}$ standard is not exceeded, further supporting the understanding that natural sources drive the high PM_{10} baseline, as $PM_{2.5}$ is more associated with combustion sources.

Table 5-4 Baseline values for NO_2, PM_{10}, and $PM_{2.5}$

Location (Site #)	NO_2 Annual Baseline Concentrations µg/m³	NO_2 Hourly Baseline Concentrations µg/m³	PM_{10} Annual Baseline Concentrations µg/m³	PM_{10} 24 Hour Baseline Concentrations µg/m³	$PM_{2.5}$ Annual Baseline Concentrations µg/m³
AQS	**40**	**200**	**40**	**50**	**25**
1	32.9	65.8	53.5*	106.9*	20.1
2	28.6	57.2	38.4	76.8*	14.9
3	28.8	57.6	39.3	78.6*	13.3
4	34.6	69.2	41.7*	83.3*	14.3
5	22.9	45.8	32.3	64.5*	12.7
6	38.4	76.8	45.8*	91.6*	16.4
7	13.9	27.8	27.7	55.4*	10.4
8	23.2	46.4	37.2	74.3*	12.9
9	23.2	46.4	58.6*	117.3*	21.3
10	39.7	79.4	64.2*	128.4*	22.7
11	30	60	37.3	74.6*	13.0
12	26.6	53.2	50.6*	101.3*	16.3
Average across whole Project area	27.6	55.2	41.6*	83.1	14.8

*Value exceeds AQS

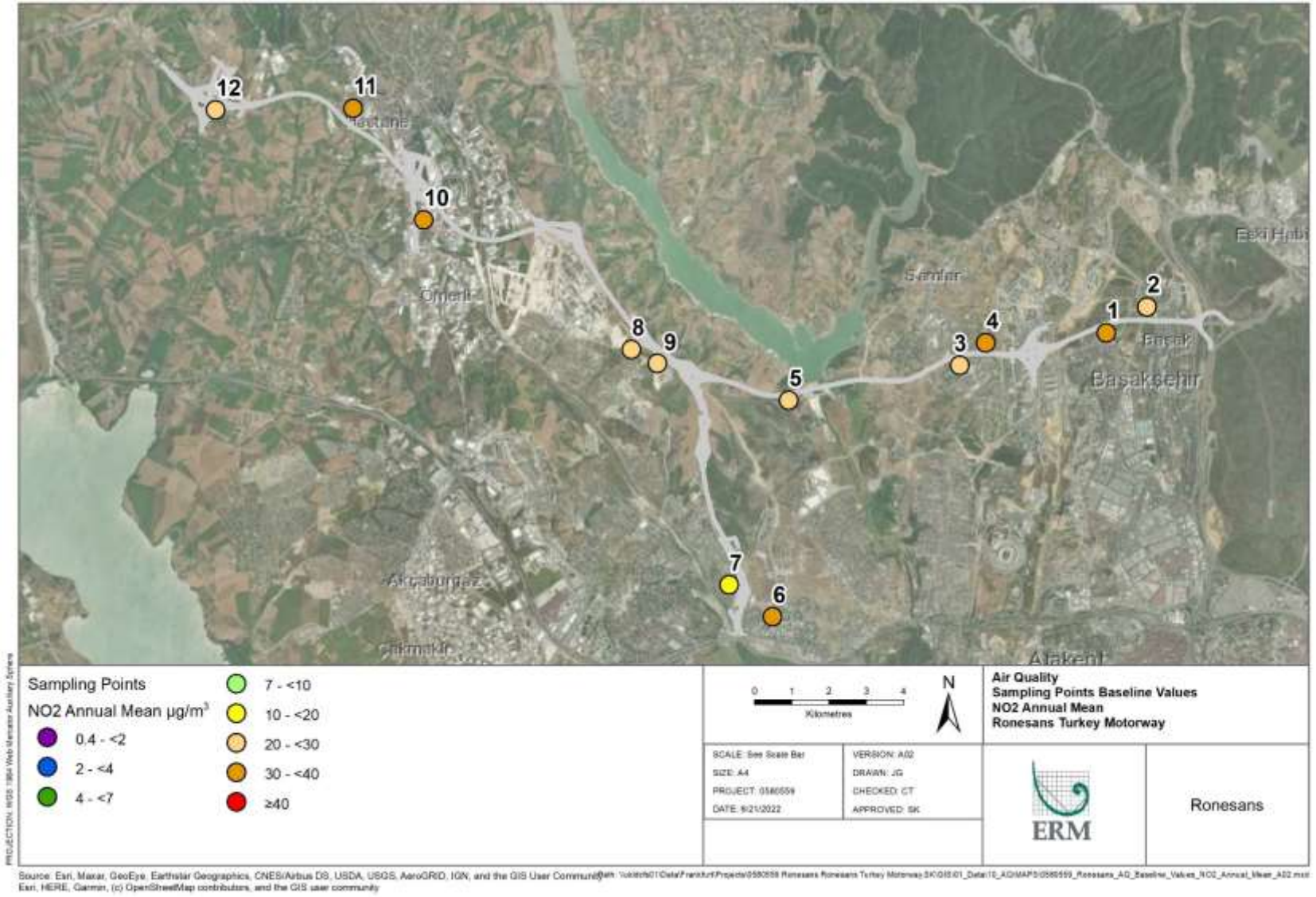


Figure 5-12 NO_2 Annual Mean Baseline

The NO_2 Hourly Mean baseline values are shown in Table 5-4 and Figure 5-13. The hourly baseline values are derived from long term monitoring data by multiplying by a factor of two[41]. This approach was developed by the Environment Agency for England and is cited by the IFC in their General EHS Guidelines for Air Emissions and Ambient Air Quality. This method is used, as the worst case impacts from sources and worst case baseline do not tend to occur under the same meteorological conditions, and therefore adding the worst case short term impacts and worst case short term baseline is excessively conservative. The AQS for NO_2 hourly is 200 µg/m^3 and it can be seen that the measured concentrations do not exceed the standard at any sites.

[41] Based on IFC cited methodology derived from Environment Agency for England guidance: Air emissions risk assessment for your environmental permit (https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit)

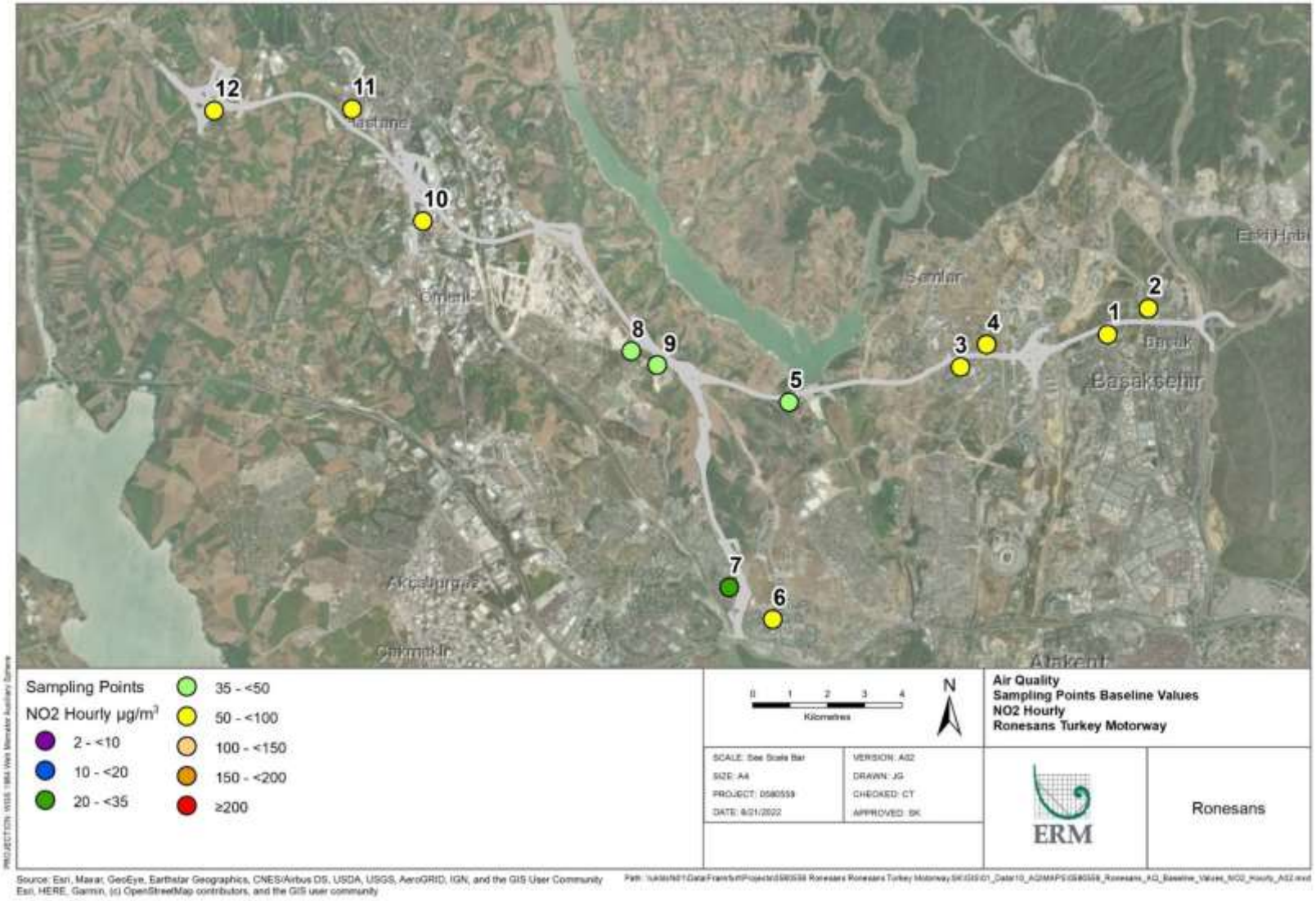


Figure 5-13 NO_2 Hourly Baseline

The PM_{10} Annual Mean baseline measured along the route is shown in Table 5-4 and Figure 5-14. The airshed can be considered degraded at sites 1, 4, 6, 9, 10, 12 as the measured baseline at these points exceed the AQS of 40 $\mu g/m^3$. For the 24 hourly baseline values (Table 5-4, Figure 5-15), every site exceeds the 50 $\mu g/m^3$ AQS so the entire area can be considered to have a degraded airshed for this metric. As the climate is generally hot and dry, the baseline PM_{10} in this area is expected to be degraded due to natural sources of PM_{10} which will drive high baseline, particularly during the summer.

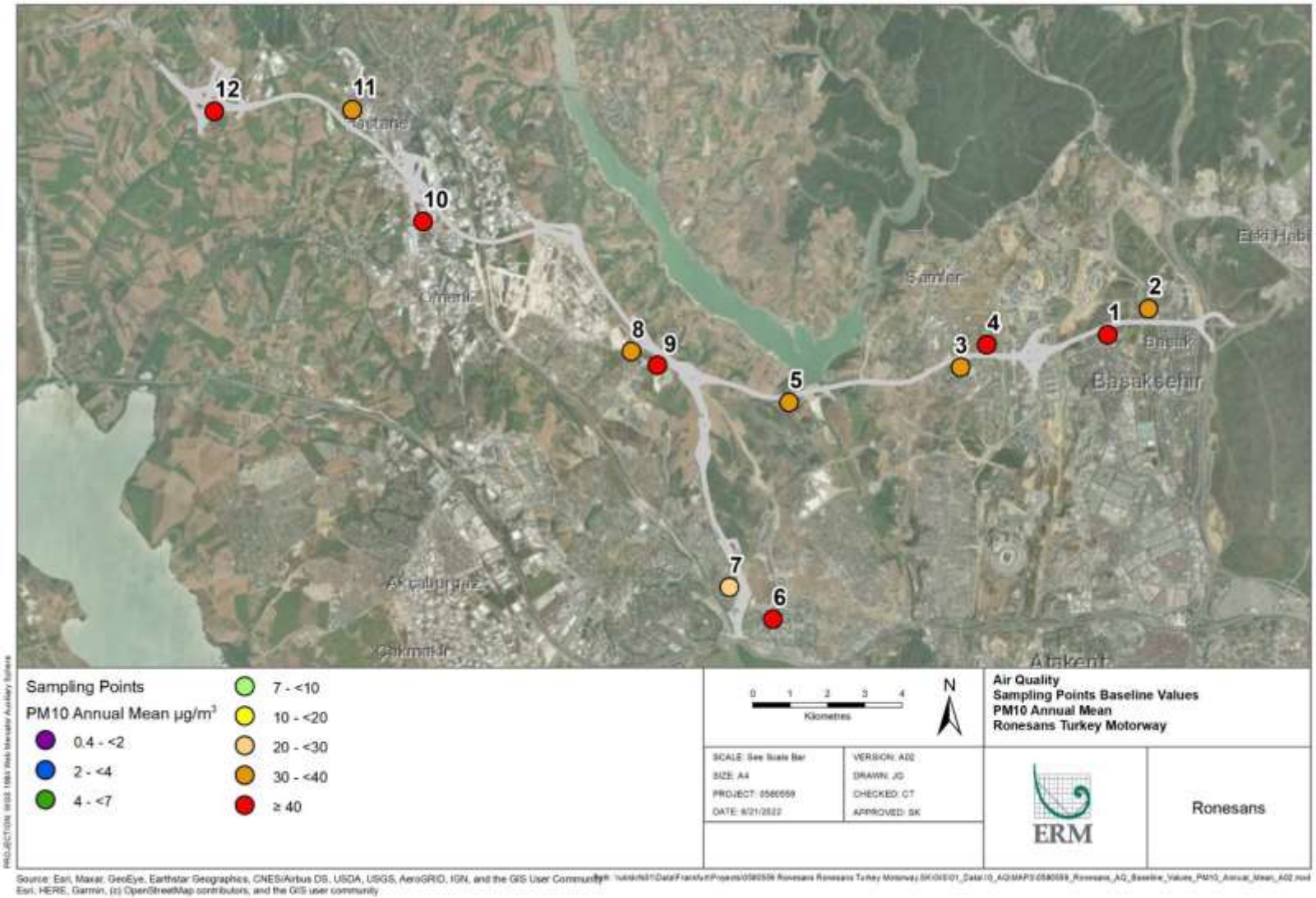


Figure 5-14 PM_{10} Annual Mean Baseline

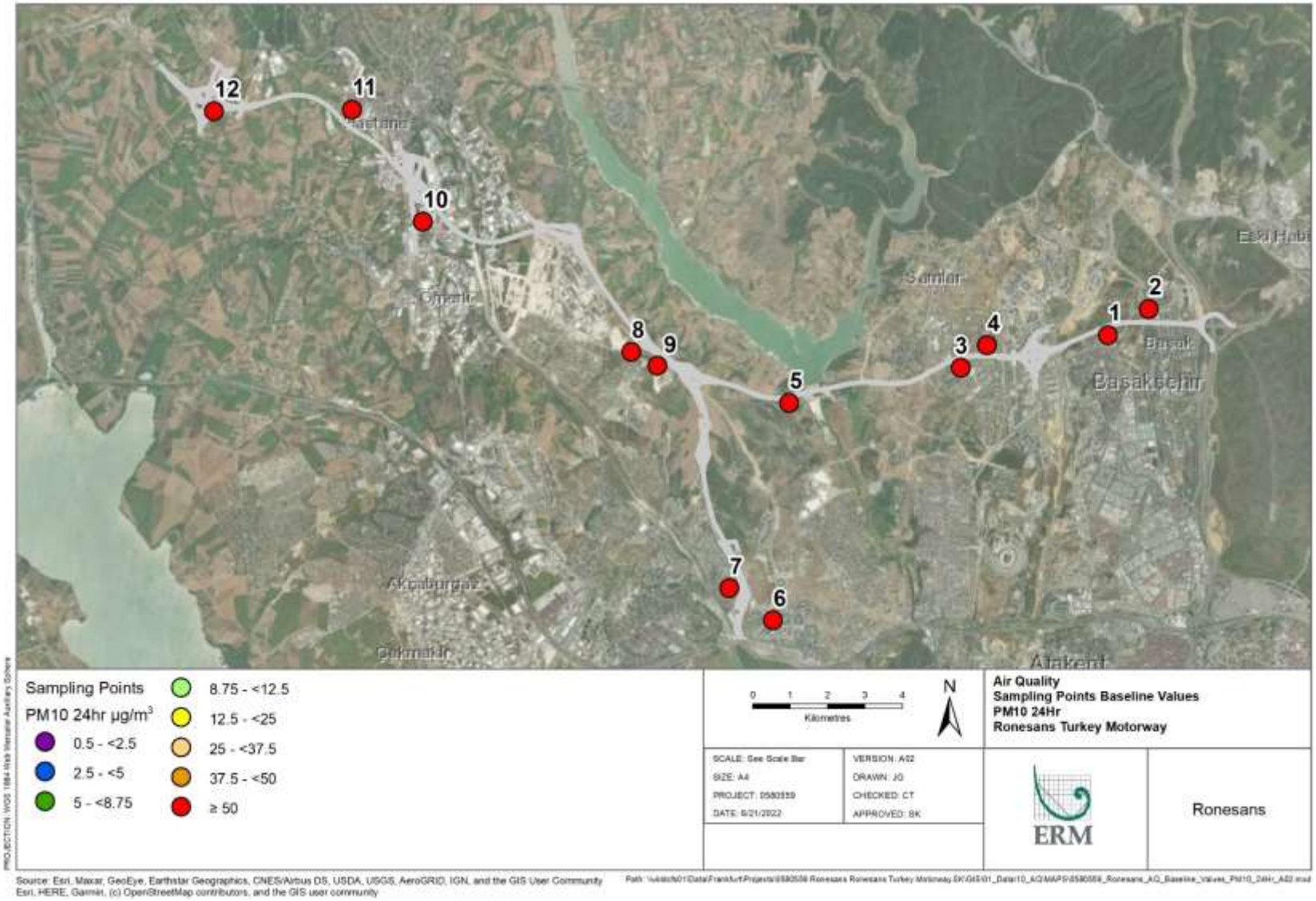


Figure 5-15 PM_{10} 24 Hour Baseline

The $PM_{2.5}$ Annual Mean baseline measured along the route is shown in Table 5-4 and Figure 5-16. The AQS for $PM_{2.5}$ Annual is 25 µg/m^3 and it can be seen that the measured concentrations do not exceed the standard at any sites.

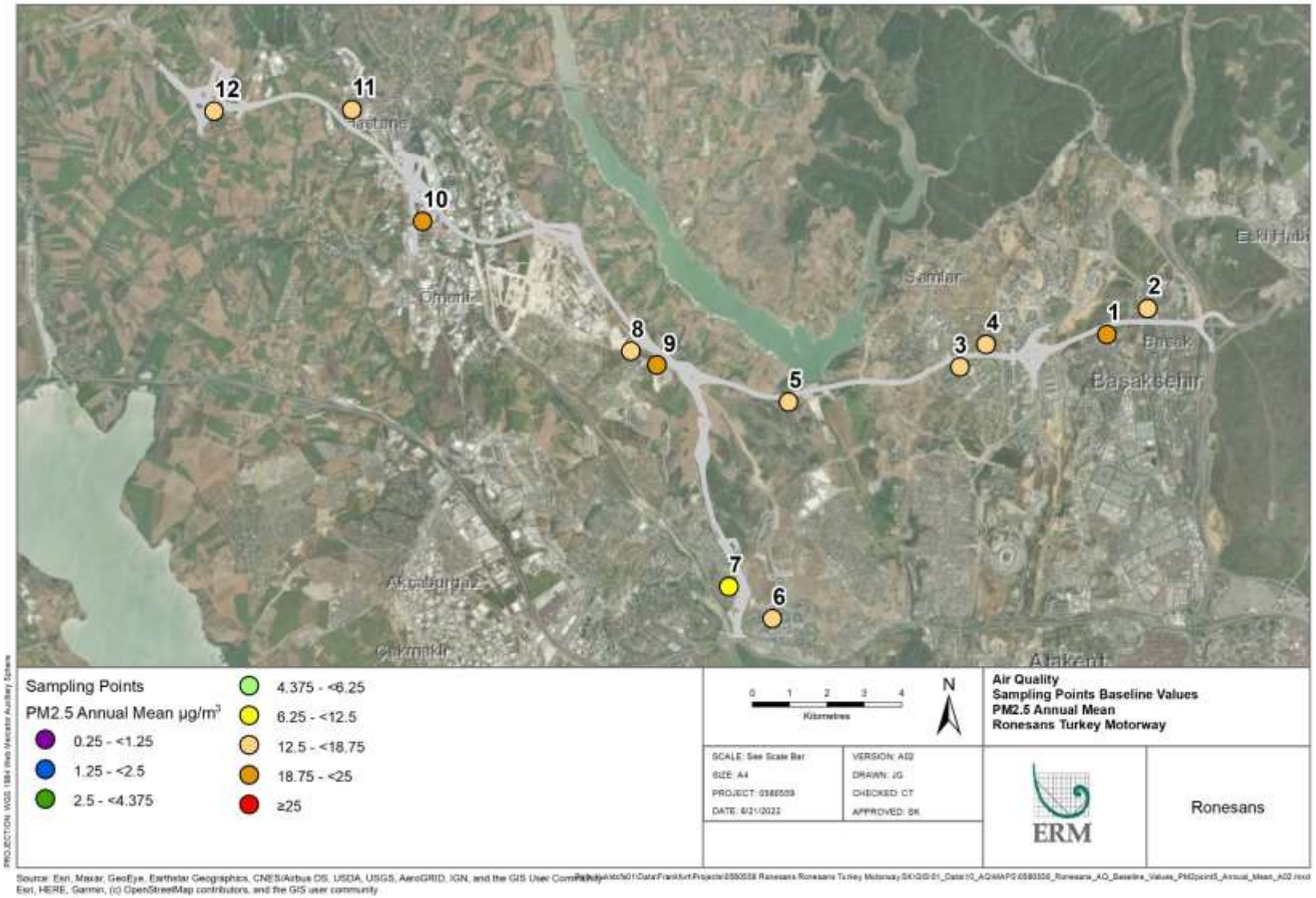


Figure 5-16 $PM_{2.5}$ Annual Baseline

5.2.3 Geology and Soil

5.2.3.1 Methodology and Information Sources

The information presented in this chapter is mainly taken from geology and geotechnical investigations conducted as part of the detailed design work for the Project.

Site-specific geological and geotechnical investigations were undertaken by Nakkaş Otoyol A.Ş. to collect information on geological, geotechnical conditions and soil types along the route. These investigations were summarized and presented by Emay Engineering and Consulting Inc. ("Emay Geotechnical Report")[42].

In addition, public domain literature (especially the extensive information available regarding seismic risk) was reviewed as part of the baseline assessment process.

With regard to identification of existing contaminated sites, ESIA team undertook a review of publicly available satellite images of the Project area to determine if there are any identifiable (or apparent) industrial facilities directly in or adjacent to the RoW since the presence of such facilities would suggest a higher potential of encountering some form of impacted soils or waste materials during Project construction at these locations.

ESIA team identified 10 locations along the RoW team and conducted soil sampling studies to understand if there were any potential sources of soil contamination along the Project route. These samples were then analysed by a specialised laboratory where parameters monitored include:

- Alkalinity,
- Ammonia,
- Nitrate,
- Nitrite,
- Biochemical Oxygen Demand (BOD),
- Chemical Oxygen Demand (COD),
- Suspended solids,
- Calcium,
- Oil products,
- Antimony,
- Arsenic,
- Cobalt,
- Vanadium,
- Cyanide and metals (chromium, iron, copper, zinc, lead, mercury, cadmium, nickel) and
- Coliform.

Soil sample from the agriculture area can be taken at representative locations after construction is finalized in case background levels are necessary to be established. Given the natural soil quality statistical variation, the sampling protocol including the number of samples to be analysed at a later stage was more appropriate to be established at a later stage.

[42] Preliminary Project Geological and Geotechnical Research Program Report, Emay Engineering and Consulting Inc. August 2021

5.2.3.2 Geological Features of the Project Area

The location of the Motorway and connecting roads within the geological setting is given in Figure 5-17. The geological information has been obtained from the Emay Geotechnical Report. The study area is on the European side (west side of the İstanbul Strait) of the İstanbul Province. The geological setting consists of Cenozoic aged (Tertiary, Quaternary) sedimentary rocks with young units which are typically located on the west side of İstanbul and are called "Cover Rocks" by some researchers. The main geological units in the region are the Trakya Formation, the Soğucak Formation, the Ceylan Formation, the Kıraç Member, and alluvial layers derived from old stream beds. The features of these units are described below:

Trakya Formation (Ct): The Trakya formation is made of a thick shale and greywacke and lytic conglomerate sequential stack that varies in lateral and vertical directions and is predominantly in the flysch facies.

Soğucak Formation (Tsğ): The Soğucak formation is a white, cream-colored, highly hard and durable, generally medium and thick layer, massive-looking, recrystallized, abundant fossil limestone. It is widespread in the Küçükçekmece district in the north of Şamlar village, around Şamlar and Kayabaşı villages. Typical crops are located on the slopes of Sazlıdere in the investigation area.

Ceylan Formation (Tc): The Ceylan formation generally consists of thin-medium layer beige-coloured clastic limestone interlayer greenish and brown sludge. This unit usually has large crops around Hoşdere, Bahçeşehir and Tahtakale, which are located in the northwest of Küçükçekmece. There are typical rock outcrops around Azatlı and Baruthane in the north of Küçükçekmece Lake.

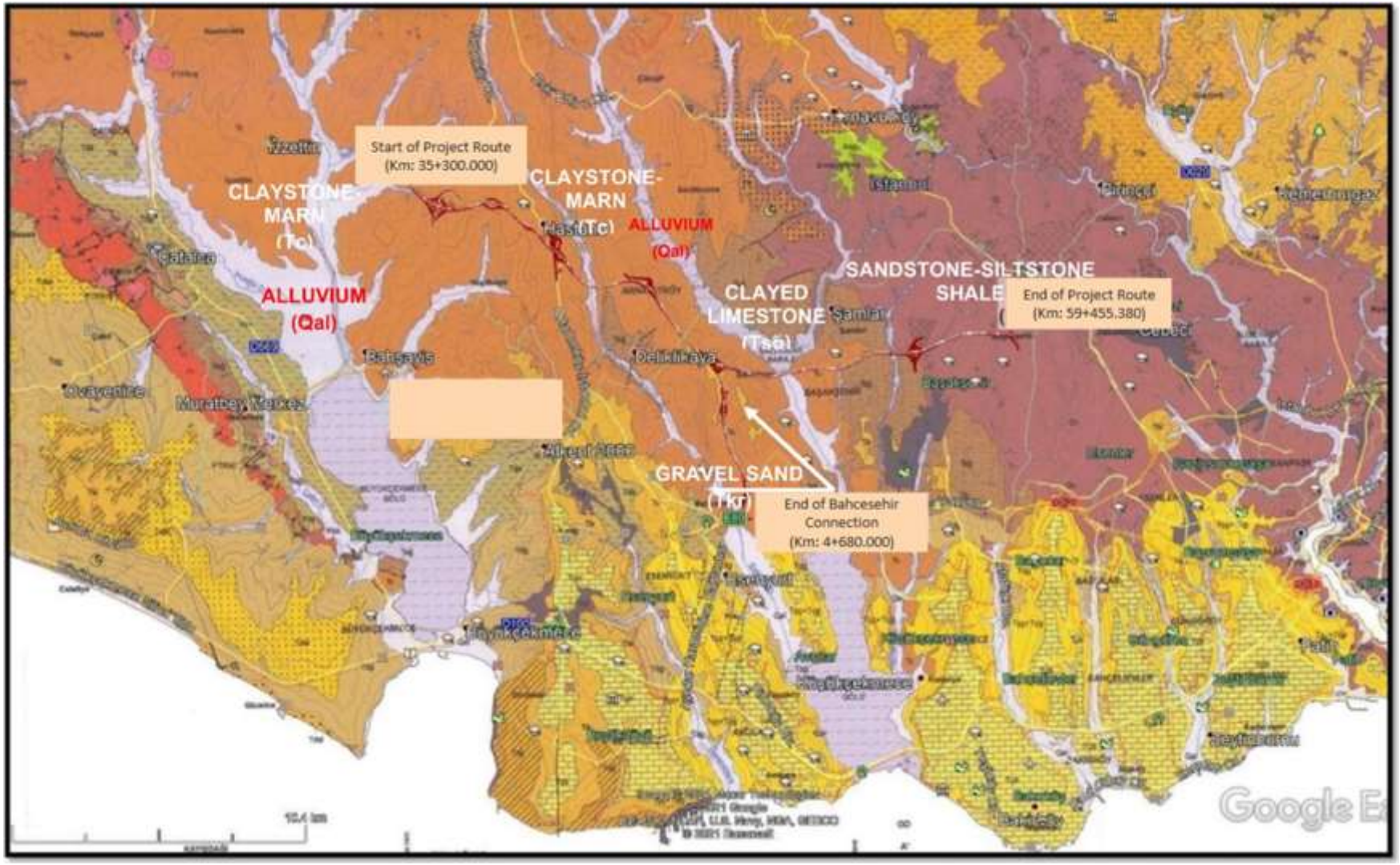


Figure 5-17 Motorway Location and Geological Setting (Emay Geotechnical Report, 2021)

Kıraç Formation (Tkr): The formation consists of grey, greyish-white, off-white, vertebrate fossil sand, and gravel. Marl levels are normal with green, brown-coloured clay lenticular levels in the sand.

Alluvium (Qal): These are sediments made of alluvium loose block-gravel-sand-clay, which are stored in various stream environments on the İstanbul peninsula in the late Quaternary. It is generally in the form of cross-layered and circular sediments. Their properties depend on the material surroundings that make them up and the physical and geometric properties of the rivers. This unit is also Holocene aged.

Artificial Fill (Yd); According to the field observations, there are fill materials with thicknesses between 0.5-20 m. These fills are usually composed of soil, clay, waste, and construction residue material.

The geological units encountered along the Motorway is shown in Table 5-5.

Table 5-5 Limits of geological units encountered on the Motorway route (Emay Geotechnical Report, 2021)

Km Range	Formation Name	Symbol	Geological Unit
KM SECTION-8 MAIN ROUTE			
Km: 35+300 – 43+125	Ceylan	Tc	Marn-Clay-Claystone
Km: 43+125 – 43+315	Alluvial	Qal	Clay-Sand
Km: 43+315 – 47+690	Ceylan	Tc	Marn-Clay-Claystone
Km: 47+690 – 48+780	Kıraç	Tkr	Gravel-Sand
Km: 48+780 – 51+220	Ceylan	Tc	Claystone-Clayey limestone-Marn
Km: 51+220 – 51+530	Alluvial	Qal	Clay-Sand
Km: 51+530 – 52+570	Ceylan	Tc	Marn-Clay-Claystone
Km: 52+570 – 53+285	Soğucak	Tsğ	Argillaceous limestone
Km: 53+285 – 53+320	Alluvial	Qal	Clay
Km: 53+320 – 55+080	Soğucak	Tsğ	Argillaceous limestone
Km: 55+080 – 55+355	Trakya	(Ct)	Siltstone-Shale
Km: 55+355 – 55+400	Alluvial	Qal	Clay-Sand
Km: 55+400 – 55+450	Trakya	(Ct)	Siltstone-Shale
Km: 55+450 – 56+080	Soğucak	Tsğ	Argillaceous limestone
Km: 56+080 – 59+455.38	Trakya	(Ct)	Siltstone-Shale
BAHÇEŞEHİR CONNECTION			
Km: 0+000 – 1+360	Kıraç	Tkr	Gravel-Sand
Km: 1+360 – 4+130	Ceylan	Tc	Marn-Clay-Claystone
Km: 4+130 – 4+330	Artificial Filling	Yd	Clay
Km: 4+330 – 5+062.458	Ceylan	Tc	Marn-Clay-Claystone

5.2.3.3 Landslide Risk

Although no landslide section can be considered to be present as the critical section on the route, there are potential and active highland regions in the part of the route between km: 45 +000-50 +000 in the Deliklikaya location. The earthworks planned in this section (splitting-filling) should be carried out by considering the potential of landslides and especially high-fill productions should be avoided. Figure 5-18 shows the relationship between the active (marked in red) and potential (marked in orange) excavation sites related to the route (Emay Geotechnical Report, 2021).

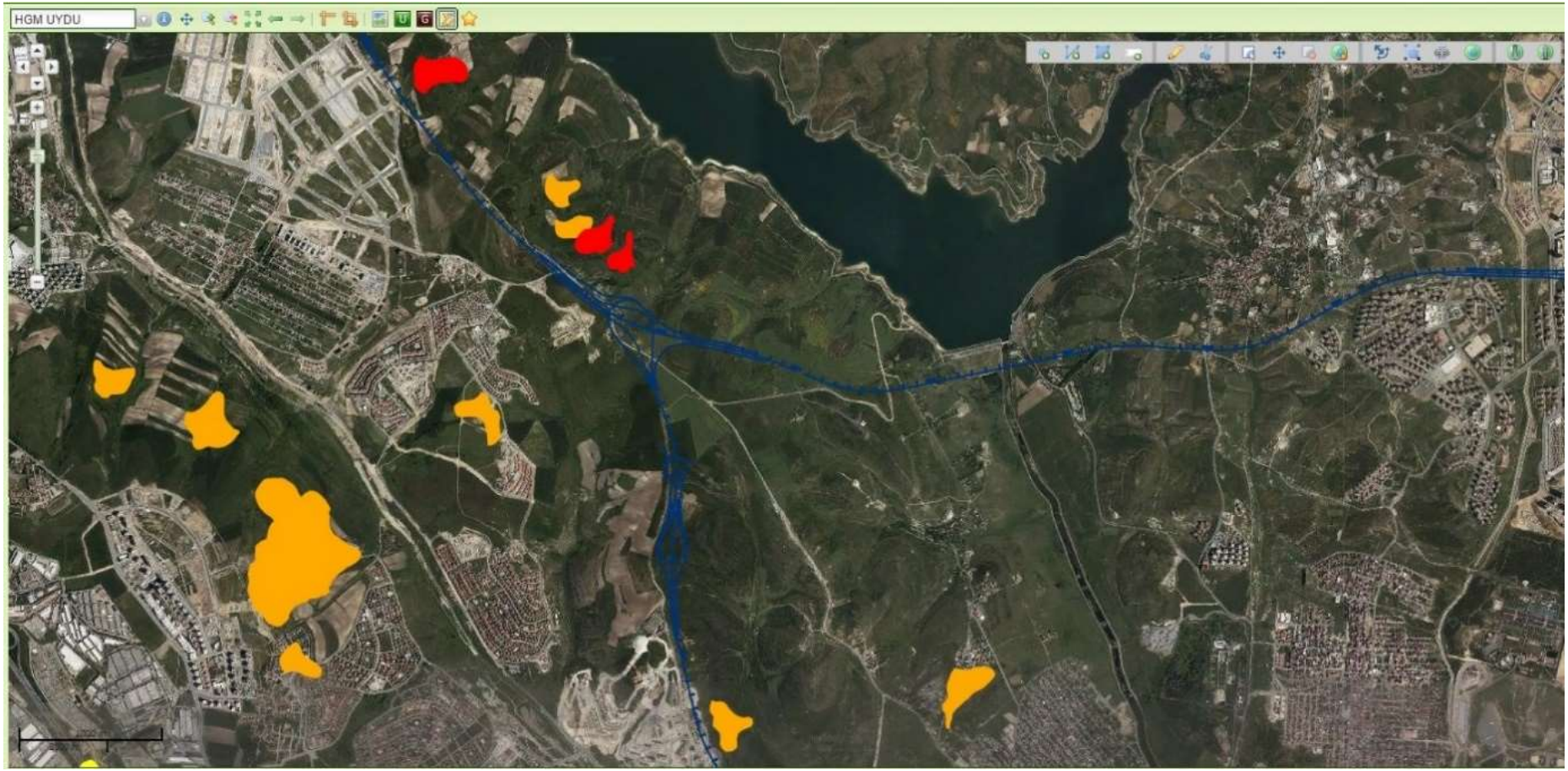


Figure 5-18 Landslide sections on the route (Km: 45+000 – 50+000) (Source: Maden Teknik Arama (MTA))

Large alluvial sections on the route constitute critical sections where poor ground conditions are expected. In the downstream parts of the streams, especially, silt-clay size fine-grained alluvial deposits have developed. The thickness of the clay-qualified alluvium unit reaches 25 meters in the valley where the Sazlıdere Dam section is located (Emay Geotechnical Report, 2021).

5.2.3.4 Seismic Background

Earthquakes of large magnitude are expected in İstanbul province due to the presence of an active fault system in the Marmara Sea. The active North Anatolian Fault Zone, where these earthquakes originate is shown in Figure 5-19 below.

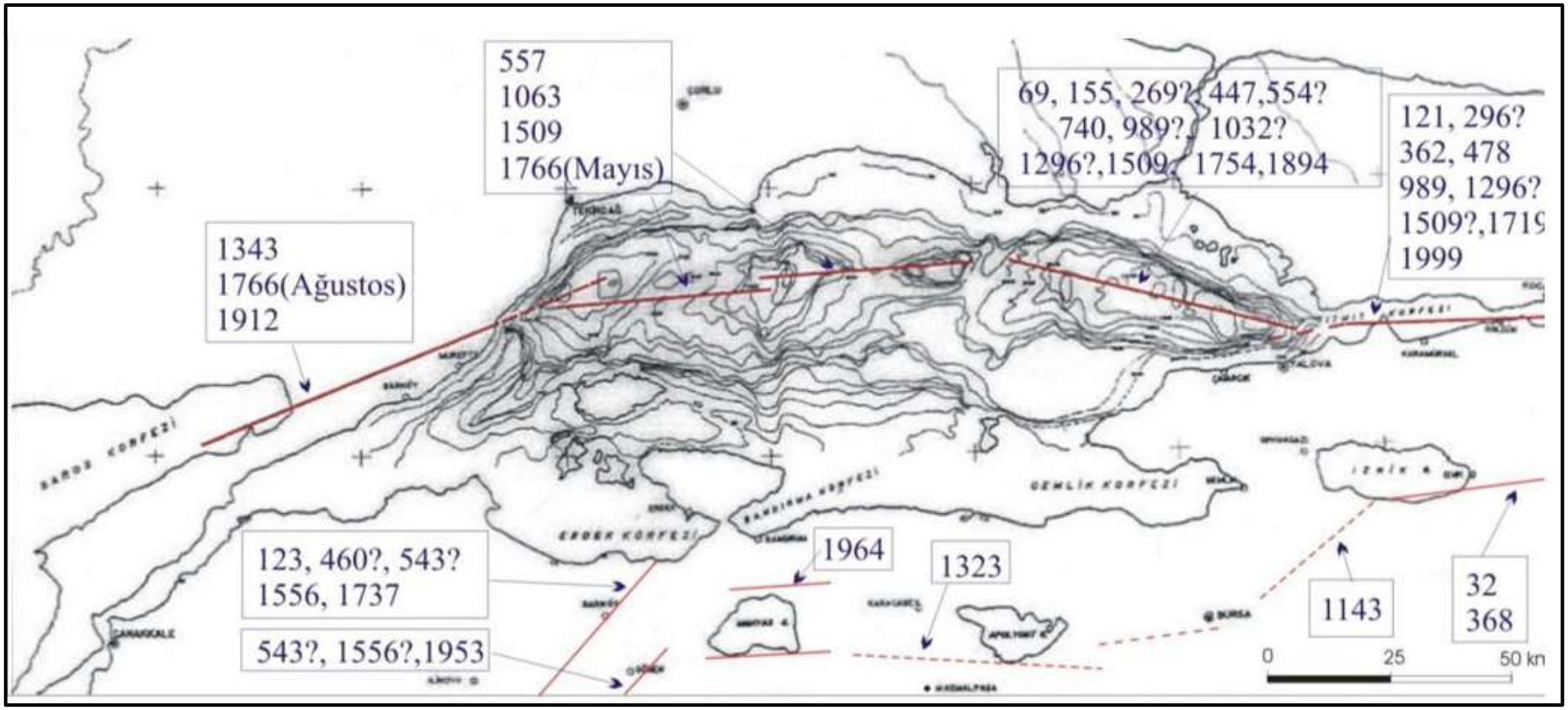


Figure 5-19 North Anatolian Fault Zone in the Sea of Marmara and the dates and magnitudes of earthquakes thought to have produced the fault segments (Emay Geotechnical Report, 2021)

The Project area is located between Nakkaş-Sazlıdere-Başakşehir-Bahçeşehir regions. According to the Earthquake Hazard Map of Turkey (2018) prepared by the Disaster and Emergency Management Directorate (AFAD). The effective earthquake acceleration coefficient can be obtained for a specific location according to four different EQ levels listed from low to high seismic hazard.

Table 5-6 EQ Levels for Seismic Hazards

EQ Levels	Exceedance Probability in 50 years	Return period (Years)	Occurrence Frequecy
DD1	68%	43	Frequent
DD2	50%	72	Seldom
DD3	10%	475	Rare
DD4	2%	2475	Very Rare

According to KGM specification all bridges should be designed according to DD4 EQ level with a target seismic performance-controlled damage for the main road. Other structures (relatively small structures such as culverts, walls and slope stability) are designed according to DD2 EQ level with a target seismic performance-controlled damage. This damage is corresponding to life safety level. Note that AASHTO considers EQ loads with 100 years return period with a 7% exceedance probability in 100 years. Furthermore, AAHSTO divides the bridges in three categories according to their importance level. (Critical, essential and other). The cable stayed bridge is evaluated as critical bridge and all other ridges are evaluated as essential bridges in the design. As a result, the bridges at the project area are designed against higher EQ forces comparing to AASHTO standard for the same target seismic performance. The Earthquake Hazard Map of Turkey and the area covering the Project location are shown in Figure 5-20.

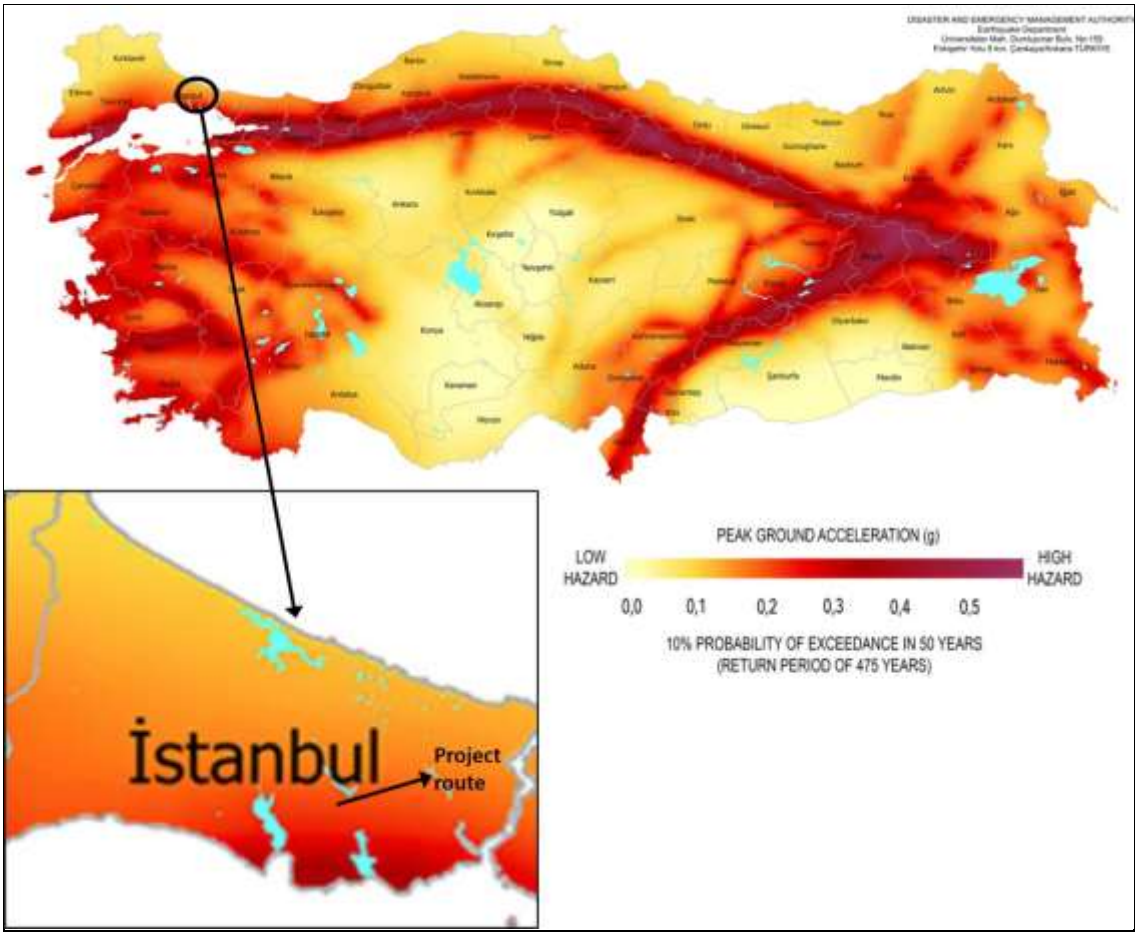


Figure 5-20 Earthquake Hazard Map of Turkey and Closer view of Project Route Region (AFAD, 2018)

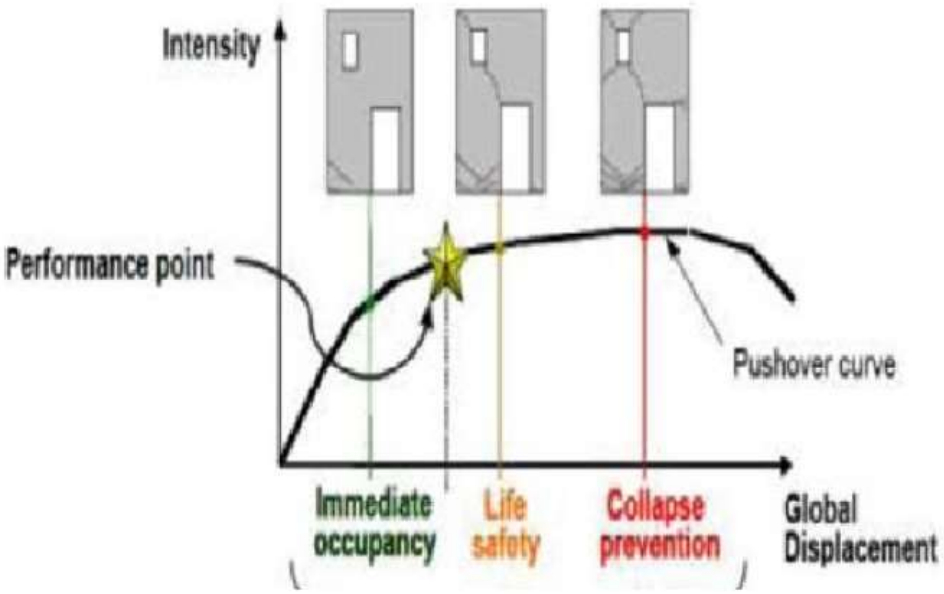


Figure 5-21 Capacity and Demand graph

Moreover, as the soil class is very important for the structures to define design spectrum, detailed soil investigation is done by the designer(EMAY). Under the project more done 300 boreholes are executed, tested and reported.

In addition, earthquake during construction is considered both at construction stage calculations and scaffolding and formwork stability calculations in order to minimize the health and safety risks. The magnitude of the ground accelerations value during construction is taken as 0.1g.

Cable stayed bridge is the most important structure in this project scope. Therefore, site specific hazard analysis is performed, and time history data is obtained from accredited institution to be used in non-linear dynamic analysis for this bridge.

5.2.3.5 Soil Quality of the Survey Area

Soil samples were collected by the ESIA team at ten different locations (Figure 5-22) along the Project route on 03.06.2021. Table 5-7 and Table 5-8 provide information on the sampling locations. The sampling and analysis were conducted by an accredited firm ARTEK Engineering Environmental Measurement and Consulting Services Inc. (ARTEK). The soil sampling analysis reports are presented in Annex 7. The soil sampling analysis results are given in Table 5-9 below. The suite of metals selected for the study is based on the requirements of the Turkish Regulations on Soil Pollution Control and Point Source Contaminated Sites[43] (Soil Pollution Control Regulations).

[43] Control of Soil Pollution and Regulation on Point Source Contaminated Sites, June 2010 (https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=14026&MevzuatTur=7&MevzuatTertip=5).

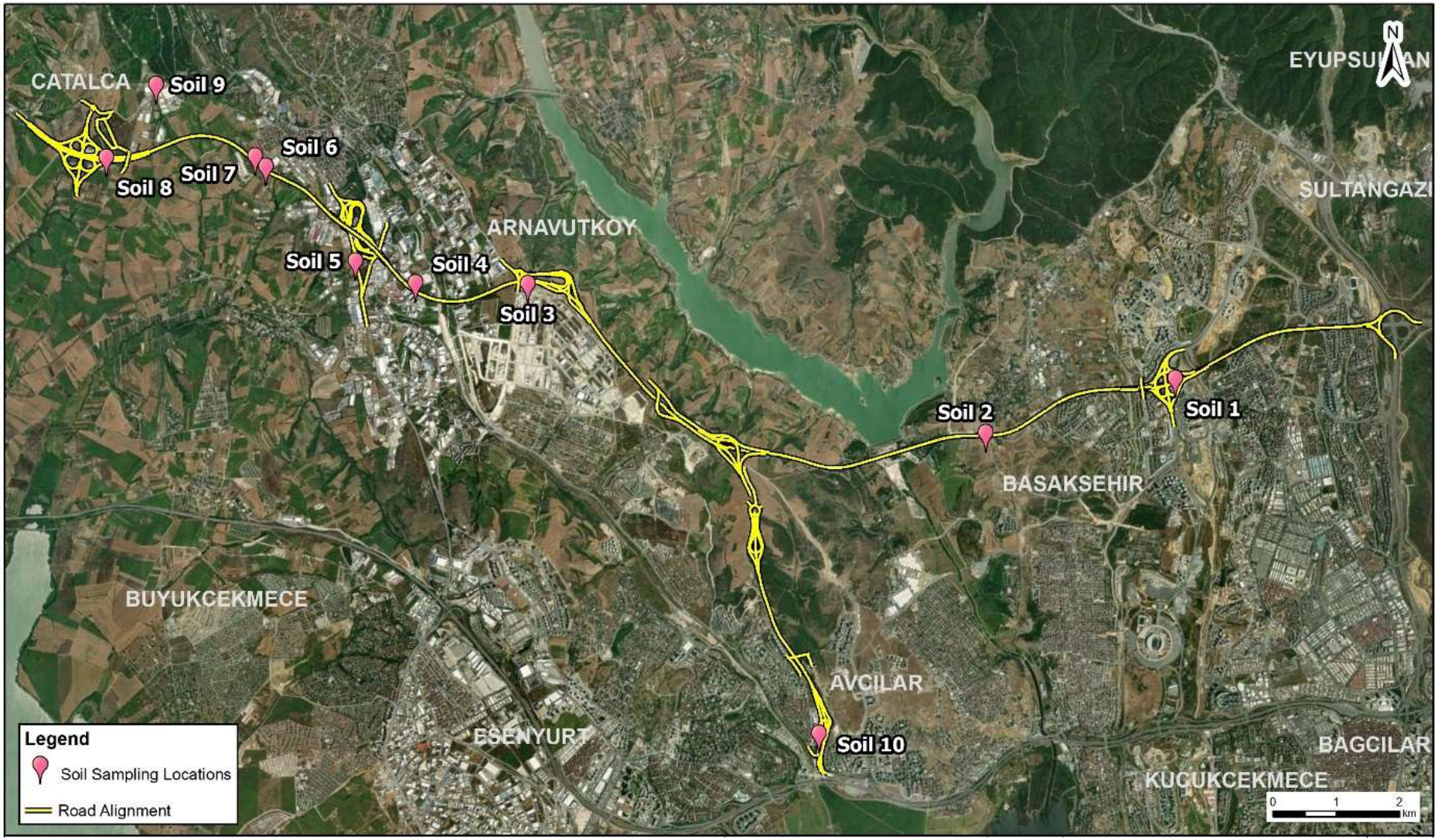


Figure 5-22 Locations of Soil Sampling Points

Table 5-7 Soil Sample Locations

Sample No	Route Alignment (km)
1	56+215.10
2	53+92.07
3	44+926.76
4	43+31.40
5	0+980.23
6	39+973.30
7	39+787.53
8	37+253.00
9	1.14 km northwest of 39+000 km
10	4+800.22 (Northwest of Küçükçekmece Lake)

Table 5-8 Soil Sampling Location Information

Soil Sampling Location 1	Soil Sampling Location 2
	
Close to KM: 56+000. The sampling location lies within the previous construction area of Cam and Sakura Integrated Health Campus and is next to the construction office base of the Project.	Close to KM: 53+000. Soil sample taken at an area where excavated soils were deposited.
Soil Sampling Location 3	Soil Sampling Location 4
	
Close to KM: 44+600. Soil sample taken from an excavated soil deposit area.	Close to KM: 42+700. Soil sample taken next to industrial establishments.

Soil Sampling Location 5	Soil Sampling Location 6
	
Close to KM: 42+000, Hadımköy Junction of the Project. Soil sample taken next to existing motorway.	Close to KM: 39+600. Soil sample taken close to a scrap material storage area close to industrial establishment.
Soil Sampling Location 7	**Soil Sampling Location 8**
	
Close to KM: 39+400. Soil sample taken near scrap material storage area.	Close to KM: 37+000. Soil sample taken near scrap material storage area.

Soil Sampling Location 9	Soil Sampling Location 10
	
800 m north of KM: 38+000. Soil sample near industrial establishments.	End of Bahçeşehir Connection of the Project. Soil sample taken near greenhouse area.

The analysis results were compared with the generic soil pollution levels (Limits) given in Annex I of the Soil Pollution Control Regulations for soil ingestion, skin contact, and inhalation of fugitive dust emission scenarios (Table 5-9).

Generic-based scenario chemical limits represent chemical compound levels that will not require any site-specific remediation because the risk assessment for human exposure has been developed under the most conservative (worst-case scenario settings) and the limits are very low.

The analysis results show that the detected levels – except for Arsenic – are below the generic limits. The generic arsenic limit is extremely low (0.4 mg/kg) and the natural soil arsenic levels are typically higher than these levels. For example, natural levels of arsenic in soil in the U.S. usually range from 1 to 40 mg/kg with a mean of 5 mg/kg, although much higher levels may occur in mining areas, at waste sites, near high geological deposits of arsenic-rich minerals, or from pesticide application (The Arsenic Rule. Background and Rule Provisions https://www.epa.gov/sites/default/files/2015-09/documents/train1-background.pdf).

The results show that the range of arsenic levels along the road alignment varies between 5.5 and 20.1 mg/kg.

Table 5-9 Soil Analysis Results

Analysis Parameter	Unit	Soil 1	Soil 2	Soil 3	Soil 4	Soil 5	Soil 6	Soil 7	Soil 8	Soil 9	Soil 10	Limit
Antimony	mg/Kg	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	31
Arsenic	mg/Kg	11.2*	20.1*	7.7*	9*	11.4*	5.5*	10.2*	11.8*	11.1*	7*	0.4
Copper	mg/Kg	18.2	32.8	15.9	21.1	12	19.6	30.3	31.5	36	15.1	3129
Mercury	mg/Kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	23
Zinc	mg/Kg	32.5	88	32.7	49.2	31	65.1	69.9	72.1	77.2	34.4	23464
Cadmium	mg/Kg	0.68	1	0.57	0.27	<0.2	<0.2	0.5	<0.2	<0.2	0.42	70
Cobalt	mg/Kg	6.2	15.6	9.9	13.3	4.9	5.2	19	16.8	26.1	5.7	23
Lead	mg/Kg	34.4	35.6	12.4	17.6	5.6	10.9	20	22.1	33.5	15.3	400
Nickel	mg/Kg	30.1	50.7	46.4	55	23	21.7	79.7	79.4	101.6	31.2	1564
Total Chromium	mg/Kg	37.5	69.1	40.4	44.3	26.1	29.1	54.3	62.9	63.7	36	235
Vanadium	mg/Kg	32.4	75.2	37.1	35.8	30.3	17.6	49.2	59.9	59.1	29.7	548

*Represents that the detected level is above the limit value.

5.2.4 Resources and Waste

5.2.4.1 Methodology and Information Sources

Information on cut and fill balances along the Project route were collected in discussion with Nakkaş Otoyol A.Ş. to understand the amount of material that can be re-used or required to be permanently stored at surplus material dumpsites.

Similarly, estimated quantities of other materials to be used for construction (concrete, steel, asphalt, etc.) and how these materials would be sourced, were provided to the ESIA team.

ESIA team also reviewed MoEUCC website to identify the licensed waste management facilities in İstanbul province which may be used by Project parties.

5.2.4.2 Baseline Features of the Project Area

5.2.4.2.1 Bulk/Large Quantity Materials

For the construction of the Project and all related infrastructure, significant quantities of various typical construction materials will be needed; these will include concrete, prefabricated segments (e.g. retaining walls), steel, aggregates, and asphalt. In addition, large volumes of soil/topsoil will need to be excavated for the Project which will be partly re-used as fill material.

In accordance with international good practice, environmental and social implications of the use of these construction materials will be considered in the selection, sourcing and transport of materials from the third-party quarries. The main principle is to source the materials locally where possible and feasible in such a way as to decrease the Project's carbon footprint to the extent possible.

There will be various oversized or heavy load components needed for the construction of the major structures such as the viaducts and these may require special transport arrangements.

The main high-volume materials of interest that will be used/generated in the Project are described in the following sections.

5.2.4.2.2 Concrete

Concrete supply will be generated from concrete plants and transported with trans-mixers to be placed as soon as possible. The approximate amount of concrete needed for the Project will be subject to change during detailed design stage. Three concrete plants are planned to be used for the Project were previously listed in Chapter 3.4.3.

5.2.4.2.3 Construction Material

The construction material requirements and the suitability of cut-fill requirements for the project have not been finalized yet. However, based on the current calculations, the estimated excavation and fill volumes of the Project will be as follows:

- Total Amount of Excavation Volume: 19,9 million m^3
- Suitable Excavation Material to be Re-Used for Fill: 3,4 million m^3
- Total Amount of Surplus Material to be disposed: 16,5 million m^3
- Total Amount of Fill Volume: 10,3 million m^3
- Total Amount of Additional Material Required for Fill: 6,9 million m^3

Suitable quarries operated by third-parties have been identified as listed in Chapter 3.4.3. Nakkaş Otoyol A.Ş will ensure that the EPC Contractor procure the aggregate from licensed and authorized sites or sources.

Where new quarries and borrow pits need to be opened only for Project needs, Nakkaş Otoyol A.Ş will ensure that the EPC Contractor will obtain the necessary permits and licenses and conduct any necessary ESIAs in line with Turkish requirements and Lender's standards prior to operation of the quarries.

The minerals that will be used for this Project are subject to licences under the applicable Mining Law (Law 3213, published in the Official Gazette Date/Number: 15.06.1985/18785, with last changes on 02.12.2020) as "Group II Minerals" (calcite, limestone, granite, and basalt rock) and "Group II a Minerals" (marble and basalt blocks). Licences must be obtained from the General Directorate of Mining and Petroleum Affairs (Maden ve Petrol Isleri Genel Müdürlügü – MAPEG) of the Ministry of Energy and Natural Resources.

The Project will only be able to utilise quarries that are fully licensed and operating in full compliance with the licence requirements and other regulatory obligations. As such, any of the existing quarries or any additional quarries identified in the future (if needed) that are not fully licensed will need to obtain the required licences.

The EHS considerations that will need to be taken into account in the selection of appropriate quarry sites and access routes will be based on IFC General EHS Guidelines (IFC, 2007) as well as guidelines for IFC EHS Guidelines for Construction Materials Extraction (IFC, 2007). These guidelines will take into account the noise, air quality, proximity to sensitive receptors, community health and safety, vibration issues (blasting), habitat and biodiversity among other considerations for the selection and use of these quarries. An audit procedure will be developed to assess the existing quarries with respect to the EBRD, IFC and Turkish regulatory requirements.

The licensing process for quarries, which includes a combination of licences and permits (which may have different holders), is described below:

- Exploration License/Certificate (in Turkish: Arama Ruhsatı):

  The first step to engage in mining activities is to apply for an Exploration Licence. The right of priority in the application process is based upon the date of application. The term of an Exploration Licence is three years; however, this period may be extended for some minerals for an additional two years.

- Operation Licence (İşletme Ruhsatı):

  Before the end of the Exploration Licence period, the licence holder must apply for an Operation Licence which will be valid for 10 years (Group II Minerals) and can be extended up to 60 years.

- Raw materials Manufacturing Permit (Hammadde uretim izin belgesi):

  Equivalent of an Exploration and Operation Licence for public bodies.

- Operation Permit (İşletme İzni):

  In addition to an Operation Licence, an Operation Permit is required to start production activities. Separate Operation Permits are required for different types of minerals within the same area covered by one Operation Licence.

  An Operation Licence covers the area in which the mining activities will be conducted and provides the legal right to use the licensed area – whereas the Operation Permit gives the licence-holder the right to operate the mine. The duration of the Operation Permit is limited to the duration of the Operation Licence.

- Transfer of Mining Rights:

  A Mining Licence may be transferred to those qualified under the Mining Law and the transfer must be registered at the MAPEG.

The Operation Permit may be held by Nakkaş Otoyol A.Ş., or the EPC Contractor, or a third party can hold the Operation Permit and sell material to the Project under contractual agreements. All quarries

will be operated exclusively for the Project during the construction time (i.e. during the time a particular quarry is being used for the Project, the excavated materials will solely be used for this Project and not for other projects).

The responsibility for rehabilitation of the quarry after closure of operation rests with the holder of the Operation Permit (according to the applicable Regulation on Rehabilitation of Areas Destroyed by Mining Activities (Madencilik Faaliyetleri ile Bozulan Arazilerin Dogaya Yeniden Kazandirilmasi Yönetmeligi, published in the Official Gazette Date/Number: 23.10.2010/27471, with last changes on 28.09.2012).

The future detailed planning will be made by Nakkaş Otoyol A.Ş. (or the contractors) in accordance with best practice such as avoiding passage through villages or other settlements if possible, and regular watering (if dust is a problem) and maintaining unpaved access roads to minimise any adverse impact. Generally, existing state roads will be used where possible. Furthermore, the Traffic Management Plan (on-site and off-site) will apply, for which key principles are set out in the Project's ESMMP.

5.2.4.2.4 Excavation Spoil

Construction of the Project and related structures such as the cuttings, earthworks, etc. will generate significant volumes of material from earthmoving and site clearance. As earlier discussed in Construction Material section, the cut and fill balances along the Project route indicates that total amount of surplus material to be disposed will be around 9 million m^3. Six surplus material dumpsites are planned to be used for the Project which are listed in Chapter 3.4.3.

The EPC contractor will need to take opinion from relevant authorities (such as Ministry of Agriculture and Forest, municipality of the relevant district and/or province, and/or other authority which has responsibility on possible storage area in any manner) and the material will be stored accordingly. The statutory process is that the relevant authority to determine where the surplus materials are to be deposited (e.g. in abandoned quarries or borrow pits), and these instructions must be followed by the EPC contractor.

5.2.4.2.5 Other Wastes during Construction

The wastes other than the excavation spoil that will be generated during the construction process include:

- Domestic waste from construction camps;
- Wastewater from construction camps and construction operations (e.g. dust suppression activities, spraying concrete, adding water to backfill material, equipment cleaning and site clean-up);
- Packaging wastes/recyclable wastes: waste metals, plastics, cables, glass, paper (packaging material, clean air filters, clean containers, drums bins, crushed stone);
- Non-hazardous waste from construction camps and construction operations (e.g. scrap metal, scrap plastic, scrap wood);
- Hazardous waste (chemicals, additives, paints) generated from use of hazardous materials for road construction and contaminated/oily fabrics and filters, contaminated packaging material;
- Pesticides and herbicides wastes to be used at campsites and during maintenance activities at the along the road operation phase;
- Machinery operation and maintenance related wastes (machinery parts replacement, used filters, etc.);
- Waste generated from concrete batch plant and asphalt plant and painting operations (wastewater, sludge, waste bitumen, spent paint);
- Waste oils from lorries or mechanical part of plant and storage tanks;

- Waste batteries and accumulators;
- Electronic waste from construction activities and construction camps;
- Fluorescent lamps from construction camps;
- Waste vegetable oils from construction camps;
- Medical waste from construction camps: and
- Scrap material (removed old towers and cables) generated by removal of the existing OHTLs.

Table 5-10 summarizes the main types of waste to be generated during construction, their characteristics (including the waste code), governing Turkish regulation and proposed management.

Table 5-10 Characteristics of main types of wastes during construction

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Proposed Management
Domestic Waste	Solid Wastes	20 03 01	Non-hazardous household waste from the camp sites	Waste Management Regulation (OG Date/Number: 02.04.2015/29314)	Impermeable and sealed waste containers
	Domestic Wastewater	No defined waste code	Generated by workers at the campsites and during construction activities	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687)	Direct discharge into the nearby municipal wastewater collection line
Excavation Waste	Excavated material-non contaminated	17 05 04	Non contaminated natural soil material/surplus excavated material	Regulation on Control of Excavated Soil, Construction and Demolition Wastes (OG Date/Number: 18.03.2004/25406)	Surplus excavated material to be transferred to surplus material dumpsites For excavated materials to be reused: Temporary piling on ground within construction site with care against dust generation and surface runoff
Packaging Waste/Non-hazardous Waste	Recyclable/packaging materials	15 01 01 to 15 01 07 (paper and cardboard, plastic, wood, metal, composite, mixed and glass packaging) 15 02 03 (clean filters)	Non-hazardous – Generated from packaging of products brought to the site and other non-contaminated recyclable materials	Packaging Waste Control Regulation (OG Date/Number: 24.08.2011/28035) Communiqué on Recycling of Certain Non-hazardous Wastes (OG Date/Number: 17.06.2011/27967)	Impermeable and sealed waste containers Dedicated storage area for large volume wastes

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Proposed Management
		17 02 (wood, glass, plastic) 17 04 (metals)			
Special Wastes	Waste oils	13 01 13 02 Code to be defined based on type of waste oil	Hazardous materials-Generated from upkeep and use of construction equipment	Waste Oil Management Regulation (OG Date/Number: 21.12.2019/30985)	Waste oils will be segregated and stored based on the type of waste oil
	Waste Batteries Waste Accumulators	20 01 33* 16 06 code based on type of battery and accumulator	Generated from construction equipment used at the site	Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/25569)	Stored in special containers and areas as in line with the regulations. Waste batteries to be delivered to TAP (authorized waste battery collector) and waste accumulators to dealers.
	Waste vegetable oil	20 01 26*	Generated at kitchens in construction camp	Regulation on the Control of Waste Vegetable Oils (OG Date/Number: 06.06.2015/29378)	Waste vegetable oils will be segregated and stored in impermeable and sealed containers

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Proposed Management
Hazardous Waste	Chemical substances, paints, antifreeze, vehicle/engine filters, contaminated fabrics, old filters, liquid fuel, pharmaceutical waste, polluted soil, etc.	Codes to be defined based on type of hazardous wastes	Generated during road and bridge construction works, maintenance of equipment and vehicles.	Waste Management Regulation (OG Date/Number: 02.04.2015/29314)	Hazardous wastes will be separated from other types of wastes generated on site and stored based on their waste code. Wastes shall be temporarily stored for a maximum of 6 months on the site on a designated area and labelled with special signs. These areas will have an impermeable surface and be covered in case of any spills or leakage of hazardous wastes.
Medical Waste	Infectious waste, pathological waste, sharps waste	18 01 …* 18 02 …*	Generated from infirmary during construction	Medical Waste Control Regulation (OG Date/Number: 25.01.2017/29959)	Stored in special containers and areas in line with the regulations.

5.2.4.2.6 Wastes during Operation

The quantities of materials used and wastes generated during the Project operation phase will primarily relate to the operation of the service and maintenance areas and the toll plazas, as well as to the maintenance of the road corridor.

Solid waste generation during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material); road litter, illegally dumped waste, animal carcasses, vegetation waste from right-of-way maintenance, and sediment and sludge from storm water drainage system maintenance (including sediment traps and oil/water separation systems). Paint waste may also be generated from road and bridge maintenance (e.g. due to removal of old paint from road stripping and bridges prior to re-painting). Waste oils and waste batteries/accumulators can be generated from road maintenance equipment. Hazardous waste will arise occasionally from clean-up activities of accidental spills.

Table 5-11 summarizes the main types of wastes to be generated during operation, their characteristics (including the waste code), governing Turkish regulation and proposed management.

Table 5-11 Characteristics of main types of wastes during operation

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Proposed Management
Domestic Waste	Solid Wastes	20 03 01	Non-hazardous household waste from the rest areas	Waste Management Regulation (OG Date/Number: 02.04.2015/29314)	Impermeable and sealed waste containers
	Domestic Wastewater	No defined waste code	Generated by employees/visitors of the rest areas	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687)	Direct discharge into the nearby municipal wastewater collection line
Packaging Waste/ Non-hazardous Waste	Recyclable/packaging materials	15 01 01 to 15 01 07 (paper and cardboard, plastic, wood, metal, composite, mixed and glass packaging) 15 02 03 (clean filters) 17 04 (metals)	Non-hazardous – Generated from packaging of products brought to the site and other non-contaminated recyclable materials	Packaging Waste Control Regulation (OG Date/Number: 24.08.2011/28035) Communiqué on Recycling of Certain Non-hazardous Wastes (OG Date/Number: 17.06.2011/27967)	Impermeable and sealed waste containers Dedicated storage area for large volume wastes
Oil/water Separator Contents	Solids, sludges, oil, oily water	13 05 code based on type of content	Hazardous materials – Generated from cleaning of oil/water separators	Waste Management Regulation (OG Date/Number: 02.04.2015/29314)	Separated from other types of wastes and stored based on their waste code.
Special Wastes	Waste oils	13 01 13 02 Code to be defined based on type of waste oil	Hazardous materials – Generated from upkeep and use of road maintenance equipment	Waste Oil Management Regulation (OG Date/Number: 21.12.2019/30985)	Waste oils will be segregated and stored based on the type of waste oil
	Waste Batteries Waste Accumulators	20 01 33* 16 06 code based on type of battery and accumulator	Generated from road maintenance equipment	Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/25569)	Stored in special containers and areas as in line with the regulations. Waste batteries to be delivered to TAP (authorized waste battery collector) and waste accumulators to dealers.

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Proposed Management
Hazardous Waste	Chemical substances, paints, antifreeze, vehicle/engine filters, contaminated fabrics, old filters, liquid fuel, polluted soil, etc.	Codes to be defined based on type of hazardous wastes	Generated during road and bridge maintenance works and from maintenance of equipment and vehicles.	Waste Management Regulation (OG Date/Number: 02.04.2015/29314)	Hazardous wastes will be separated from other types of wastes generated on site and stored based on their waste code. Wastes shall be temporarily stored for a maximum of 6 months on the site on a designated area and labelled with special signs. These areas will have an impermeable surface and be covered in case of any spills or leakage of hazardous wastes.

5.2.4.2.7 Licensed Waste Management Facilities

The Project will only utilize fully licensed transport and disposal/treatment firms. The treatment capacity of non-hazardous and hazardous waste management facilities has developed over the years in Turkey to treat the waste generation across the country. There is adequate capacity in the treatment facilities to treat the waste generated in the construction and operation phase of the Project.

The licensed waste management facilities in İstanbul province have been reviewed from the MoEUCC website. A large number of licensed waste management facilities are available in İstanbul (625 facilities based on data obtained from MoEUCC website on 23.08.2021 – https://eizin.cevre.gov.tr/Rapor/BelgeArama.aspx).

The list of licensed waste management facilities in Başakşehir and Arnavutköy districts (226 in number) where the main Project route will be located is presented in Annex 8. The waste facilities to be used during construction will be selected by the EPC contractor. Wastes during the construction and operation of the Project will be managed at the appropriate facility not only according to their class and type but also according to the status (validity) of the facility permit.

5.2.5 Surface and Groundwaters

5.2.5.1 Methodology and Information Sources

ESIA teams initially aimed to identify the hydrological and hydrogeological features within the zone of influence of the Project. The features include published information on the freshwater environment as well as the water quality information that is available to establish the baseline prior to construction and operation of the Project. It has to be noted that for surface and groundwaters, the AoI extends to:

- Groundwater sources within the vicinity of the Project and more broadly in the region; and

- Freshwater resources down-gradient of the above areas with the potential of being impacted through contamination transport process from construction and operation activities.

The following desktop sources were used to identify the hydrological and hydrogeological features:

- TÜBİTAK-MAM, 2010 report
- ISKI Drinking Water Watershed Regulation
- The Regulation on the Protection of Drinking-Utilization Water Basins
- İstanbul Province Environmental Status Report, 2019

In addition to the desktop studies, ESIA team conducted site visits to ground truth identified water sources and conduct water quality sampling to understand the existing water quality at identified streams interacting with the Project's RoW. Surfacewater sampling was conducted at streams where the RoW is directly interacting with.

The physicochemical parameters included the following:

- pH,
- Conductivity,
- Turbidity,
- Total alkalinity,
- Total dissolved solids,
- Dissolved oxygen, and
- Total hardness.

5.2.5.2 Watersheds and Governing Regulations

5.2.5.2.1 National & Regional Watersheds

The State Hydraulic Works (DSI) has partitioned Turkey into 26 main hydrological basins with a total of 186 billion m³ average annual runoff (TÜBİTAK-MAM, 2010). Turkey possesses 177,714 km of river, 203,599 ha of natural lakes, and 179,920 ha of constructed dams and artificial lakes. The Project is located within the boundaries of the Marmara Basin (Figure 5-23) with borders along the eastern part of Korudağ, Ganos Mountain, and Istranca Mountains in Thrace in the north and northwest and the Anatolian part, on the east and south sides, Alem Mountain, Aydos Mountain, Kayalıdağ, Gökdağ (Garipağaoğlu, 2016).

The most important receptor of the basin is the Sea of Marmara. The Büyükçekmece, Küçükçekmece and İznik Lakes are located in the basin and are important parts of its hydrography (Garipağaoğlu, 2016). The surface water potential of the Marmara Basin is 5.08 x 10^9 m^3 representing 2.77 % of Turkey's overall potential. The groundwater operating reserve potential of the Marmara Basin as determined by DSI is 2.97 x 10^8 m^3/year (TÜBİTAK-MAM, 2010).

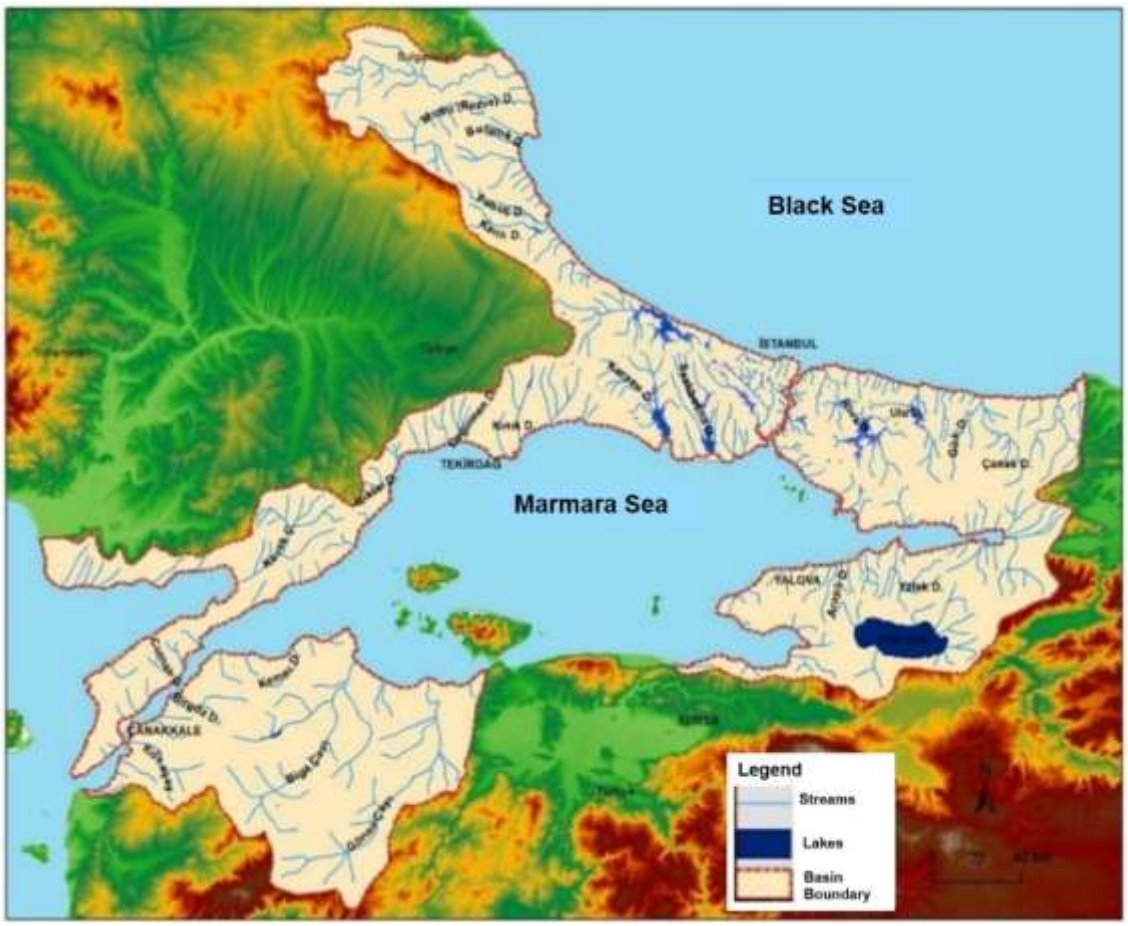


Figure 5-23 Marmara Watershed Boundaries (Garipağaoğlu, 2016)

İstanbul Province is located on two large basins: the Marmara Sea Basin and the Black Sea Basin. There are no large-capacity rivers within the provincial borders; however, there are streams that feed the lakes and ponds that provide drinking and utility water or flow into the sea. The flow rates of the streams are low and irregular in feeding lakes, ponds, and dams in İstanbul.

Some of the streams dry up completely in the summer, and some of them cause floods after heavy rains in the spring. İstanbul Province does not consist of a single river basin, but many smaller basins formed by the confluence of the river basin.

There are eight surface water collection basins in İstanbul where approximately 90 % of the daily total water requirement (approximately 3 million m^3) is met from these basins. These basins are the Terkos, Büyükçekmece, Sazlıdere, Küçükçekmece and Alibeykoy basins on the European side, and Elmali, Ömerli and Darlık basins on the Anatolian side (Figure 5-24). Each water basin has protection areas as described below and shown in Figure 5-24:

- Absolute Protection Area (0 - 300 m): Drinking and utility water is provided; distance measured from the highest water level in the water body. No developments except for wastewater treatment plants are allowed.
- Short Distance Protection Area (300 - 1000 m): land area with a horizontal width of 700 m from the upper limit of the absolute protection area. No disposal of excavated material is allowed.
- Medium Distance Protection Area (1000 - 2000 m): the land area with a horizontal width of 1000 m from the boundary of the Short Distance Area. Functions prohibited include industrial buildings, free zone, medical faculties, education and training institutions where chemical substances are processed in laboratories and workshops, hospitals, gasoline stations, integrated livestock

facilities, slaughterhouse, chemical, fuel, toxic, harmful, and dangerous substance warehouses, industrial and domestic solid waste storage and disposal centres.

- Long Distance Protection Area (2000 m-basin boundary): the land area between the boundary of the medium distance protection area and the watershed boundary. Activities that are prohibited include metal hardening with salt, metal covering, surface cleaning with acid, textile dyeing, and screen printing, lift washing-lubrication, combustible, flammable, explosive chemical warehouses, chemical production facilities from which industrial wastewater is produced, paper manufacturing plants from scrap paper, raw leather processing, acid production and filling places, batteries and accumulator manufacturing sites, grease oil factories, pig farms, pharmaceutical synthesis factories, heavy metal salt production, glasswasher, wool washing, industrial and domestic solid waste final storage centres, chemical warehouses, and fuel filling facilities.

The designation of these zones and the measures for the protection and activities allowed within these zones are governed by the ISKI Drinking Water Watershed Regulation[44] published in 2016.

When Figure 5-24 is examined, it is noted that the Küçükçekmece basin (shown as number 4) does not have protection zones. The reason for this is that pollution caused by excessive settlement and uncontrolled population growth has prevented the lake from being used as a source of drinking water supply and the protected areas have been cancelled.

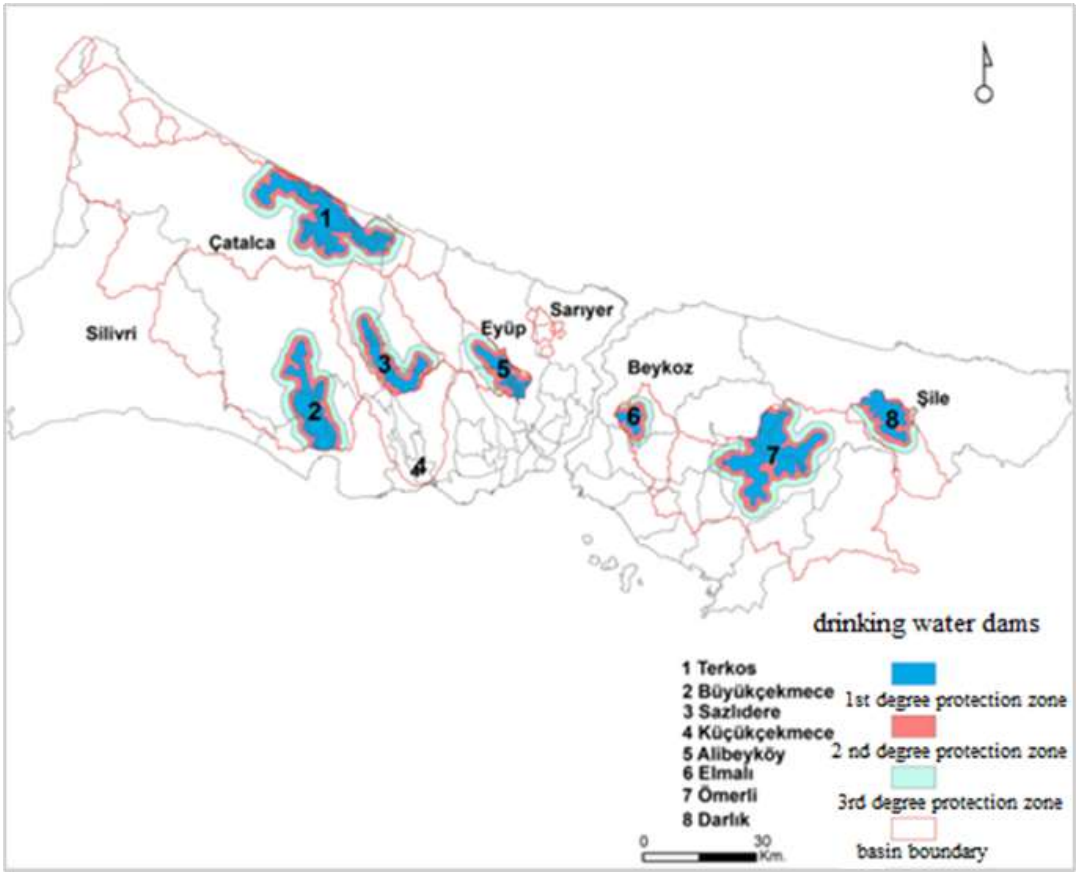


Figure 5-24 Watershed Boundaries in İstanbul Province (Demiroğlu M., 2019)

(Note: 1st degree protection zone: absolute protection area, 2nd degree protection zone: short distance protection area, 3rd degree protection zone: medium distance protection area)

44 https://www.iski.gov.tr/web/assets/SayfalarDocs/Mevzuat %20ve %20Y %C3 %B6netmelikler/ISKI-ICMESUYU-HAVZALARI-YONETMELIGI-29092017.pdf

5.2.5.2.2 Project-specific Water Bodies

The Project passes just immediately to the south of Sazlıdere Dam via a bridge over the Sazlıdere Creek. The alignment passes close to the Küçükçekmece Lake as shown in Figure 5-25.

The Sazlıdere Dam is located approximately 0.2 km north of Km: 51+400 of the Project route, while Küçükçekmece Lake is located at 1.5 km west of end of the Yeşilbayır and 2.5 km southeast of end of the Bahçeşehir Connection of the Project, respectively.

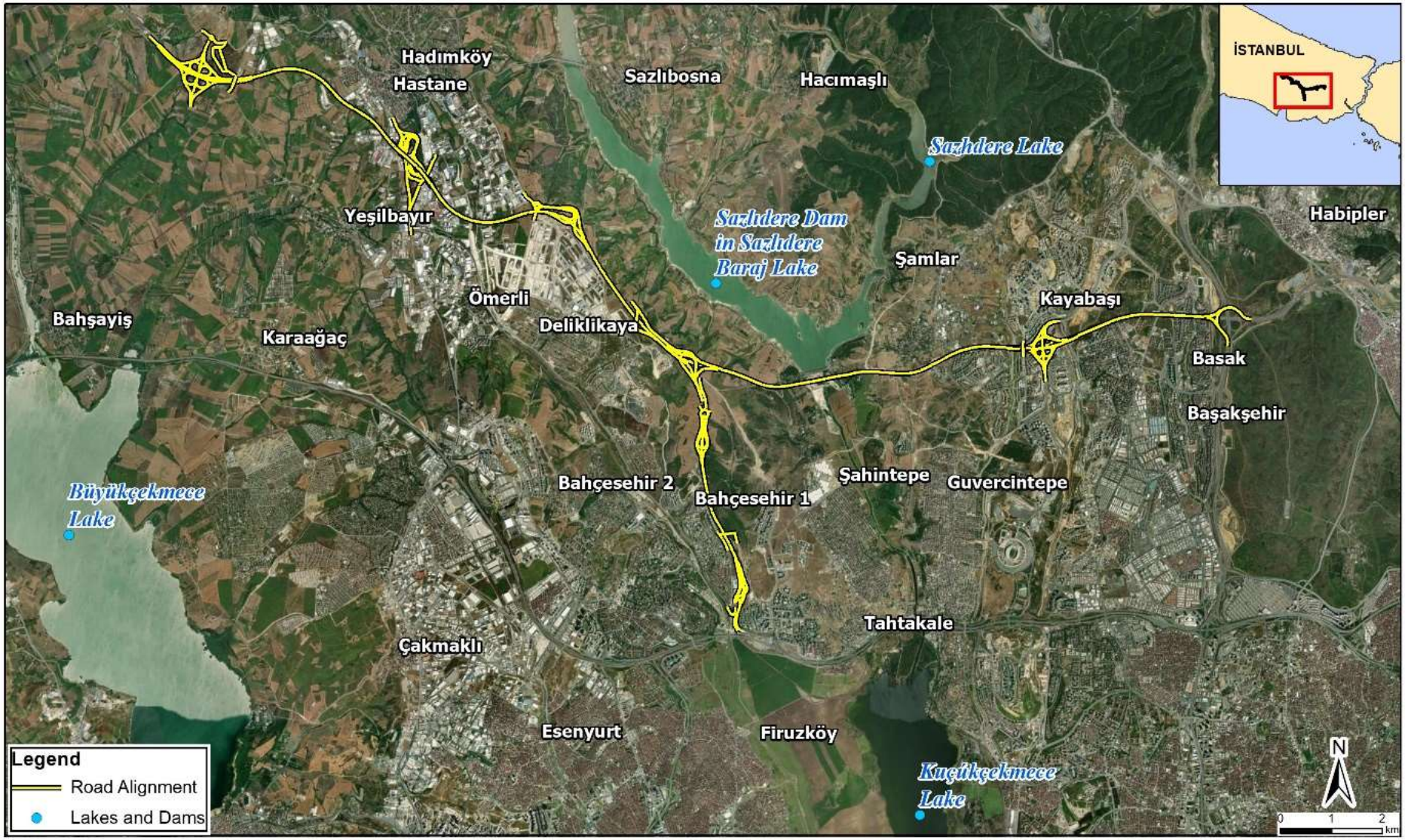


Figure 5-25 Project Location near the Sazlıdere Dam and Küçükçekmece Lakes

Information on the stream names, collection basins in the Project area, and their capacity are given in Table 5-12.

Table 5-12 Other Hydrological Features of the Project Area (İstanbul Province Environmental Status Report, 2019)

Name	Length (km)	Average Flow rate (2019-m^3/sec)	Function
Streams			
Sazlıdere	40	-	Feeds Sazlıdere Dam (drinking water supply)
Nakkaş	-	-	Discharges into Küçükçekmece Lake.
Basins			
Büyükçekmece		125.42 hm^3/year	
Sazlıdere Dam		50 hm^3/year	

Figure 5-26 and Figure 5-27 show that the motorway most likely falls within the Medium Distance Protection Area of the Sazlıdere Dam and the Long-Distance Area of the Büyükçekmece Lake.

Figure 5-26 Project Location near the Sazlıdere Dam and Protection Zones

(Dotted line near the dam represents the boundary of the Medium Distance Protection Area)

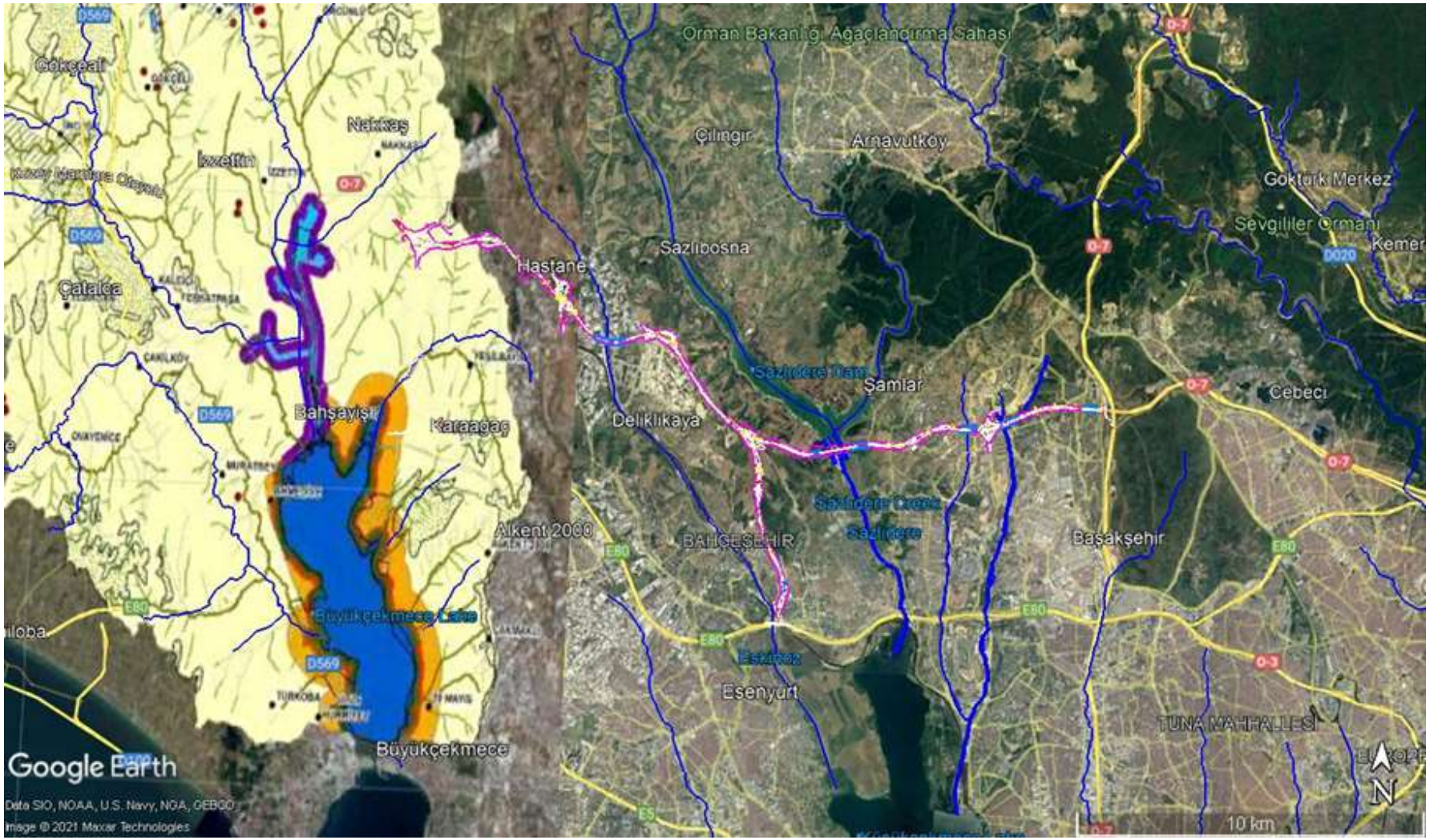


Figure 5-27 Project Location near Büyükçekmece Lake and Protection Zones

The Regulation on the Protection of Drinking-Utilization Water Basins (Official Gazette Date/Number: 28.10.2017/30224; Last Amended on 27.08.2020) aims to regulate principles to protect and improve the quality and quantity of all surface and groundwater resources that are used or planned to be used for drinking-utilization purposes.

The regulation defines the types of activities that can be conducted within the protection zones of lakes, dam lakes, and ponds. Considering the public benefit and if there is no other alternative, motorways can be allowed to pass through absolute protection zone and short distance protection zones on the condition that necessary measures are taken to prevent pollution of surface waters. Only the transportation related functions of transportation infrastructure can be allowed within medium distance protection area. In case the transportation infrastructure is an access-controlled motorway, pollution related to the service facilities of the motorway should be prevented to reach the water resource.

Resting areas, fuel station and similar facilities are not allowed within medium distance protection area. Construction of new motorways that would not negatively impact the water quality and quantity and installation of fuel stations that meet the Turkish Standard Institute's (TSE) relevant standards can be allowed within the long-distance protection area.

5.2.5.3 Surface Waters

5.2.5.3.1 Present Water Bodies

Sazlıdere Dam

Sazlıdere Dam was built on the Sazlıdere stream and is located at a distance of 0.2 km to the Project route. Sazlıdere Dam has a length of 20 km in the east-west direction and a width of 9 km in the north-south direction. The total drainage area of the Sazlıdere Basin is 165 km^2 and includes agricultural lands and pastures, residential and industrial areas, forested areas, and dam areas. The precipitation area of Sazlıdere Basin includes the precipitation areas of Hasanoglu Stream, which empties into Küçükçekmece Lake in the east, Terkos Lake in the north, and Ispartakule Stream, which empties into Küçükçekmece Lake in the west.

The Sazlıdere Dam (rock body fill type) was built from 1991-1996 for drinking water supply purposes. The height from the riverbed is 48.00 m; the lake volume at normal water level is 91.60 hm^3 with a surficial area of 11.81 km^2. The average flow rate of Sazlıdere stream is 1.55 m^3/s downstream of the lake. The dam provides 50 hm^3 of drinking water annually (Figure 5-28).

Figure 5-28 View of the Sazlıdere Dam (https://www.Başaksehir.bel.tr/sazlidere-baraji)

Domestic and agricultural sources of pollution are the dominant sources of pollution affecting the water quality of the lake. As a result of population growth and structuring, the water quality of the Sazlıdere Basin has deteriorated, and the lake became mesotrophic from phosphorus values (Ozdemir, 2010). The water collected in the Sazlıdere Basin is treated at the Ikitelli Fatih Sultan Mehmet Han Treatment Facility via the pumping centre and transmission lines and sent to settlement areas such as Küçükçekmece, Bagcılar, Bahcelievler, Bakirkoy, Gungoren, Esenler, Gaziosmanpasa, Bayrampasa, and Eyup.

5.2.5.3.2 Sazlıdere Cable-Stayed Bridge and Sazlidere Dam Flood Risk Assessment

The Project structures can result in the removal of flood storage capacity, causing an increased risk of flooding elsewhere, and the hydraulic structures such as bridges, culverts, and diversion channels can also impede flow during times of flood, thus causing water levels upstream of structures to be raised above what would occur in the absence of the structure. Undersized sub-structures crossing rivers, streams, and drainage systems in urban highways may also prevent the floodwaters from flowing in extreme conditions. The backwater from the drainage sub-structures may inundate and increase the risk of loss of life and properties in the urban area.

Considering these potential risks, this flood risk assessment was prepared as a part of the ESIA studies to identify the risks and assess these risks during the design of the hydraulic structures as presented in Annex 16 of this ESIA report. The scope of the study was defined as:

- Calculations of peak flow and hydrographs for 100-, 200- and 500-Years extreme events for the catchments area where the Project is crossing
- Viaduct hydraulics examination and flood risk assessment
- Culverts hydraulics examination and flood risk assessment

The flood risk assessment was conducted for Sazlıdere Cable-Stayed Bridge and Sazlıdere Downstream of the Sazlıdere Dam using the hydraulic model and information from the alignment, plan profile of sub-structure, hydrology, and stream geometry. Water surface profile and mapping were prepared for 100 years of design flood considering State Water Works (DSI) and General Directorate of Highways (KGM) manual and standards.

Sazlıdere Cable-Stayed Bridge is located downstream of the Sazlidere dam at 1619 meters in length. Its deck elevation is approximately 30 meters height from river level. The Sazlidere river downstream of the dam is protected and designed with a 60 meters width. Therefore, the river flows freely without restriction by the viaduct and its piers.

The calculated design floods are conducted using hydraulic calculation considering the effect of 30 percent Sazlidere reservoir flood routing. Both the bridge and channel capacities are adequate for a 100-year flood passage. It will cause problems around the bridge if the release of the spillway will be more than 506,39 m^3/s (Routed flood with the 500-year return period and the spillway design flood).

Büyükçekmece Lake

The Büyükçekmece Lake is located on the Çatalca peneplain in the west of İstanbul. The lake, which is fed by the Karasu Stream and its branches, was a lagoon up to 1988; the lake's connection with the Marmara Sea was cut off by the embankment constructed by İSKİ after 1988 and the lake became a dam lake (Figure 5-29).

Streams that feed the Büyükçekmece Basin are the Beylikcayı Stream, Cekmece Stream, Hamza Stream, Eskidere and Orcunlu Stream, Kızıldere Stream, Karasu Stream and Akalan Stream, Devil Stream, Ayus Stream, Inter Stream, Tavsan Stream, Delice Stream Tributaries, Tahtakopru Stream, Koy Stream, Damlidere and Kesliciftligi Stream and Kiladine Stream Tributary.

Figure 5-29 Büyükçekmece Lake (https://www.goller.gen.tr/Büyükçekmece-golu.html)

The area of the lake, which is one of the most important drinking water sources of İstanbul, is 2,850 ha with a surface watershed area of 622 km^2 which includes land from the Büyükçekmece, Çatalca, Arnavutköy, and Silivri Districts. The deepest part of the lake is about 8.6 m and the volume of the lake at normal water level is 161.61 hm^3. The annual average yield of Büyükçekmece Dam is 70 million m^3.

Water pollution has increased due to rapid and irregular population growth, industrialization, and agricultural works. The amount of nitrate, nitrogen, and phosphorus in the lake water is high. For this reason, the lake, which is one of the drinking water sources of İstanbul, is in danger of losing its drinking water feature by being polluted like Küçükçekmece Lake.

Küçükçekmece Lake

The Küçükçekmece Lake (Figure 5-30) is located between the Küçükçekmece and Avcılar districts in İstanbul. Located at sea level, the lake is separated from the sea by a shallow shore formed by sand and gravel fill carried along the coast. The lake empties its excess water into the Marmara Sea with a stream at its eastern end. When the sea swells or the lake water is low, the seawater is drained into the lake. For this reason, the water of the lake is more or less salty. The Nakkaş Stream, Sazlıdere, and Eskinoz waters mix with the lake from the north. The length of Küçükçekmece Lake is approximately 10 km, and its width is 6 km. Accordingly, the entire lake area is 16 km^2 and its deepest point is 22 meters.

Figure 5-30 View of the Küçükçekmece Lake
(https://www.cnnturk.com/turkiye/kucukcekmece-golundeki-son-durum-havadan-goruntulendi?page=1**)**

5.2.5.3.3 Watercourses

The flowing creeks and streams through which the motorway passes are identified from east to west as the ones listed in Table 5-13 and illustrated in Figure 5-31:

Table 5-13 Creeks and Streams along the Project route

Name of creek	Project KM	Observations
Creek 1	These two creeks converge between KM 56+000 and KM 57+000	A low flow was observed at Creek 1 during the site visit in February 2021 and the creek was observed to be dry at the time of water sampling in June 2021.
Nakkaş Stream (Creek 2)		
Sazlıdere Stream (Creek 3)	between KM 51+000 and KM 52+000	Flows into Küçükçekmece Lake after exiting the Sazlıdere Dam.
Creek 4	between KM 43+000 and KM 44+000	

The photographs of Creek 1 to 4 are provided in Table 5-14. In addition to Creek 1 to 4, intermittent flowing creeks or drainage paths over which the motorway will pass will ultimately empty into the Küçükçekmece Lake and Sazlıdere Dam.

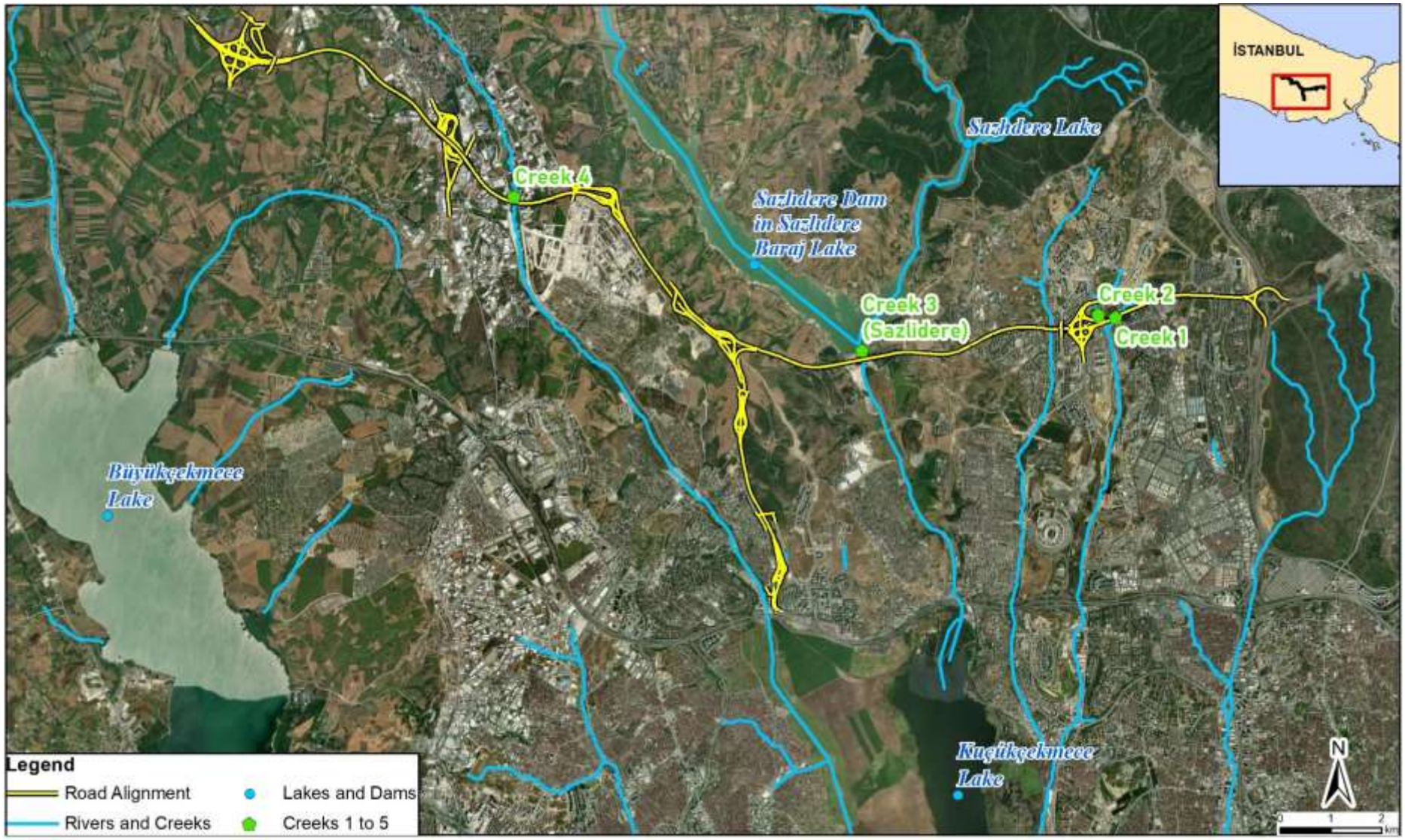


Figure 5-31 Locations of crossing creeks along the Project route and their discharge locations

Table 5-14 Photographs of Creek 1, Creek 2, Creek 3, Creek 4

Creek 1 – the creek was observed to be dry in July 2021

Creek 1 – Low flow was observed during site visit in February 2021

Creek 2

Creek 2 and converging location of Creek 1 to Creek 2

Creek 3 (Sazlıdere)

Creek 4

5.2.5.4 Hydrogeology and Groundwater

The groundwater potential in İstanbul is 300 hm^3 with the European site supplying 180 hm^3, and the Asian side supplying 120 hm^3. The total number of Registered Groundwater Utilization Certificates as of March 2021 was 5,175 units, total allocation in İstanbul as of March 2020 was 156,010 hm^3. Groundwater levels in İstanbul vary depending on geology, topographic structure, seasonal conditions, and recharge.

The majority of the certified wells, for which water is allocated by issuing a Groundwater Use Certificate throughout the Province of İstanbul, is given as “Usage Water”. In addition, water allocation is made under the name of “Industrial Process-Bottling” for water use in water facilities producing drinking water. There are a total of nine groundwater operational areas; the closest is the İstanbul-Topkapi and Küçükçekmece area which has a groundwater reserve of 10.50 million m3/year; presently the area is closed to further groundwater extraction.

The formations that make up İstanbul Europe and the lithological units that make up them are divided into different types of geohydraulic environments according to their geohydraulic environment characteristics, that is, their ability to pass and transmit groundwater (presence of space, dimensions of space, presence and degree of relationship between spaces). The distribution of hydrogeological environments in İstanbul Province is shown in Figure 5-32.

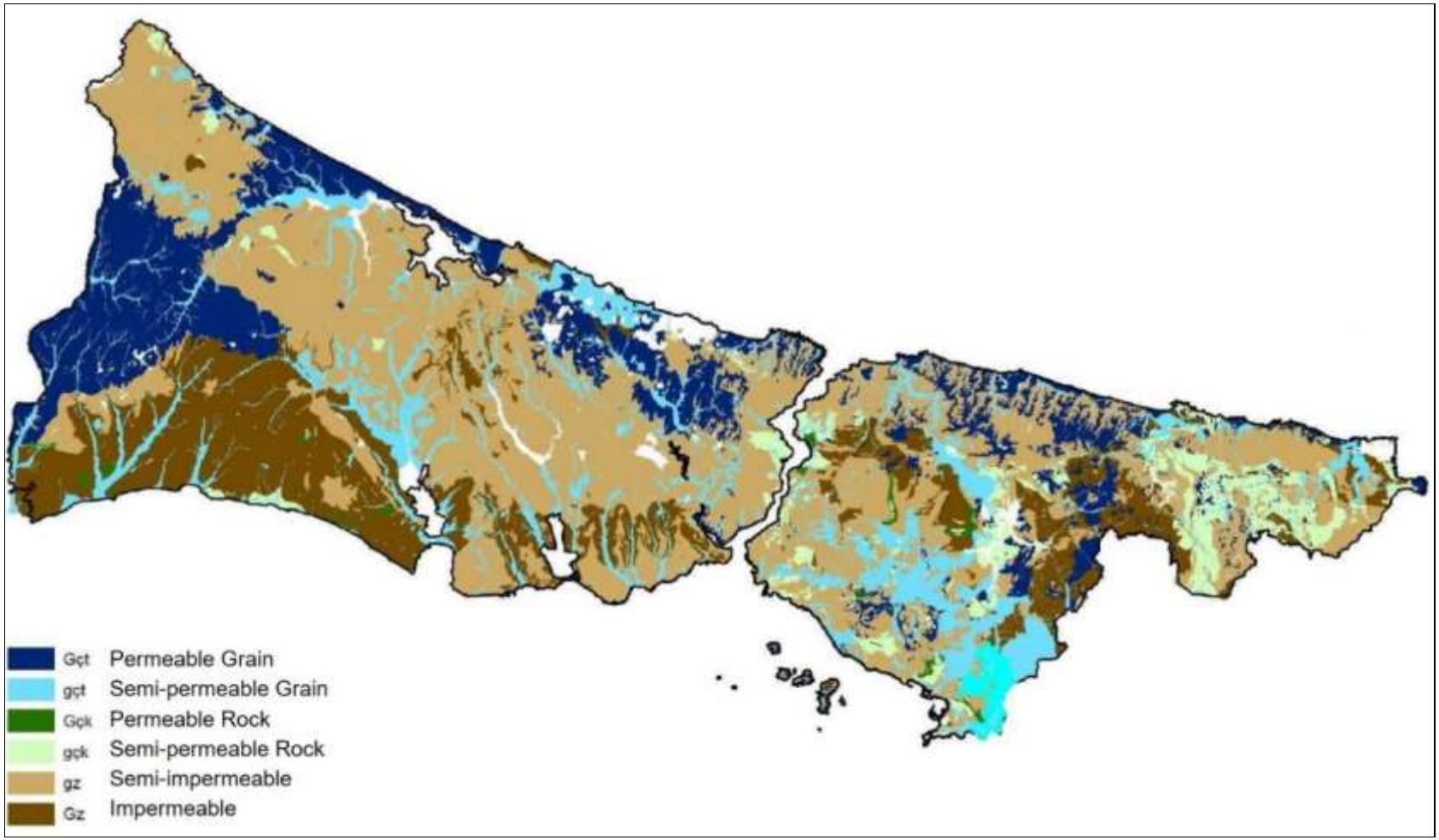


Figure 5-32 Distribution of Hydrogeological Environments in İstanbul Province (İstanbul Province, 1/25,000 scaled Land Use Based Geological Survey Report, August 2017 – İstanbul Metropolitan Municipality, Directorate of Earthquake and Ground Investigation)

Based on the Preliminary Project Geological, Hydrogeological and Engineerıng Geology Survey Report, geological and geohydraulic environments constituting the units encountered in the investigation area are presented in Table 5-15 and described below.

Table 5-15 Geological and Geohydraulic Environments Constituting the Units Encountered in the Investigation Area

GEOLOGICAL ENVIRONMENTS			GEOHYDROLIC ENVIRONMENTS	
Icon	**Description**		**Icon**	**Description**
Qal	Alluvial	≤ 3rd degree drain line basins	Gçt	Permeable Grain
		≥ 4rd degree drain line basins	Gçt	Semi-permeable Grain
Tkr	Kıraç Formation (unparted)		Gçt	Semi-permeable Grain
Tc	Ceylan Formation (unparted)		Gçt	Semi-Impermeable
Tsğ	Soğucak Formation		Gç	Permeable
(Ct)	Trakya Fm. (unparted)		gz	Semi-Impermeable

Semi-impermeable Environments (gz)

Trakya Formation (Siltstone-Seyl), Ceylan Formation (Claystone-Marn) units are "Semi-permeable Environment (gz)" due to their geohydraulic properties.

Semi-impermeable environments and the lithological units that make up them have led to the development of uneven and high elevated areas in their morphology depending on their petrographic characteristics.

Semi-impermeable environments are practically considered to be impermeable environments when they have a permeable or semi-permeable geohydraulic environment on them. For this reason, it undertakes a task that limits the flow of groundwater and serves to store the groundwater in the environment within the framework of its relations with permeable and semi-permeable environments depending on its positional properties.

Semi-permeable Environments (gç)

Semi-permeable environments and the rock(s) that make up them were found to be predominantly "grainy".

The areas of Kıraç Formation (Gravel, coarse sand, silty sand) differentiated with the participation of the surrounding rock fragments and the areas where the Alluvial material is stored along the high-degree (≥ 4th degree) drainage lines indicating relatively long-distance transportation are named as "Semi-permeable Grain Environment (Semi-permeable Grain Environment)" in terms of geohydraulics, considering the groundwater permeability characteristics.

When semi-permeable environments are limited to an impermeable or semi-permeable environment from their bases, they form low-efficiency hydrogeological environments (semi-permeables/contractors) that can still store groundwater in them, although the amount of groundwater that can be used is not high. Considering some local groundwater possibilities, it should be considered that they still have the potential to provide low-yielding groundwater, even if it may not be of great importance in terms of quantity.

Permeable Environments (Gç)

Permeable environments defined throughout the study area are defined in more detail as permeable grain environment (PGE) and permeable rock environment (PRE), considering that the rock (s) that make up the study area are predominantly grainy or rock environment. Soğucak formation has a structure with melting gap from place to place.

Due to the positional situation that occurs when the permeable environments are limited to an impermeable and semi-permeable geohydraulic environment from their bases, they form hydrogeological environments with low-high groundwater storage capacity (aquifers) that are "free" in the sections open to the topography surface and "pressurized" in the depths.

5.2.5.5 Springs

Küçükçekmece Municipality Catchment: reefal limestone at a distance of 50-100 m from Küçükçekmece lake and descending to (-4 m) elevation, large karst gaps are crossed, and the water collected in these karstic voids are pumped and transferred to the drinking water supply tanks of the Küçükçekmece Municipality. The amount of water drawn by the pumps has been reported as 30-35 lt/sec.

5.2.5.6 Freshwater Quality

The surface water quality is segregated into three categories according to the Surface Water Quality Regulation as follows:

- Class I – High-quality water (Class I water quality means “Very Good” water status)
  - Surface waters with high potential to be drinking water
  - Water usable for recreational purposes, including those requiring body contact, such as swimming
  - Water that can be used for trout production
  - Water that can be used for animal production and farm needs
- Class II – Less polluted water (Class II water quality means “Good” water status)
  - Surface waters that have the potential to be drinking water
  - Water that can be used for recreational purposes
  - Water that can be used for fish production other than trout
  - Irrigation water provided that it meets the irrigation water quality criteria determined by the legislation
- Class III – Contaminated water (Class III water quality refers to “Medium” water status)

  Water and industrial water can be used for aquaculture after appropriate treatment, excluding facilities that require qualified water such as food and textiles.

Prior to the enactment of Surface Water Quality Regulation in 2012, the watercourse water quality was segregated into the following four categories: Class I = very good; Class II = good, Class III= moderate and Class IV= poor, according to the Water Pollution Control Regulation. The definitions are similar to the definitions given in Surface Water Quality Regulation as follows:

- Class I – very good (high-quality water);
  - Surface waters with high potential to be drinking water,
  - Recreational purposes (including those requiring body contact such as swimming),
  - Trout production,
  - Animal production and farm needs,
  - Other purposes.
- Class II – good (slightly polluted water);
  - Surface waters with the potential to be drinking water,
  - Recreational purposes,

- Fish production other than trout,
- As irrigation water, provided that the irrigation water quality criteria given in the Technical Procedures Communiqué are met,
- All other uses are other than Class I.

- Class III – Contaminated water; It can be used for industrial water supply after suitable treatment, except for industries that require quality water such as food or textiles.
- Class IV – Heavily contaminated water; these are surface waters that are of lower quality than the quality parameters given for Class III and can be used by improving them to the upper-quality class.

5.2.5.6.1 Sazlıdere Dam

According to the 2003 and 2009 DSI water quality measurement data, the water quality upstream of the Sazlıdere Dam is Class II for NH4-N, Class III for NO3-N is Class III.

5.2.5.6.2 Sazlıdere Stream

According to the 2003 and 2009 DSI water quality measurement data, the stream water quality feeding the dam is Class II, Class IV and Class II for organic matter (COD and BOD), nitrogen TKN and NH4-N and NO3-N, respectively. Total coliform was measured in the Class III range.

5.2.5.6.3 Büyükçekmece Lake

Nitrogen parameters, physical parameters, and total coliform measurements were conducted at four locations in the Büyükçekmece Lake. According to the 2003-2009 water quality measurement data, the level of ammonium nitrogen (NH4-N) was Class II in the sample collected upstream of the spillway of the lake and the water treatment plant; The results were identified in Class III and IV range at the other two stations. NO3-N measurements ranged from Class I to III range. Total coliform levels in Büyükçekmece were also measured between Class I and II levels (TÜBİTAK-MAM, 2010).

According to the 2003-2009 DSI water quality measurement conducted in the Karasudere, Sarısudere and Çakıldere streams feeding the Büyükçekmece, organic parameters COD and BOD were in Class II, TKN in Class IV, nitrogen parameters NH4-N between Class III or IV, NO3-N between Class II or III. Total coliform was measured in Class III (TÜBİTAK-MAM, 2010).

According to the results of the 2020 surface water nitrate pollution analysis of the İstanbul Provincial Directorate of Agriculture and Forestry, the annual average nitrate values of three different stations of Büyükçekmece Lake (on the Karaağaç village road-Karaağaç Middle-Ulus district) were 2.1 mg/l, 2.9 mg/l, and 6.4 mg/l (İstanbul Province Environmental Status Report, 2019).

5.2.5.6.4 Creek 2, 3, 4 and 5

Surface water samples were collected at the locations of Creek 2 (Nakkaş), Creek 3 (Sazlıdere), Creek 4 and Creek 5 (as shown in Table 5-16) on 03.06.2021 by an accredited firm ARTEK according to relevant Turkish Standard Institute standards and analysed in ARTEK laboratories. The surface water analysis reports are presented in Annex 9 and the analysis results are shown in Table 5-16 below. The suite of parameters selected for surface water sampling is based on Annex 5, Table 2 of Surface Water Quality Regulation that shows quality criteria for inland surface waters. Table 5-16 also indicates the surface water quality of the creeks according to Annex 5, Table 2 of Surface Water Quality Regulation.

Table 5-16 Surface water quality analyses result for creeks

Analysis Parameters	Unit	CREEK 2		CREEK 3 (SAZLIDERE)		CREEK 4		CREEK 5	
		Value	Class	Value	Class	Value	Class	Value	Class
Conductivity	µS/cm	654	II	592	II	802	II	959	II
Ammonium (NH4-N)	mg/L	0.46	II	4.61	III	<0.02	I	<0.02	I
Biochemical Oxygen Demand (BOI5)	mg/L	9.5	III	57	III	28.1	III	7.1	II
Dissolved Oxygen Saturation Ratio	%	73	II	4.2	III	88.5	II	84.4	II
Fluoride (F-)	mg/L	0.268	I	5.34	III	0.471	I	0.255	I
Phosphate Phosphorus	mg/L	0.054	II	1.68	III	<0.005	I	0.12	II
Chemical Oxygen Demand (KOI)	mg/L	26.9	II	160.2	III	78.4	III	19.9	I
Nitrate Nitrogen (NO3-N)	mg/L	0.163	I	0.246	I	<0.0226	I	5.95	II
Colour	Pt-Co	10.33	II	60.86	III	23	II	<2.22	I
Sulphur	mg/L	0.05	III	0.81	III	0.077	III	0.105	III
Total Kjeldahl Nitrogen (TKN)	mg/L	2.49	III	24.48	III	1.97	III	1.88	III
Total Nitrogen	mg/L	2.68	I	24.76	III	2.02	I	7.85	II
Total Phosphorus	mg/L	0.1	II	2.13	III	0.02	I	0.18	II
pH		9.28*	III	7.4	I	7.52	I	7.35	I
Manganese	mg/L	<0.001	I	0.54	III	0.001	I	<0.001	I
Selenium	mg/L	<0.005	I	<0.005	I	<0.005	I	<0.005	I
Oil and Grease	mg/L	0.277	II	4.16	III	19.2	III	0.14	I

**pH shows exceedance compared to the range that needs to be between 6-9 according to Annex 5, Table 2 of Surface Water Quality Regulation.*

The results show that Creek 2, Sazlıdere Stream (Creek 3, Creek 4 and Creek 5 fall within Class III (i.e., contaminated water and referred to as medium quality) for water quality classification. Quality parameters for Class I, Class II and Class III and definitions are provided in Annex 2 (EHSS Legal Register).

5.2.5.7 Flood and Stormwater Risk

Flood disasters in Turkey are among the “most common natural disasters and events with high economic losses”. Turkey has a rugged topography where 57 % of the rainfall falls under the mountainous terrain class. Topography average height is 1,132 meters. Areas with a slope of more than 15 % make up 62 % of these mountainous areas.

Due to the characteristic features of the climatic conditions, it is in a structure that is very sensitive to flood disasters in terms of ecology due to heavy rains. In recent years, there has been an increase in sudden and heavy maximum precipitation due to climate change.

The mountainous and sloping topography accelerates the movement of water falling as precipitation. Particularly, precipitation falling on bare and sloping lands passes into the surface flow in a short time, causing floods and overflows. Among the effective factors in the formation of the flood; events such as climate, vegetation, human influences, geological structure and soil characteristics, deterioration of natural balance in basins, heavy and sudden showers can be shown.

Considering these factors, flooding potential is not expected in the Marmara Region, where the Nakkaş-Başakşehir Motorway Project is located, however risk of flash flooding is expected which has already been which has already been assessed in a separate Flood Risk Assessment Study.

5.2.6 Noise and Vibration

5.2.6.1 Methodology and Information Sources

ESIA team initially searched if there are any available desktop data to define the current noise levels in the Project AoI. Since there were not any publicly available data, baseline noise measurements were conducted in the AoI.

ESIA team reviewed the below data to identify noise monitoring locations:

- Road alignment with height profile; and
- Noise-sensitive receptors along the RoW and along adjacent roads where traffic flows will be increased;
- Assessment and Management of Environmental Noise Regulation, Turkey
- IFC General EHS Guidelines,
- IFC EHS Guidance for Toll Roads,
- EC Directive 2002/49,

Based on the above listed data review, ESIA team identified a total of 16 locations including the Başakşehir Çam and Sakura City Hospital and other residential areas to monitor baseline noise conditions.

Baseline noise monitoring study was conducted between 17th and 23rd of March 2021 at 20 different locations including sensitive receptors, industrial areas and rural areas as shown in Figure 5-37 and listed in Table 5-17.

The measurements were undertaken for a continuous period of 48 hours at each selected location, in order to obtain *day, evening and night time* noise levels, in accordance with the ISO 1996[45] as presented in provided Annex 10.

[45] ISO 1996-2:2017 Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels

5.2.6.2 Noise Features of the Project Area

The proposed route traverses both built up, industrial and rural areas. Besides residential buildings, there are also other noise sensitive receptors such as hospitals, schools, recreational areas, public parks, playgrounds and places of worship in the proximity of the Motorway alignment. The sensitive receptors are mainly located between the following locations of the RoW alignment as presented in Figure 5-33 to Figure 5-36 below.

- Km 58+500 – Km 59+300 – Başakşehir
- Km 57+000 – Km 57+600 – Başakşehir
- Km 54+300 – Km 55+700 – Başakşehir
- Km 2+600 – Km 4+500 Bahçeşehir Connecting Road – Bahçeşehir

The proximity of the sensitive receptors to the RoW changes between 30 m to 400 m which may be high likely affected by both during construction and operation stages of the Project due to noise and vibration nuisance.

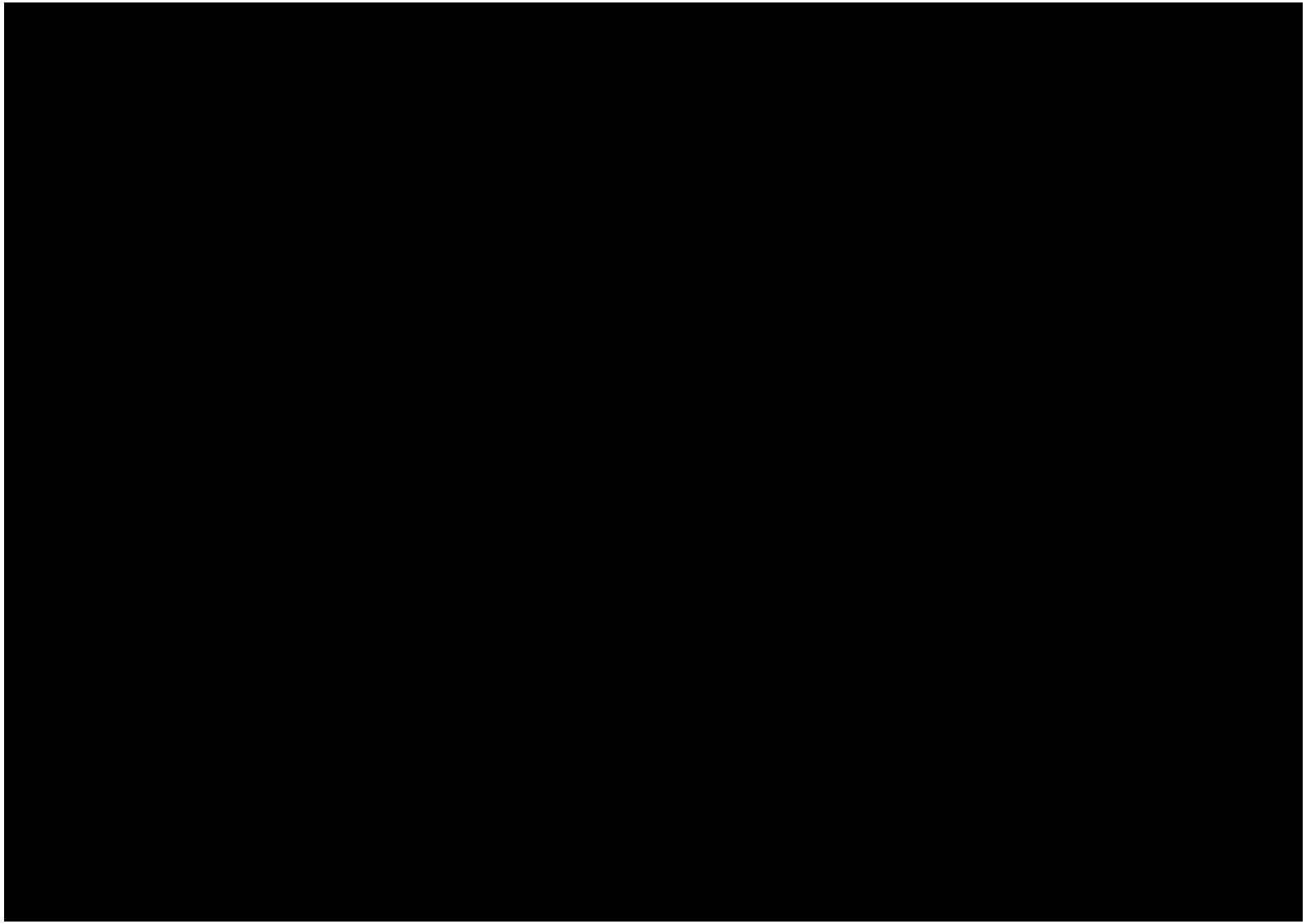


Figure 5-33 Sensitive Receptors between Km 58+500 – Km 59+300

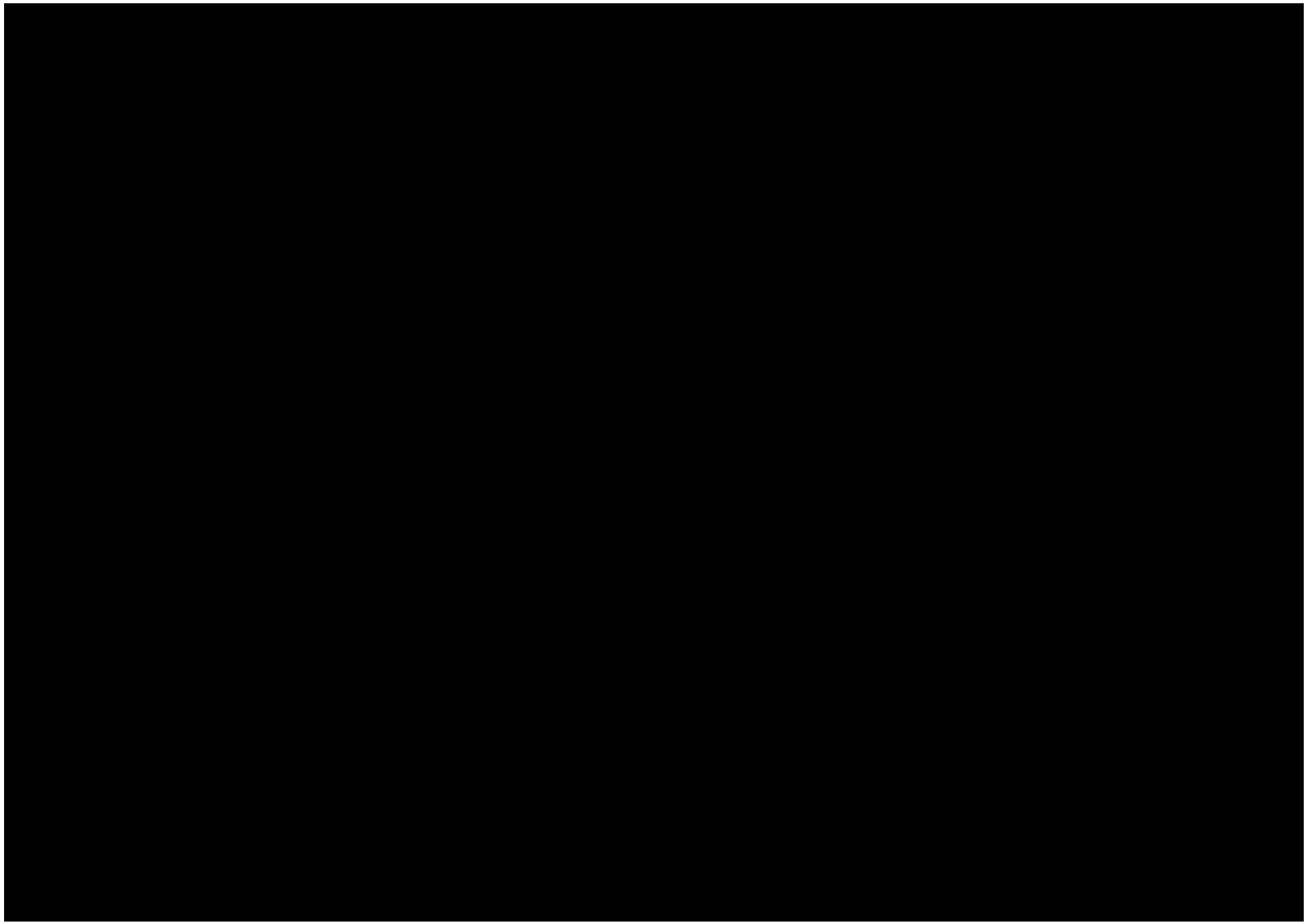


Figure 5-34 Sensitive Receptors between Km 57+000 – Km 57+600

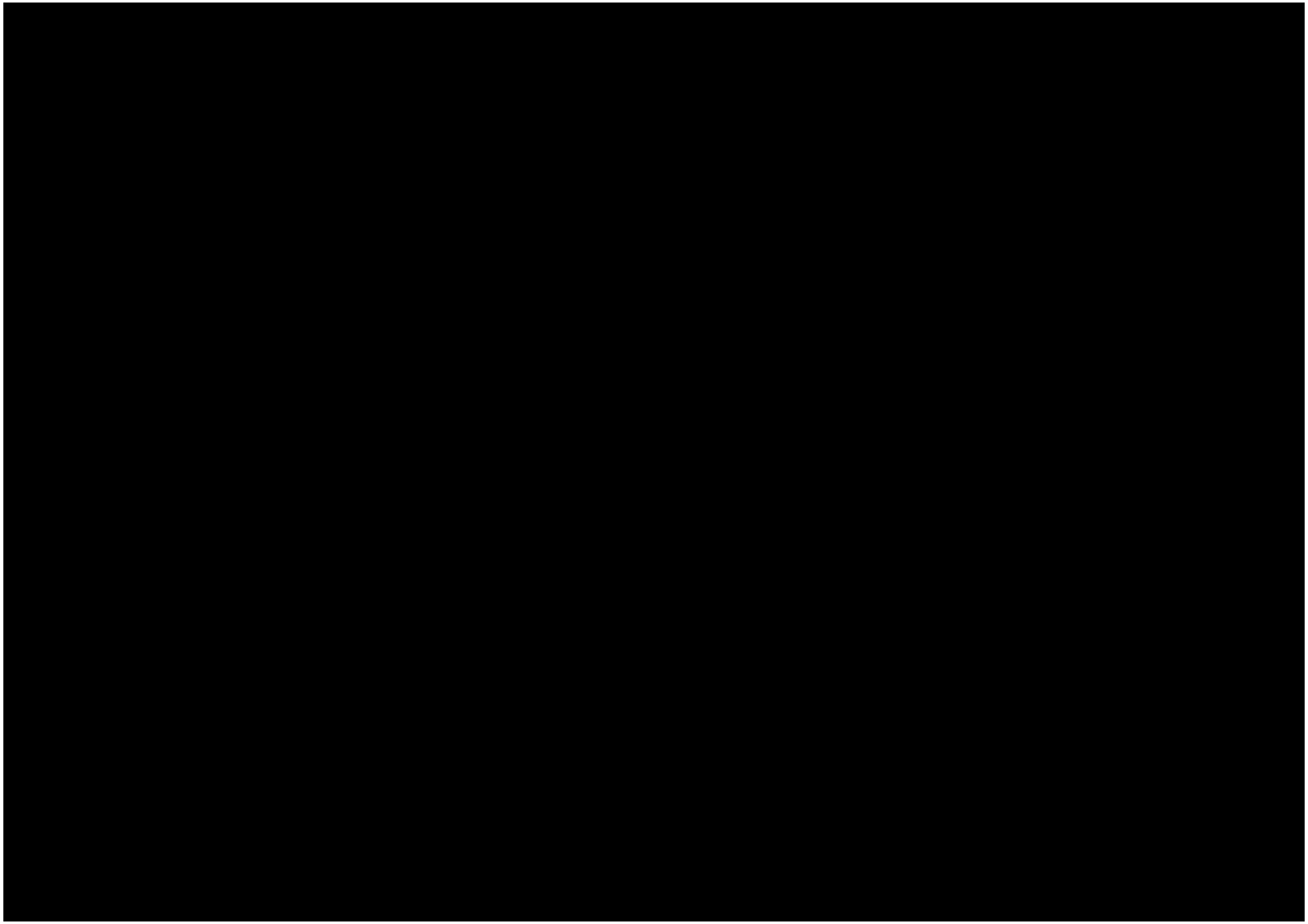


Figure 5-35 Sensitive Receptors between Km 54+300 – Km 55+700

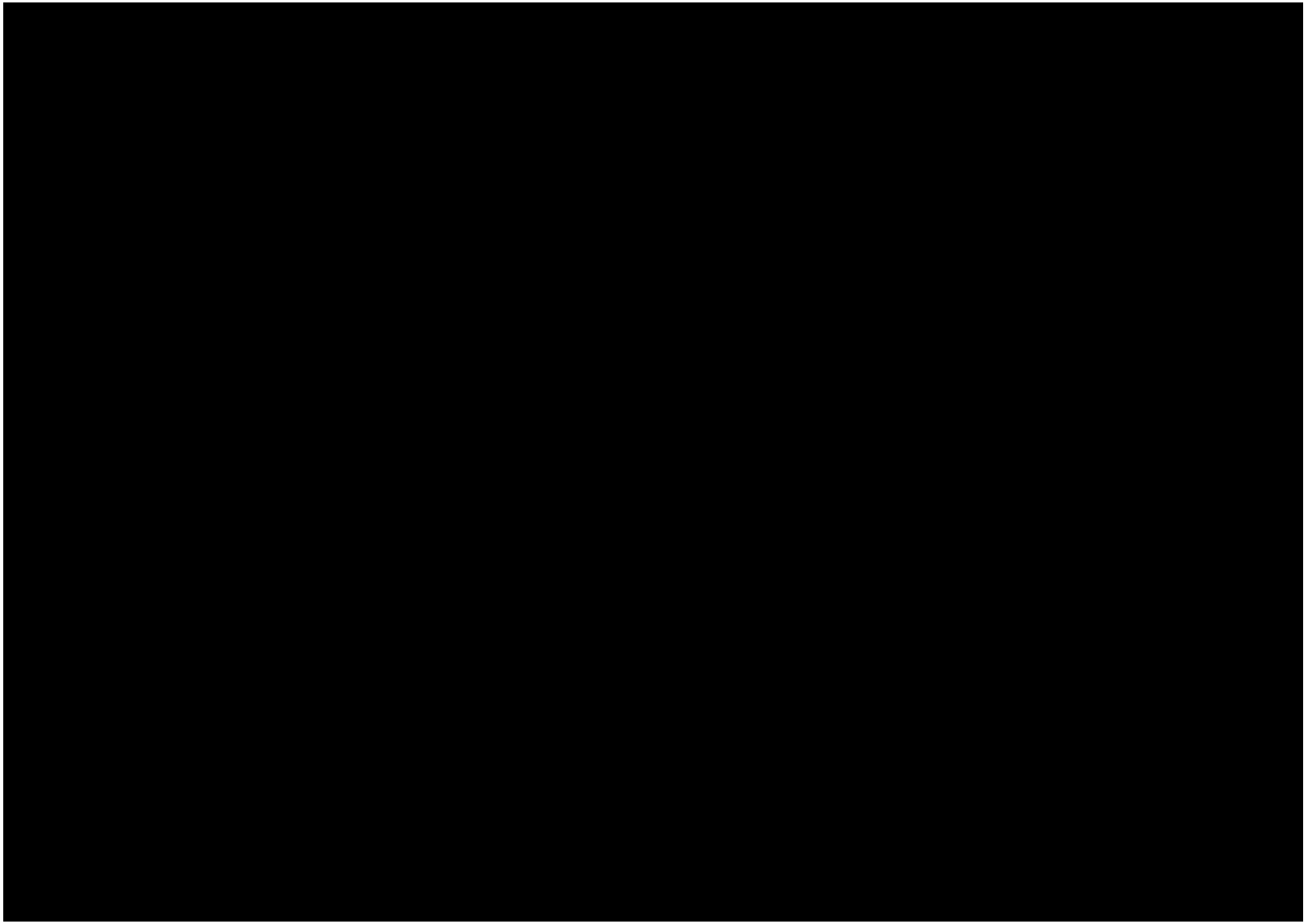


Figure 5-36 Km 2+600 – Km 4+500 Bahçeşehir Connecting Road

5.2.6.2.1 Baseline Noise Monitoring

Baseline noise monitoring study was conducted between 17th and 23rd of March 2021 at sixteen different locations including sensitive receptors, industrial areas and rural areas as shown in Figure 5-37 and listed in Table 5-17.

The measurements were undertaken for a continuous period of 48 hours at each selected location, in order to obtain *day (Lday), evening (Leve) and night time* noise levels, in accordance with the ISO 1996[46] as presented in provided Annex 10.

[46] ISO 1996-2:2017 Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels

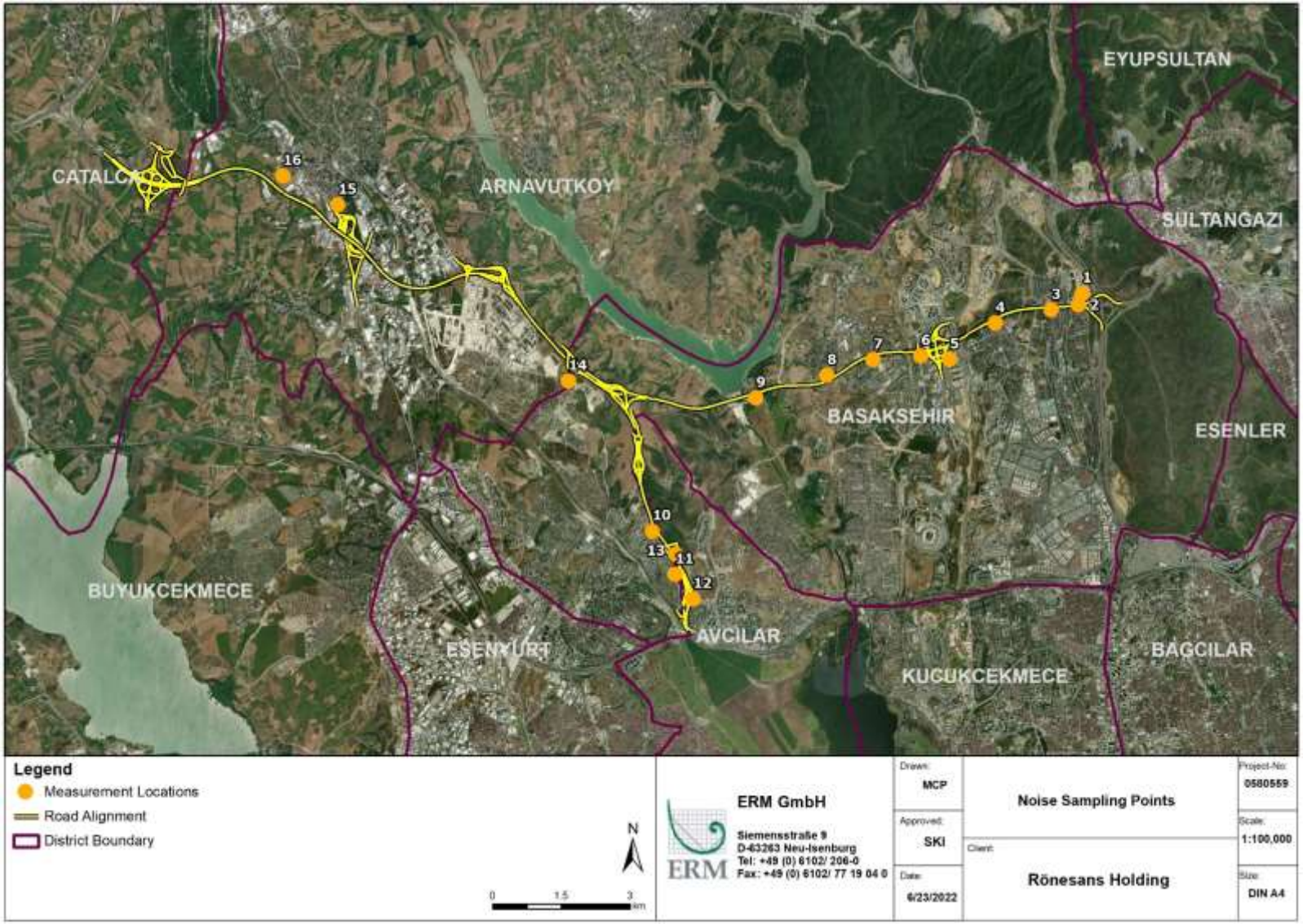


Figure 5-37 Baseline Noise Monitoring Locations

Table 5-17 Baseline Noise Monitoring Locations and Receptors

Sampling Location Point	KM Chainage	Receptors	Proximity of the Closest Receptor to the RoW border
Location 1	59+300	■ High Density Residential Development ■ School ■ Mosque ■ Playground	40 m
Location 2	59+200	■ High Density Residential Development ■ Wedding Centre ■ Recreational Area (Sular Vadisi) ■ Public Park	30 m
Location 3	58+600	■ High Density Residential Development	30 m
Location 4	57+400	■ High Density Residential Development ■ School ■ Playground	40 m
Location 5	57+000	■ City Hospital	200 m
Location 6	55+600	■ High Density Residential Development ■ Public Park (Kayaşehir Millet Bahçesi)	50 m
Location 7	54+500	■ High Density Residential Development	130 m
Location 8	53+800	■ Residential Buildings ■ School	120 m
Location 9	51+800	■ İSKİ Sazlıdere Facilities	60 m
Location 10	Bahçeşehir Connecting Road 2+700	■ High Density Residential Development	60 m
Location 11	Bahçeşehir Connecting Road 3+800	■ Schools ■ High Density Residential Development	90 m

Sampling Location Point	KM Chainage	Receptors	Proximity of the Closest Receptor to the RoW border
Location 12	Bahçeşehir Connecting Road 4+400	■ School ■ High Density Residential Development ■ Mosque	40 m
Location 13	Bahçeşehir Connecting Road 3+400	■ High Density Residential Development	40 m
Location 14	47+700	■ Commercial Facilities	180 m
Location 15	40+800	■ Commercial Facilities	20 m
Location 16	39+500	■ Commercial Facilities	50 m

Baseline Noise Monitoring Results

Results obtained from noise measurement are presented in Table 5-18.

Measured levels were compared to the limits outlined in the Turkish legislation (see[47]) and results indicate that existing sound levels at most measurement locations are within the allowed limits. Nevertheless, a few locations showed exceedance of noise level criteria during the whole measurement duration (highlighted in red). For the locations showing exceedance of noise limits during the full measurement period, a rationale is provided in Table 5-19:

Table 5-18 Noise Measured Levels

		Noise Measured Levels (dBA)			Lden Implied
		Lday (07:00-19:00)	Leve (19:00-23:00)	Lnight (23:00-07:00)	
Location 1	1	57	48	48	54
	2	56	47	50	53
Location 2	1	57	50	48	55
	2	58	52	50	56
Location 3	1	61	62	54	61
	2	58	59	56	58
Location 4	1	67	68	59	67
	2	66	65	57	65
Location 5	1	63	62	58	62
	2	61	59	57	60
Location 6	1	65	55	56	62
	2	65	56	53	63
Location 7	1	54	53	47	53
	2	56	53	48	54
Location 8	1	52	50	52	51
	2	51	51	50	50
Location 9	1	54	52	51	52
	2	51	51	50	50
Location 10	1	57	56	50	56
	2	55	56	52	55
Location 11	1	65	62	58	63
	2	61	61	59	61
Location 12	1	57	52	51	55

[47] For simplicity of comparison, noise limits are included here:

Type of Areas	Lday in dBA 07:00 – 19:00	Leve in dBA 19:00 – 22:00	Lnight in dBA 22:00 – 07:00	Lden Implied
Noise sensitive areas including residential,educational, cultural and health centres	60	55	50	60
Mixed use areas with predominance of dwellings	63	58	53	63
Mixed use areas with predominance of commercial	65	60	55	65
Industrial Areas	67	62	57	67

		Noise Measured Levels (dBA)			Lden Implied
		Lday (07:00-19:00)	Leve (19:00-23:00)	Lnight (23:00-07:00)	
	2	54	52	51	53
Location 13	1	57	57	54	56
	2	52	54	54	53
Location 14	1	57	55	45	56
	2	57	55	46	56
Location 15	1	56	49	48	54
	2	57	53	48	55
Location 16	1	51	43	46	48
	2	53	45	46	50

Table 5-19 Measurement Locations with Exceedance of Noise Limits

Sampling Location Point	KM Chainage	Rationale for Exceedance of Limits
Location 3	58+600	A high-density, high-rise residential development, close to a roundabout and junction of various roads.
Location 4	57+400	A high-density residential development with high-rise blocks of buildings, close to an existing school and playground. This location is characterized by very dense population and rapid urban development.
Location 5	57+000	A roundabout connecting various roads to the city hospital. Other commercial activities are also located in the area. This location is characterized by congested traffic and high levels of traffic noise.
Location 6	55+600	Similarly to Locations 3 and 4, this measurement location is also close to a high-density residential development with high-rise blocks of buildings and a public park. The areas is characterized by high levels of urban noise.
Location 11	Bahçeşehir Connecting Road 3+800	A high-density residential development with high-rise blocks of buildings, close to an existing school and playground. This location is characterized by very dense population and urban development.

5.2.7 Landscape and Visuals

5.2.7.1 Methodology and Information Sources

Landscape character and resources are of importance in their own right and are valued for their intrinsic qualities regardless of whether they are seen by people. Impacts on visual amenity as perceived by people are therefore clearly distinguished from, although closely linked to, impacts on landscape character and resources.

The landscape of the study area has been analysed by ESIA team by field visits along the RoW and described in terms of the key features and overall character. It has been subdivided into discrete landscape character areas or parcels of landscape which share common characteristics.

The sensitivity of the landscape for each survey point based on a combination of field notes, desktop work and professional judgement of the ERM Team in line with international best practice guidance for this topic.

5.2.7.2 Landscape Features of the Project Area

The Project route passes through the western part of İstanbul via Başakşehir, Arnavutköy, Avcılar and Çatalca districts. The alignment includes several landscape characters as summarized below:

- Vacant land and agricultural areas between KM 36+000 and KM 40+000;
- Industrial areas between KM 40+000 and KM 45+000;
- Vacant land and agricultural areas between KM 45+000 and KM 54+000; and
- Mass housing with public parks between KM 54+000 and KM 59+000.

The landscape of the study area has been analysed and described in terms of the key features and subdivided into discrete landscape character areas which share common characteristics. The boundaries of the landscape character areas are identified with reference to the chainage together with descriptive information and photographic views of the field survey points[48] as described in Table 5-20.

Table 5-20 Landscape Baseline

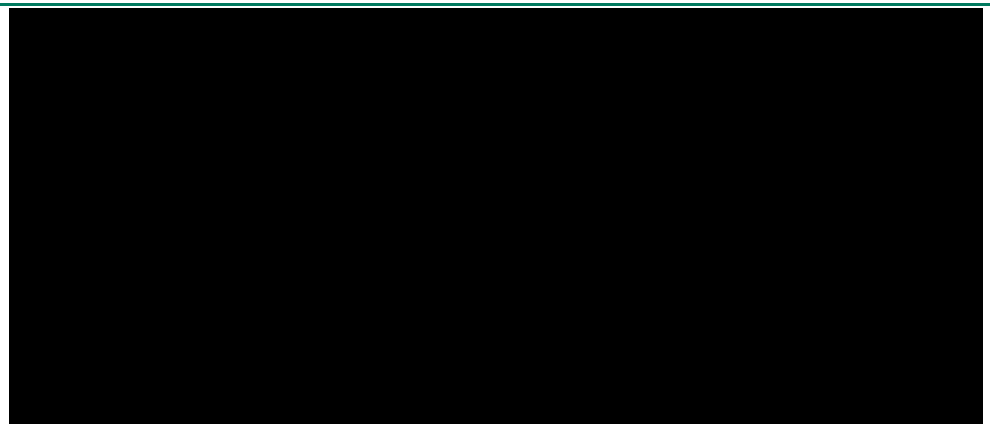
KM Chainage	Description	Photos
36+000 – 40+000 Vacant Land and Agricultural Areas	■ Located between Nakkaş and Hastane Neighbourhood. ■ Büyükçekmece Lake is located in 7 km north of the RoW. ■ South of the RoW is mainly consisted of agricultural lands and hills. ■ North part of the RoW is mainly consisted of commercial and residential areas. ■ The RoW itself is gentle sweeping valleys between hills with a number of scattered houses in the valley. ■ Some industrial establishments are close the RoW around KM 40+000. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ There are no viaducts in this section.	 **KM 36+000 towards KM 37+000 (west-east direction according to the photo)**

[48] Field survey was conducted in February and March 2021.

KM Chainage	Description	Photos
	■ This landscape is considered to be of *high* sensitivity.	 **Panoramic view of the Project route between north of KM 38+600 towards KM: 39+450**

KM Chainage	Description	Photos
40+000 – 45+000 Industrial areas	■ Located between Hastane and Deliklikaya Neighbourhood. ■ The RoW is located 1.5 km west of Sazlıdere Dam Reservoir and 10 km northwest of Büyükçekmece Lake ■ South and West of the RoW is surrounded by industrial areas (Deliklikaya Industrial Zone) ■ North part of the RoW is mainly consisted of agricultural lands. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ One viaduct will be constructed between KM 42+800 – KM 43+800 ■ This landscape is considered to be of *low* sensitivity.	[redacted] **Panoramic view of the Project route around KM: 43+000 Industrial area.**  **Project route from KM: 43+000 to KM: 44+000**

KM Chainage	Description	Photos
45+000 – 54+000 Vacant land and agricultural areas	■ Located between Deliklikaya and Başakşehir. ■ Sazlıdere Dam is located at KM 51+500. ■ The RoW passes through Sazlıdere Basin. ■ Şamlar Natural Park is located 4 km northeast of the RoW. ■ 6 km north of Küçükçekmece Lake. ■ South of the RoW is mainly consisted of agricultural lands. ■ Greenhouses are located in some sections of the RoW. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ Sazlıdere Cable Stayed Bridge will be constructed between KM 50+742 – KM 52+359. ■ This landscape is considered to be of *high* sensitivity.	 **Panoramic view of the Project route between KM: 50+400 and KM: 52+000 onwards**  **Panoramic view of Sazlıdere Cable Stayed Bridge Location**

KM Chainage	Description	Photos
54+000 – 56+000 Mass housing	■ Located in Başakşehir District centre. ■ Mainly consisted of mass housing, public parks, recreational areas ■ There are several existing public roads. ■ Transmission lines are present within the RoW which will be relocated. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ One viaduct will be constructed between KM 55+130 – KM 55+670. ■ This landscape is considered to be of *medium* sensitivity.	 **Panoramic view of the Project route around KM: 56+000**  **Panoramic view of the Project route KM: 55+100 – KM 56+500**

KM Chainage	Description	Photos
56+000 – 58+000 Mass housing with public parks	■ Located in Başakşehir District centre. ■ Mainly consisted of mass housing, public parks, recreational areas. ■ The RoW passes through Kayaşehir Millet Bahçesi (Public Park) is located at KM 55+300 – KM 55+600. ■ There are several existing public roads. ■ Transmission lines are present within the RoW which will be relocated. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ One viaduct will be constructed between KM 56+310 – KM 56+920. ■ This landscape is considered to be of *high* sensitivity due to presence of Millet Bahçesi.	 **Panoramic view of the Project route around KM: 57+000**  **Panoramic view of the area around KM 56+000 – KM 57+000** **(The Project route will pass through this area via a viaduct that will overpass the existing road)**

KM Chainage	Description	Photos
58+000 – 59+000 Mass housing with public parks	■ Located in Başakşehir District centre. ■ Mainly consisted of mass housing, public parks, recreational areas. ■ The RoW passes through Sular Valley (a public park consisting of wedding centre and shopping mall). ■ There are several existing public roads. ■ Transmission lines are present within the RoW which will be relocated. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ One viaduct will be constructed between KM 58+810 – KM 59+280. ■ This landscape is considered to be of *high* sensitivity.	 **Panoramic view of Sular Valley around KM 58+800 – KM 59+300**  **Panoramic view of Sular Valley around KM 58+800 – KM 59+300**

KM Chainage	Description	Photos
Bahçeşehir Connection Road	■ Located in Bahçeşehir District ■ Partially consisted of mass housing on the western side of the RoW. ■ There are several existing public roads. ■ The RoW itself is sweeping valleys between hills. ■ Construction Design in this interval is a combination of Cuts and Fills. ■ One viaduct will be constructed between KM 3+900 – KM 4+460. ■ This landscape is considered to be of *medium* sensitivity.	 **Panoramic view of Bahçeşehir connection from KM: 3+600 – KM 4+500 onwards.**

5.3 Biological Environment

5.3.1 Methodology and Information Sources of Biodiversity Surveys

5.3.1.1 Baseline habitat and flora surveys

Field surveys were carried out in order to determine the habitat and flora species present along the proposed route. Surveys were conducted during three seasons in 2021 between the 1st and 2nd February, the 22nd to 24th May and the 13th to 15th September. Surveys were conducted by Professor Dr. Hayri Duman.

After review of satellite imagery and desk study, five survey points were selected. The selection of the survey points took into consideration their accessibility by car and the habitat type of the area, focusing on natural and semi natural areas. Habitats were identified based on European Nature Information System (EUNIS) codes. During the field surveys, habitats at each location were examined in detail, and field notes were recorded. The five sampling locations are shown in Figure 5-38.

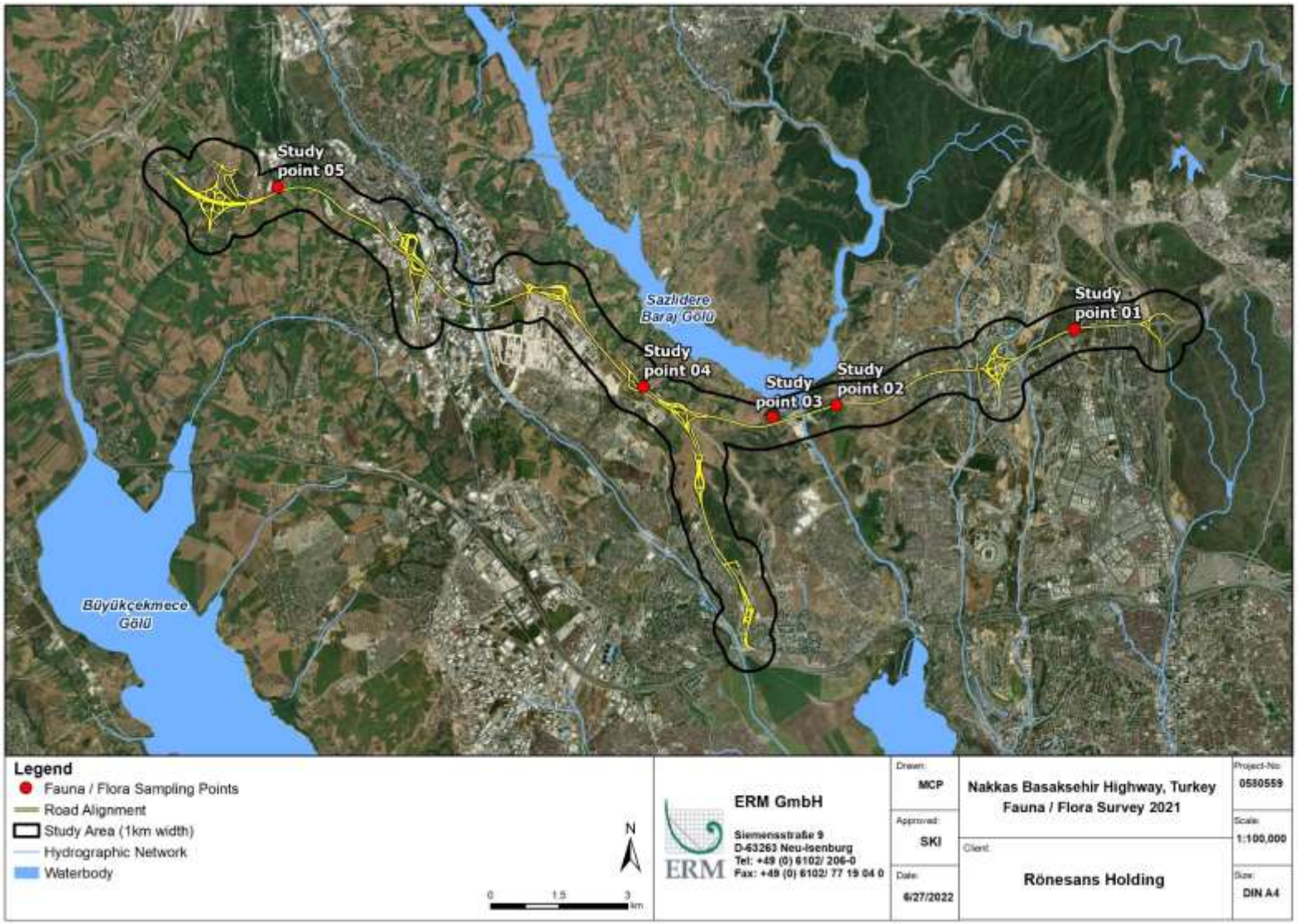


Figure 5-38 Flora and fauna survey locations

The findings and observations obtained during the field study were used to produce a list of flora recorded at the sampling locations. Plant samples collected from the study areas were identified using the *Flora of Turkey and East Aegean Islands* (Davis, 1965-1988). Turkish names of the identified plants are predominantly presented by using Prof. Dr. Turhan Baytop's work "Turkish Plant Names".

The IUCN threat categories of many species endemic to Turkey, and rare but non-endemic species, are not yet included in the IUCN database. A project to determine the IUCN categories of endemic species of Turkey on a global scale began in 2021 and will take at least four years to complete[49] (Professor Hayri Duman *in litt*.) The "Red Data Book of Turkish Plants" written by Ekim et al. (2000)[50] has been used to determine the equivalent IUCN threat categories of endemic and non-endemic rare species recorded or predicted to occur within the study area. These threat categories have been reinterpreted according to the IUCN criteria from 2001, considering the population of endemic species and their threat factors within the study area.

5.3.1.2 Baseline fauna surveys

Field surveys were conducted in order to determine the terrestrial fauna species present along the proposed route between the 1st and 2nd February, the 22nd and 23rd May and the 13th and 17th of September 2021. Surveys were conducted by Professor. Mustafa Sözen of the Biology Department at the Zonguldak Bülent Ecevit University Faculty of Arts and Science.

The study areas were identified in collaboration with Prof. Dr. Hayri Duman and were located in the same positions as the flora survey areas in order to cover all habitat types along the proposed route.

A walkover survey was conducted at each study area and fauna groups were determined based on direct observations, animal tracks, burrows, animal calls, droppings, food remains and animal signs. At each study area, the area was surveyed for at least 60 minutes to suitably examine the area and determine any fauna present. One study area (Station 1) had a larger natural habitat area and to adequately survey the fauna in this area the survey duration was increased to approximately 2 hours.

The fauna list was prepared by combining the literature review data of fauna distribution and habitat requirements, and the findings of the field survey. An evaluation of the threat status and endemism for each species using criteria from International Union for Conservation of Nature (IUCN), Bern Convention (BERN), Central Game Commission (MAK 2020-2021) Decrees, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Habitats Directive[51] are presented within the Annex 4.

5.3.1.3 Batch plant areas

In addition to the five sampling locations discussed above, further field surveys were conducted between 13th – 17th of September 2021. These focused on the flora species and habitat types present at three batch plant areas that run simultaneously alongside the motorway, and thus form part of the AOI. The batch plant sites are Nakkaş batch plant area (C1), Sazlıdere mobilization and batch plant area (C2) and Olimpiyat batch plant area (C3). As the study areas were independent from each other and generally small, each area was studied by the transect method to assess flora and habitats by Professor Dr. Hayri Duman. Professor Mustafa Sözen conducted the fauna surveys by surveying an area of about 500m diameter around the sampling location. These additional sampling locations are shown in Figure 5-39.

[49] https://www.iucn.org/fr/node/31671

[50] Ekim, T. et al. (2000) Red Data Book of Turkish Plants.Turkish Association for the Conservation of Nature. Bublish Number:18.

[51] Conservation of natural habitats and of wild fauna and flora Directive 92/43/EEC

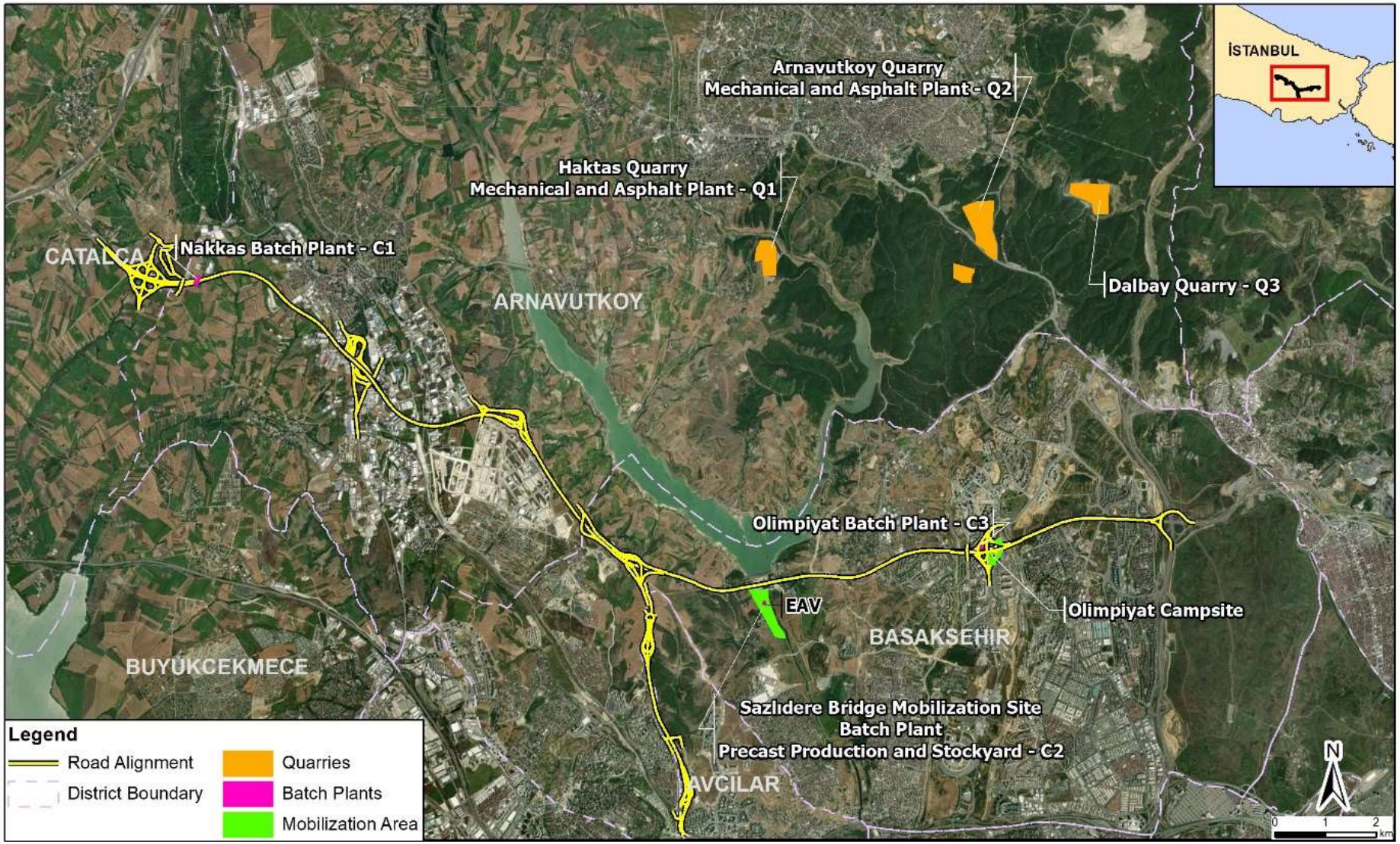


Figure 5-39 Quarries (Q1, Q2, Q3), batch plants (C1, C2, C3) and mobilization area (C2)

The methods and approach applied to the flora and fauna surveys at the five sampling sites were utilised for surveys at the batch plant areas. For the fauna surveys of the batch plant the areas of three concrete batch plant points were very small, so each of these areas were inspected for approximately about 45 to 60 minutes. An area of approximately 500-meter diameter around the point was surveyed. The fauna field surveys were carried out to cover all habitat types in and around the batch plants to be used for the Başakşehir-Nakkaş Motorway Project. The full flora and fauna batch plant reports are presented in Annex 11.

5.3.1.4 Bat surveys

Bat surveys were conducted using static detectors deployed for one or two nights per month, and one nights transect per month between July and October 2021. Survey locations chosen focused mainly around the area close to the Sazlıdere dam where the cable stayed bridge will be built. This is the only site seen as a potentially important habitat for bats, due to the presence of caves and wetland habitats as feeding grounds. It was acknowledged that bat populations likely exist in rural areas, and colonies could occur on the roofs of houses along the project site however it is considered that there is no old-growth mature deciduous forest that can provide a good habitat for some important species.

5.3.1.5 Bird migration surveys

Bird species were recorded as part of the fauna surveys, however focussed bird migration surveys were also undertaken in spring and autumn.

Two points along the project site were identified as points of interest to assess the potential impact of the project of migratory bird species (see Figure 5-40). The points of concern were identified as (1) habitats such as waterbodies, forestry and fruit plantations and crags and rock faces within a 500 m buffer of the highway route, and (2) points of potential collision risk. The two survey locations along the route were:

- Site 1 - Sazlıbosna Reservoir Area – to observe movement of birds between the reservoir and Küçükçekmece Lake.
- Site 3 - Riparian Habitat near Nakkaş – located around a creek which eventually feeds into Büyükçekmece Lake, which is predicted to be a crucial rest stop for migratory birds, especially passerines.

Prior to the design change, an additional site was also considered at Meadow near Bahşayış Village. The proposed route runs approximately 3 km away from this survey area but not through it.

Site 2 - Meadow near Bahşayış Village – expected to be a stop-over site for migratory soaring species, especially White Stork (*Ciconia cionia*).

Surveys were carried out at the three points identified above over six days, both in the spring and autumn. The spring surveys were undertaken on the 18th, 25th and 27th April and the 2nd, 16th and 23rd May 2021. The autumn surveys were conducted on the 21st, 22nd, 28th, 29th August and the 11th and 12th of September.

Most surveys took place between an hour after sunrise and 11:00 in order to catch peak bird activity. Each area was surveyed by an experienced ornithologist in order to determine diversity and abundance of bird species using a pair of binoculars and a camera. The survey duration for the reservoir habitat and riparian habitat was approximately one hour, the meadow was approximately 15 minutes. The surveyors moved between positions on site to expand coverage of the area.

For recording purposes, birds were classified as:

- Breeding bird: those may be breeding resident birds, or breeding summer migrants;
- Migrant: Non-breeders present within the site during migration; and

- Fly-over: mostly migrant birds, that do not use the habitat at the site, and were recorded passing over the site during their trans-continental migration, such as raptors.

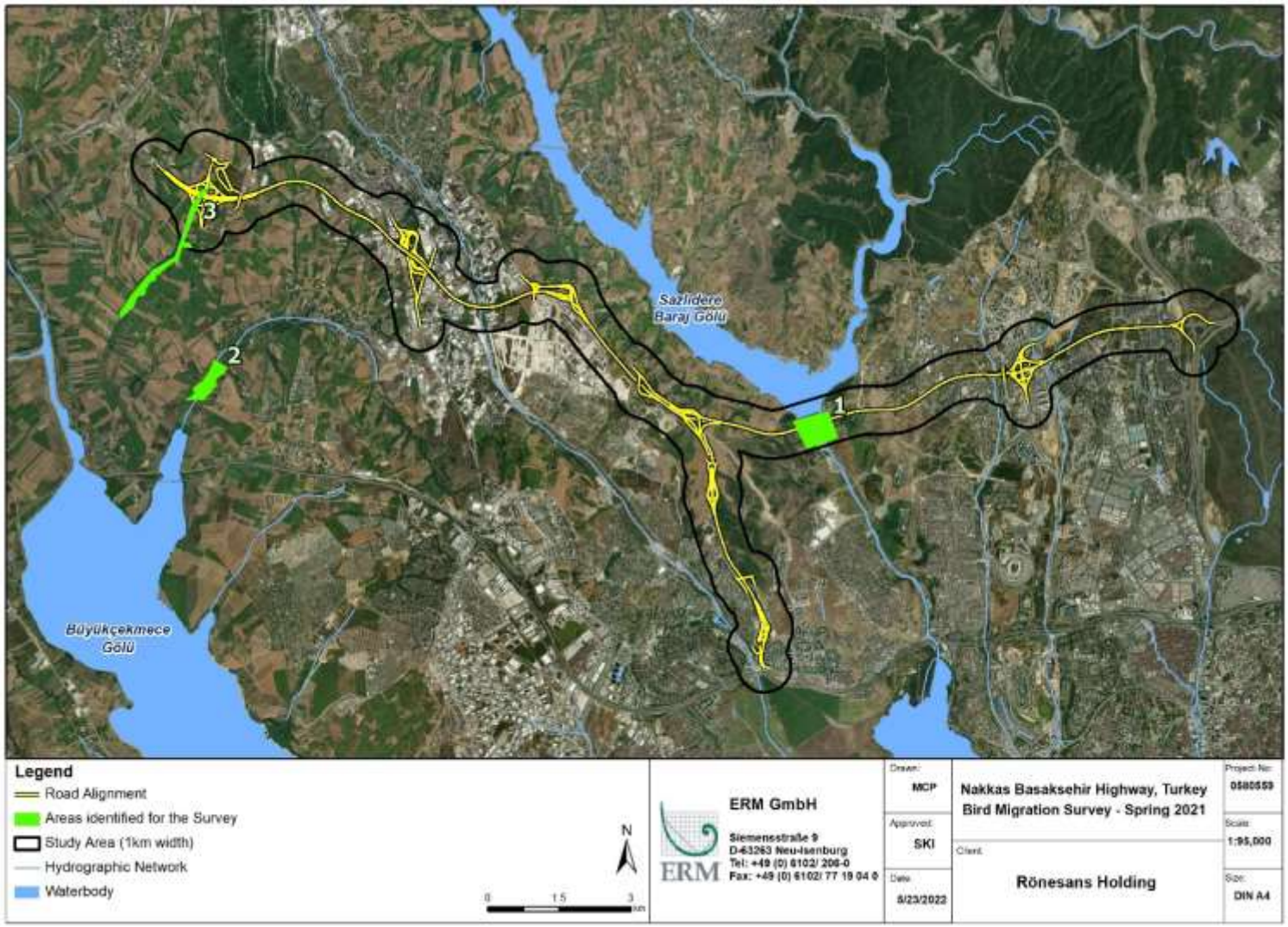


Figure 5-40 Spring bird migration survey locations

5.3.1.6 Baseline aquatic surveys

Field surveys were conducted in order to assess the aquatic ecosystems present along the proposed route. Surveys were carried out by Professor. Aydin Akbulut (Hacettepe University, Faculty of Education, Division of Biology Education) on the 28th and 29th May 2021.

Aquatic surveys were conducted at four locations, all of which are at flowing stream systems and are identified as the four crossing creeks along the Project route. Through the sampling of the selected watercourses, an appropriately representative sample of the aquatic habitat types and associated biota was successfully obtained. Four aquatic sampling locations were chosen which correspond to the principal perennial and/seasonal watercourses crossed by the road development.

The focus was on sampling streams where sufficient flows were encountered to support aquatic instream and/or riparian habitat as well as key biota such as fish and aquatic invertebrates. These are perceived to be the watercourses at highest risk from development due to the presence of flows supporting aquatic habitat and associated (semi)aquatic species. The chosen water sampling points also align with the location of the construction camps and concrete/asphalt batching plants where water quality risks are likely to be greatest.

Other watercourses (for example the drainage canals in the west associated with agricultural areas) were found to be heavily degraded and with infrequent flows that are not considered supportive of sensitive aquatic habitat and species receptors. Sampling was undertaken with consideration of both the upstream and downstream reach at each watercourse sampling point, to provide a relevant baseline that can be used to inform operational monitoring by accounting for external impacts that are beyond the road project. Given the location below Sazlidere dam, with drainage being south, sampling of the dam was considered unnecessary as risk to the dam ecosystem is considered insignificant.All of the wetlands in the regions where the highway project will pass have the characteristics of a stream ecosystem and the highway will not pass over natural lake areas however the third sampling point passed very close to the Sazlıdere Dam, therefore the standing water environment of the dam was also evaluated. The four sampling locations are shown in Figure 5-41.

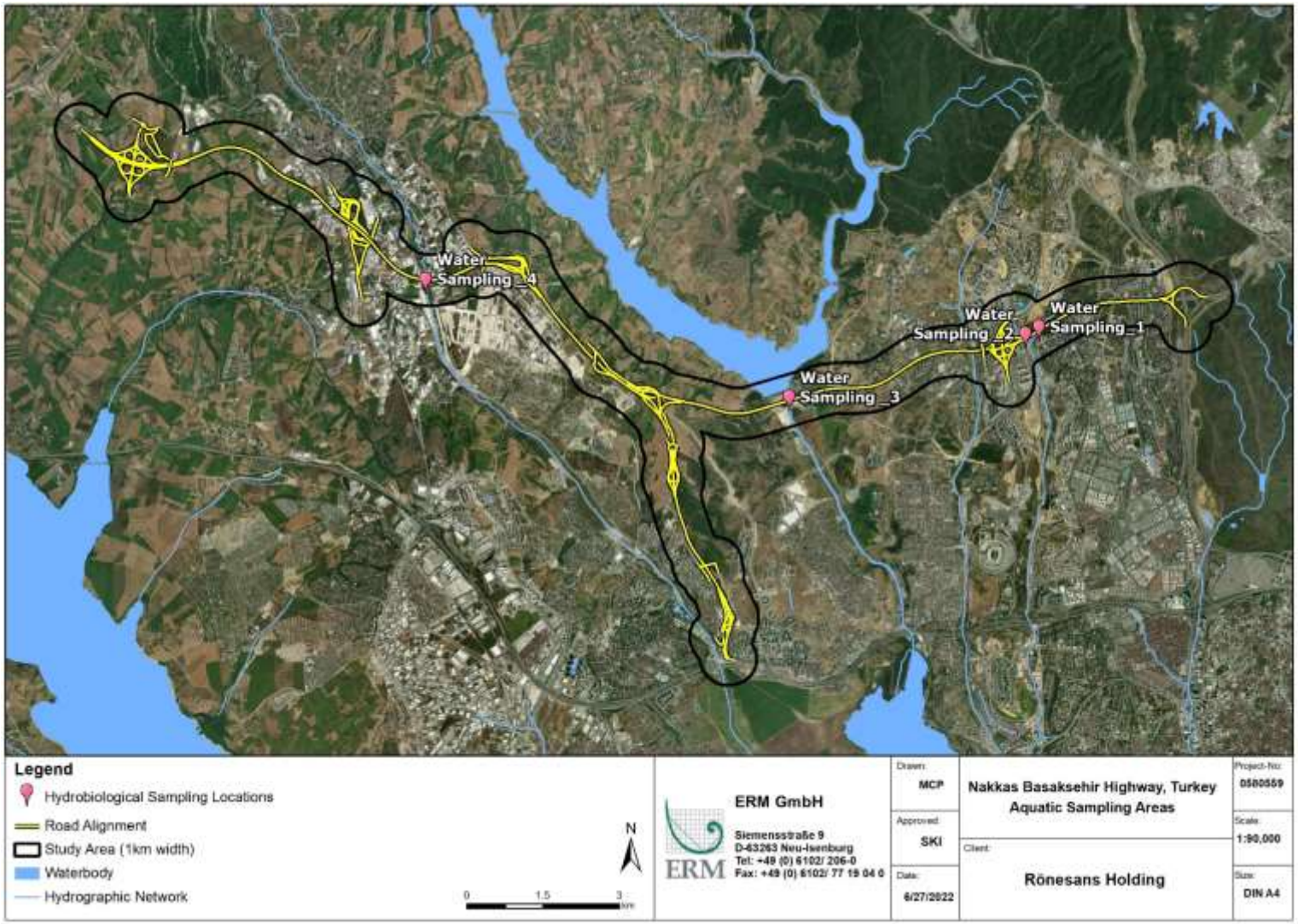


Figure 5-41 Aquatic survey sampling locations

Aquatic habitat assessments were made at each of the four locations where stream crossings occur along the route. At each survey location both the downstream and upstream habitats were taken into account.

Habitat assessments of each of the aquatic sampling stations were carried out using the Rapid Bioassessment Protocols[52]. In addition, the Qualitative Habitat Evaluation Index (QHEI)[53] was used in the studies.

Within the scope of evaluation of habitat quality, important physical characteristics such as water flow and the surrounding terrain, catchment basins and the bottom structures of the stream were evaluated. Habitat parameters evaluated were directly related to aquatic organisms. These physical factors significantly affect the presence and the density of aquatic organisms.

While conducting habitat assessments, parameters such as the existing vegetation, burial characteristics of the ground stones, substrate properties of stagnant water environments, velocity, depth, structures of stagnant water environments, sedimentation, occupancy of the streambed, variability of the river-bed, geomorphological conditions of the river-bed, stability of the river banks and vegetation cover of the river banks were taken into consideration.

Aquatic organisms were sampled using the following three methods.

- Planktonic (phytoplanktonic and zooplanktonic organisms) and attached algae samples were collected through holding a plankton net in the direction of water flow for 5 minutes and also scraping the surface of plants, stones and sediment in the watercourse. Planktonic samples were fixed by buffering with 4 % formaldehyde for later identification using a microscope.
- Benthic invertebrates in the study area were collected from shallow areas (from the shore of the creek) by dredging the bottom with a standard kick-net. The collected samples were placed in 80 % ethanol and taken to the laboratory where they were washed in sieves with various pore diameters, and were separated and identified.
- The fish within the watercourses were surveyed through electrofishing methods. The fish caught, were taken into 4 % formaldehyde. After washing in water in the laboratory, they were preserved in alcohol and their distributions were evaluated according to the stations.

5.3.2 Protected and Designated Areas

The proposed route runs through two internationally recognised areas (shown in Figure 5-42). These areas are not designated by national legislation but are considered to contain sensitive habitats, which are ecologically important:

- Küçükçekmece Basin – Important Bird Area (IBA)[54] and Key Biodiversity Area (KBA) [55] – 11,715 ha. The site is a natural brackish lagoon and qualifies as an IBA for holding in excess of 20,000 waterbirds in winter, and for winter great cormorant (*Phalacrocorax carbo*) and passage pygmy cormorant (*Microcarbo pygmaeus*); and

[52] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

[53] Rankin, E. T. 1989. The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application. Columbus, OH: Environmental Protection Agency

[54] BirdLife International (2021). *Important Bird Areas factsheet: Küçükçekmece Lake.* Downloaded from http://www.birdlife.org on 25/05/2021.

[55] Key Biodiversity Areas Partnership (2020) *Key Biodiversity Areas factsheet: Küçükçekmece Basin*. Downloaded from http://www.keybiodiveristyareas.org/ on 25/05/2021

- West Istanbul Grasslands – Important Plant Area (IPA)[56] – 14,900 ha. The IPA comprises the remaining fragments of limestone grassland, rock outcrops and dry acid heath grassland, situated on the low hills north-west of Istanbul. The site hosts 19 threatened flora species, seven of which are endemic to the area.

The proposed route runs approximately 2 km away from one internationally recognised area but not through it.

- Büyükçekmece Lake – IBA and KBA[57] – 5,118 ha. Designated for the freshwater and brackish lake habitats, supported by mudflats, sandbanks, reedbeds and arable land. The site is important for wintering waterbirds including an assemblage greater than 20,000, red-breasted goose (*Branta ruficollis*), common pochard (*Aythya ferinan*), and yellow-legged gull (*Larus michahellis*). Little gull (*Hydrocoloeus minutus*) and mediterranean gull (*Larus melanocephalus*) are qualifying interest features on passage. During autumn, the surrounding arable land can support thousands of migrating white stork (*Ciconia ciconia*)[58]. The KBA data sheet also includes the spur-thighed tortoise (*Testudo graeca*);

Key Biodiversity Areas, including both IBA and IPA's, are assessed on strict criteria developed by international conservation organisations. Although internationally recognised they are not protected.

[56] Plant Life International (2021) *Important Plant Area – West Istanbul Grasslands*. Last accessed 27/05/2021 PlantLife Important Plant Areas (plantlifeipa.org)

[57] Key Biodiversity Areas Partnership (2020) *Key Biodiversity Areas factsheet: Büyükçekmece Lake.* Downloaded from http://www.keybiodiveristyareas.org/ on 25/05/2021

[58] Bird Life International (2021). *Important Bird Areas factsheet: Büyükçekmece Lake.* Downloaded from http://www.birdlife.org on 25/05/2021.

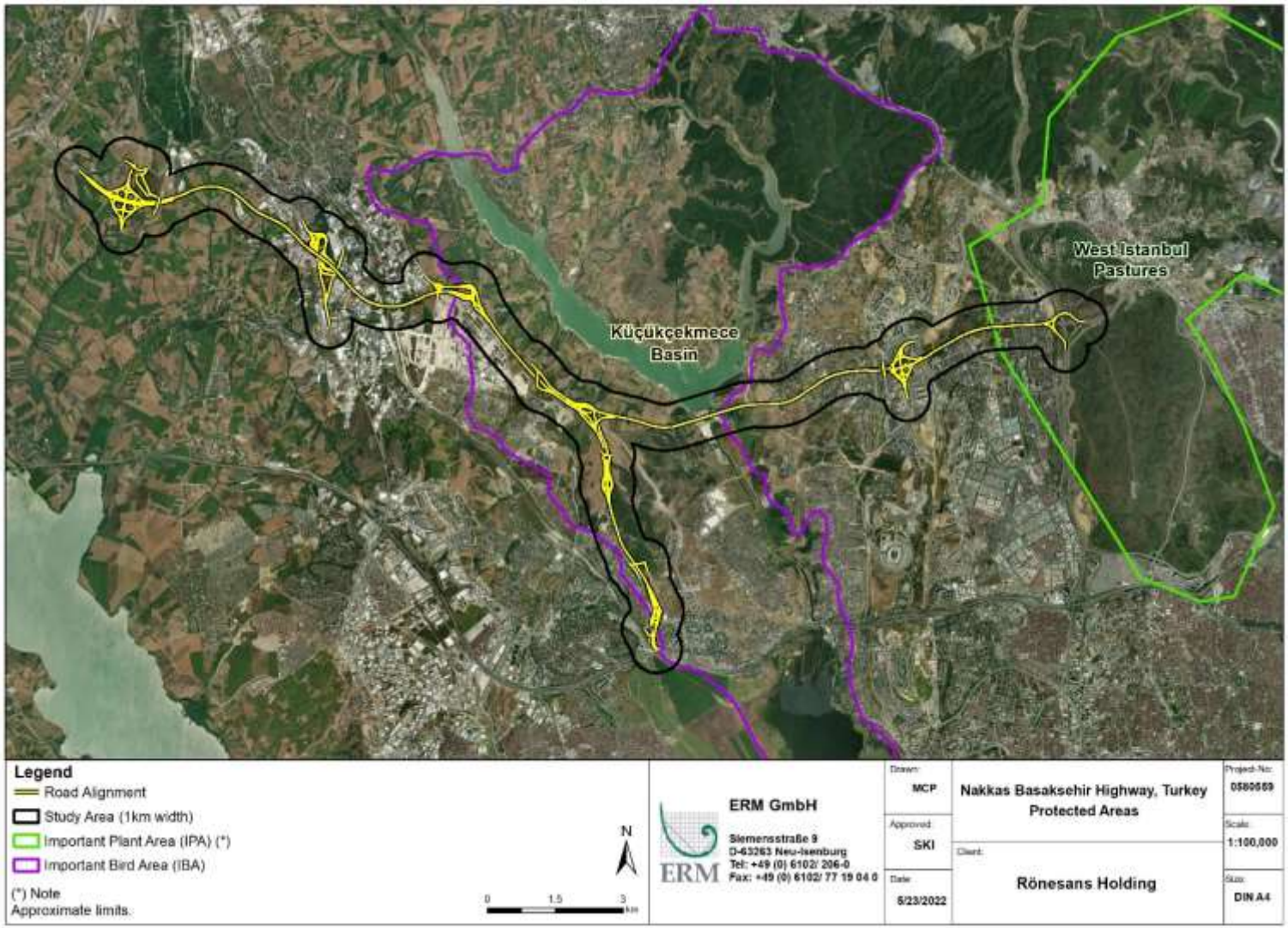


Figure 5-42 Internationally recognised areas in the study area and the location of the motorway (white line).

The amounts of the IBA and IPA which are of overlapped by the footprint of the Project (excluding the Quarry areas) are shown in Table 5-21.

Table 5-21 Area of IBA/IPA overlapped by the Proposal Development expropriation corridor and Batch areas

Internationally recognised area	Overlapping (Ha)	Total Ha (IBA/IPA)	Percentage
Küçükçekmece Basin IBA	207.86	11818.88	1.75 %
West İstanbul Grasslands IPA	13.87	8515.99	0.16 %

Batch plant C2 is located within the Küçükçekmece Basin IBA.

5.3.3 Habitats

The proposed route for the Project mainly consists of residential and agricultural habitats. Areas of natural and semi-natural habitats of Mediterranean climate are also scattered along the proposed route. Wheat farming is the predominant activity in the agricultural areas. Natural and semi-natural areas consist of meadows, riparian habitats, garrigue habitats, and *Spartium junceum* (Spanish broom) communities. Natural and semi-natural habitats on the motorway route are non-continuous.

The habitats recorded were classified according to the European Nature Information System (EUNIS)[59]. The following nine habitat types were identified within the AoI:

- C3.2: Water-fringing reedbeds and tall helophytes other than canes;
- E2.252 - Moeso-Thracian mesophile hay meadows;
- F5.2 Maquis;
- F5.4 *Spartium junceum* Fields;
- F6.4 Black Sea Garrigue;
- G1.3 Mediterranean Riparian Woodland;
- G3.F Highly Artificial Coniferous Plantations;
- I1.1 Intensive Unmixed Crops, and;
- J1.1 Residential Buildings of City and Town Centres;

The selected flora survey sampling locations and their habitat types are presented in Table 5-22.

Table 5-22 Studied sampling locations and their habitat types

Sampling location	Habitat
Flora survey 1	F6.4 Black Sea Garrigue
Flora survey 2	F5.4 *Spartium junceum* Fields I1.1 Intensive Unmixed Crops
Flora survey 3	F5.4 *Spartium junceum* Fields G3.F Highly Artificial Coniferous Plantations
Flora survey 4	E2.252 - Moeso-Thracian mesophile hay meadows F5.4 *Spartium junceum* Fields I1.1 Intensive Unmixed Crops

[59] European Environment Agency (2004) *European Nature Information System (EUNIS)*. Last accessed 24/05/2021 EUNIS habitat classification — European Environment Agency (europa.eu)

Sampling location	Habitat
Flora survey 5	F5.4 *Spartium junceum* Fields G1.3 Mediterranean Riparian Woodland I1.1 Intensive Unmixed Crops
Batch plant 1 (C1)	I1.1 Intensive Unmixed Crops
Batch plant 2 (C2)	C3.2: Water-fringing reedbeds and tall helophytes other than canes I1.1 Intensive Unmixed Crops J1.1 Residential Buildings of City and Town Centres
Batch plant 3 (C3)	F5.2 Maquis G3. F Highly Artificial Coniferous Plantations J1.1 Residential Buildings of City and Town Centres

Following an additional rapid habitat survey and ground-truthing exercise completed by ERM in May 2022 (extended to consider all habitat within a 500m radius buffer of the road RoW), the habitat descriptions were further updated, and several additional habitats were included. The additional habitat types were non-coniferous plantations, transitional weed and water body.

All of the above habitats are considered to be of ecological interest and are discussed in more detail below apart from Intensive Unmixed Crops (I1.1), and Residential Buildings of City and Town Centres (J1.1). These two habitats are considered to be highly modified with low ecological interest.

5.3.3.1.1 C3.2 Water-fringing reedbeds and tall helophytes other than canes

This type of habitat is represented in the project area along the creek at the Sazlıdere Dam exit (see Photo 5-1 Tall halophytes growing within shallow instream area below the Sazlidere dam spillway). Since the flow is low along the creek, the species diversity of the hydrophilic herbaceous species and overlap are high. The dominant species of this habitat are bulrush (*Typha latifolia*), common reed (*Phragmites australis*), fat duckweed (*Lemna gibba*), soft rush (*Juncus effusus*), common club-rush *(Schoenoplectus lacustris),* Gypsywort *(Lycopus europaeus), Bidens tripartita* and *Senecio aquaticus.*

Water-fringing reedbeds and tall helophytes other than canes is listed as a Revised Annex I of Resolution 4 (1996) of the Bern Convention on endangered natural habitats types using the EUNIS habitat classification. That being said, the presence of this habitat below Sazlidere dam is not typical of the area and is considered to be a modified habitat which has formed artificially as a result of the excavation and straightening/canalization of the section of the previous natural watercourse present before dam construction and operation. Indeed, the extensive reed/bulrush growth observed is considered to be linked to the eutrophic status of the watercourse and elevated nutrient levels, exemplified by the presence of extensive algal blooms within the water column. The habitat is therefore not considered representative of the natural ‘Water-fringing reedbeds and tall helophytes’ type which would be more commonly associated with natural wetland ecosystems in the region.

Photo 5-1 Tall halophytes growing within shallow instream area below the Sazlidere dam spillway

5.3.3.1.2 E2.252 - Moeso-Thracian mesophile hay meadows

These open, secondary grassland habitats (Photo 5-2 Moeso-Thracian mesophile hay meadows habitat) are located at various points along the route alignment and have been formed as a result of the clearance of Black Sea garrigue or as a result of overgrazing by livestock which has diminished the woody vegetation component and maintained the short herbaceous/grass cover. This habitat type is grazed heavily by cattle and goats/sheep with the dominant species being soft rush, *Ranunculus constantinopoliatanus,* ribwort plantain (*Plantago lanceolata*), hemlock (*Conium maculatum*), blessed thistle (*Silybum marianum*), radish (*Raphanus raphanistrum*), cutleaf teasel (*Dipsacus laciniatus*), alfalfa (*Medicago sativa*), cat grass (*Dactylis glomerata*), and Bermuda grass (*Cynodon dactylon*).

Moeso-Thracian mesophile hay meadows is listed as a Resolution 4 habitat type at a higher level (E2.2). However, this habitat is not considered representative of natural hay meadows or grasslands which would be sustained naturally by several environmental and climatic drivers and is rather considered a secondary grassland type forming as a result of the factors discussed above.

Limestone cliffs and rock outcrops were commonly found within the hay meadow/grassland habitats, particularly towards the east closer to the more built-up areas, with hollows amongst the rock faces serving as nesting sites for swifts. (Photo 5-3 Limestone cliffs and outcrops in grassland/hay meadow habitat).

Photo 5-2 Moeso-Thracian mesophile hay meadows habitat

Photo 5-3 Limestone cliffs and outcrops in grassland/hay meadow habitat

5.3.3.1.3 F5.2 Maquis

This habitat type was found only in the natural area around the Olimpiyat batch plant (C3) (Photo 5-4 Maquis habitat located at plant site C3. These dense shrubland habitats are considered to be secondary vegetation communities in the Mediterranean region, forming from the partial or complete destruction of primary forests. They may represent pre-forest communities, the replacement stages of primary climax forests or permanent communities on more arid slopes and xeric sites.

Structurally, these habitats have typically closed canopy structure comprised mainly of dense arrangements of shrubs and low trees, lacking tall trees typical of forest habitats. The main woody tree components are resistant to fire, typically regenerating from root stocks, and hence these communities generally appear stable in karstic landscapes such as those in Istanbul. Livestock grazing and fire are important drivers of these habitats that typically depend on low to moderate disturbance at an acceptable frequency. With increasing summer aridity, overgrazing and human pressure, maquis can begin to resemble the more open garrigues as they become low and sparse.

Compositionally, these habitats were found to dominated by the common Kermes oak (*Quercus coccifera*) with subdominant species being Turkey oak (*Quercus cerris),* Green olive tree (*Phillyrea latifolia*), Aleppo oak (*Quercus infectoria*), Prickly juniper (*Juniperus oxycedrus*) and Blackthron (*Prunus spinosa*). Typical species have deep rooting system, sustaining growth even on shallow soils in rocky areas.

Important plant species include *Cirsium polycephalum*, a regionally endemic species classified globally as Critically Endangered (CR) by IUCN, and *Ferulago confusa*, which is rare but not endemic species

classified on the national IUCN scale as Vulnerable (VU), which are both distributed throughout the habitat.

Photo 5-4 Maquis habitat located at plant site C3

5.3.3.1.4 F5.4 Spartium junceum Fields

This habitat type is frequently found along the route (Photo 5-5 *Spartium junceum* fields habitat). It is a secondary habitat resulting from the destruction of deciduous oak forests and usually represents arid slopes. This habitat type of transitional woodland / low closed shrubland was found located mainly near the middle of the proposed motorway route. The dominant species of this habitat is Spanish broom (*Spartium junceum*) with other species present including cat grass, bracken (*Pteridium aquilinum*), dog rose (*Rosa canina*), osyris (*Osyris alba*), butcher's broom (*Ruscus aculeatus*), smilograss (*Piptatherum miliaceum*) and yellow jasmine (*Jasminum fruticans*).

The regionally endemic *Cirsium polycephalum* can also be found within this habitat. Consultation with local experts indicate this species is considered to be Critically Endangered.

***Notes on Spartium junceum**: this is a fast-growing shrub, widely introduced as an ornamental and also for erosion control. It has escaped from cultivation and become an aggressive invader in many tropical, subtropical and temperate regions of the world. S. junceum is a prolific seed producer, with abundant and persistent seed banks, high rates of germination and seedling establishment. It also has adaptations to grow in a wide range of habitats and soil types with tolerance to severe drought conditions. Seed germination is triggered by soil disturbance and fire. Once established, S. junceum forms dense, monospecific thickets that are impenetrable and unpalatable to most wildlife. These dense thickets outcompete and displace native species and increase fuel load for fires. The species is also nitrogen-fixing and capable of altering soil fertility, nutrient cycling and successional patterns.*

Photo 5-5 *Spartium junceum* fields habitat

5.3.3.1.5 F6.4 Black Sea Garrigue

These low-growing relatively open shrublands form as secondary vegetation communities following the destruction/degradation of primary forests, typically arising in areas where the natural equilibrium has been disrupted and on completely burnt areas. Garrigues are in essence the result of retrogressive succession after degradation of primary evergreen Mediterranean forest and maquis vegetation and are generally maintained as more open, sparse shrubland through grazing and fire.

Structurally, these habitats comprise xerophyllous vegetation that is slightly shorter than maquis and comprised of more open habitat with scattered shrublets (Photo 5-6 Black Sea garrigue habitat). They are characterized by low, thorny formations mainly of hemispherical shrubs that are deciduous during the dry season. Compositionally, the dominant species include pink rock rose (*Cistus creticus*), sage-leaved rock rose (*Cistus salviifolius*), green olive tree (*Phillyrea latifolia*), Turkey oak (*Quercus cerris*) and tree heath (*Erica arborea*). In addition, *Iris sintenisii*, *Dactylorhiza iberica*, Mediterranean lineseed (*Bellardia trixago*), Yellow glandweed (*Parentucellia viscosa*), *Onosma thracica*, pink butterfly orchid (*Orchis papilionacea)*, Long-lipped Tongue-orchid (*Serapias vomeracea*), Small-flowered Tongue Orchid (*Serapias parviflora*) are found in this habitat.

Important plant species include *Cirsium polycephalum*, a regionally endemic species classified globally as Critically Endangered (CR) by IUCN, *Ferulago confusa*, which is rare but not endemic species classified on the national IUCN scale as Vulnerable (VU) and *Euphorbia amygdaloides var. Robbiae,* a Near Threatened species globally which are distributed throughout the habitat. The habitat is not corresponding to any of the Annex I habitat types of the Directive 92/43/EC.

Photo 5-6 Black Sea garrigue habitat

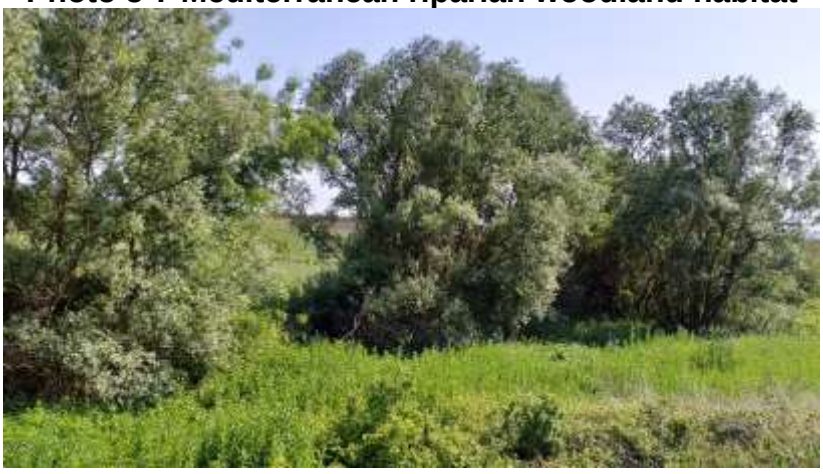
5.3.3.1.6 G1.3 Mediterranean Riparian Woodland

This habitat develops along alluvial valley grounds with high groundwater table level and along streams. This habitat type is represented at study point 5. Riparian habitats were found mainly in the west within the agricultural lands, with evidence of habitat degradation as a result of clearing vegetation and straightening of river channels to facilitate crop farming in these areas. The characteristic tree species are field elm (*Ulmus minor*), white willow and narrow-leaved ash. While there are bush species holy bramble (*Rubus sanctus*) and blackthorn in the underbrush, there are high water-use species such as *Juncus heldreichianus,* bulrush, lesser water-parsnip (*Berula erecta*), common club-rush, common rush, common reed, common fleabane (*Pulicaria dysenterica*), ribwort plantain, and cutleaf teasel (Photo 5-7 Mediterranean riparian woodland habitat).

Mediterranean Riparian Woodland is listed as a Resolution 4 habitat. However, this habitat is not considered representative of natural riparian woodland given the location of the majority of these watercourses in agricultural areas where a high level of modification that has taken place as a result of historical channel straightening and excavation and the replacement of typical native species by invasive species and weeds typical of cultivation.

The regional endemic snowdrop (*Galanthus x valentinei*) can be found within this habitat, this species is considered to be of Vulnerable status in consultation with local experts.

Photo 5-7 Mediterranean riparian woodland habitat



5.3.3.1.7 G3. F Highly Artificial Coniferous Plantations

Coniferous plantations are quite common in the Thrace regions (Photo 5-8 Highly artificial coniferous plantations habitat). This habitat type is represented in the project area around study point 3 as well as the Olympiyat batch plant area (C3) and at various locations around Sazlidere dam. These plantations replace the existing natural meso eutrophic woodlands (EUNIS G1.A), although the original ground flora can persist despite planting with black (*Pinus nigra*) and maritime pine (*Pinus pinaster*). *Cirsium polycephalum* (C3, one of the endemic species, is found in this habitat.

Note that there are also non-coniferous plantations in the study area which have also been artificially established Such plantations have been mapped and classified as ‘plantations’ seperate to the ‘Highly Artificial Coniferous Plantations’ type.

Photo 5-8 Highly artificial coniferous plantations habitat

5.3.3.1.8 Transitional Weed

These are areas of land which had been clearly disturbed, with signs of tillage from previous agricultural practices associated with crop cultivation, which appeared to have remained fallow for some time and now resemble old agricultural lands that are now recovering (Photo 5-9 Transitional weed (in foreground)). They are in a very early successional state, being dominated by pioneer grass and herbaceous cover by auricular weeds and ruderal species. It is not known whether these lands will be put into production again after a rest period. They are considered to be highly modified habitats.

Photo 5-9 Transitional weed (in foreground)

5.3.3.1.9 Water Body

This habitat refers to open water bodies largely void of any emergent vegetation (apart from aquatic vegetation fringing water body edges and algal blooms in the water column), most notably Sazlidere dam. This is an artificial reservoir supplying water to Istanbul and provides habitat for waterbirds and fish (Photo 5-10 Open Water Body (Sazlidere dam)).

Photo 5-10 Open Water Body (Sazlidere dam)

5.3.3.1.10 Habitats within the AOI

A habitat map was prepared based on the flora survey data and the rapid habitat survey and ground-truthing exercise completed by ERM in May 2022. Habitats within the AOI are shown in Figure 5-43.

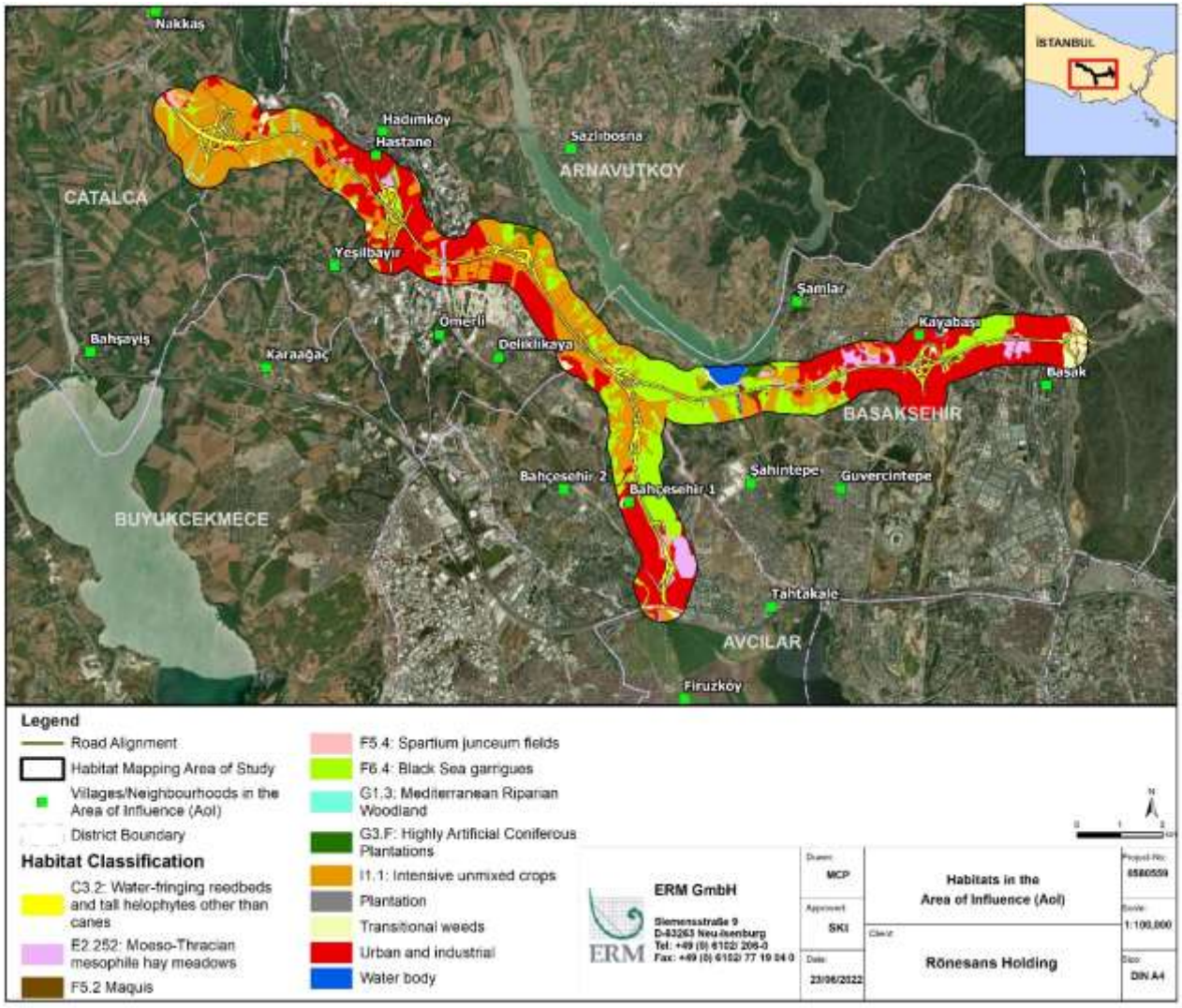


Figure 5-43 Habitats within the AOI

The majority of the AOI is covered by modified habitat. The proportion of the habitat types under the footprint of the Proposal Development expropriation corridor including the Batch plant areas are presented in Table 5-23.

Table 5-23 The proportion of the habitat types under the footprint of the Proposal Development expropriation corridor including the Batch plant areas

Habitat	Area (Ha)
Urban and industrial	1532.32
I1.1: Intensive unmixed crops	1326.01
F6.4: Black Sea garrigues	744.89
E2.252: Moeso-Thracian mesophile hay meadows	159.53
Transitional weed	136.18
Water body	35.60
G3.F: Highly Artificial Coniferous Plantations	34.24
F5.4: Spartium junceum fields	26.52
G1.3: Mediterranean Riparian Woodland	15.72
G1.3: Mediterranean Riparian Woodland-degraded	12.22
Plantation	6.27
F5.2: Maquis	3.00
C3.2: Water-fringing reedbeds and tall helophytes other than canes	2.01

5.3.4 Flora

A total of 276 plant species were recorded within the AoI (see Annex 11). The habitat and flora surveys at the five sampling locations conducted in February, May and September 2021 recorded 255 species and subspecies (i.e. taxa below the species level) of plants belonging to 60 families. The results from the additional surveys conducted at the three batch plant sites identified a further 21 species which had not been previously recorded, bringing the total number of species determined within the 1km buffer of the motorway to 276.

During the surveys, four species were identified which are considered of note and at risk from development (see Photos 5-11 to 5-14). The following are regionally endemic species:

- *Cirsium polycephalum;*
- *Euphorbia amygdaloides var. robbiae; and*
- *Galanthus x valentinei.*

In addition to the list above, the following rare species was recorded:

- *Ferulago confusa.*

Cirsium polycephalum, was recorded in the AoI (Photo 5-11 Cirsium polycephalum) and *Euphorbia amygdaloides var. robbiae* are known only from the Marmara region, especially around Istanbul. *Cirsium polycephalum* has been assigned CR status in the ongoing review of Turkish flora against IUCN criteria. It was identified within Black Sea garrigue habitat, *Spartium junceum* fields, Maquis habitat, and *Pinus* plantation forest. The ratio of the population of this species within the Project Area is considered to be 0.4-0.6% of its population in Turkey.

The snowdrop *Galanthus x valentinei* is found only in the Thrace region in Turkey (Photo 5-12 *Galanthus x valentinei*). It was originally recorded along the connecting road to the south west of the route which was subsequently removed following the design change. *Galanthus x valentinei* was

recorded in Mediterranean riparian woodland. As such habitat is known to be present in the AoI, it is considered that this Vulnerable species may be present in the AoI. . The ratio of the population of this species within the Project Area is considered to be >0.1% of its population in Turkey.

Euphorbia amygdaloides var. robbiae (Photo 5-13 *Euphorbia amygdaloides* subsp*. robbiae*) is a Near Threatened species globally according to IUCN. It was recorded during an additional rapid habitat survey and ground-truthing exercise completed by ERM in May 2022. It was noted as commonly occurring in almost all habitats, particularly the garrigue. It was noted to be widespread and found growing along the roadsides.

Ferulago confusa (Photo 5-14 *Feruloago confusa*) was identified within Black Sea garrigue habitat and also within Maquis habitat. *Ferulago confusa* is a rare species and found only in the Thracian region of Turkey on meadows and oak openings. The ratio of the population of this species within the Project Area is considered to be >0.1% of its population in Turkey. Although the population status of the species is currently good, it is subject to continued decline due to habitat loss, and due to this decline, the national review against IUCN criteria assigns it as Vulnerable.

The habitats in which these four species are found are decreasing across the region.

Photo 5-11 Cirsium polycephalum

Photo 5-12 *Galanthus x valentinei*

Photo 5-13 *Euphorbia amygdaloides* subsp. *robbiae*

Photo 5-14 *Feruloago confusa*

5.3.5 Fauna

5.3.5.1 Birds

Desk study identified an important bird migration route (the Bosphorus) shown in Figure 5-44. The Bosphorus Strait is a major bottleneck of migrating bird flight paths connecting Europe to Asia, the Middle East and Africa; hence several studies have been done to investigate the spring and autumn migration of raptors and other soaring birds in this region. A migration study undertaken in 2014[60] found that migration occurs over the full length of the Bosphorus, with similar intensity at different regions. Recent studies show that more than ninety-five percent of world's lesser spotted eagle and white stork populations use Turkey during migration from Europe to Africa and vice versa. Thousands of black storks, white pelicans, and other soaring birds are regularly counted along Turkey's flyways, forming overwhelming proportions of these species' European and global populations[61].

[60] Autumn migration of soaring birds at Bosporus: validating a new survey station design. FÜLÖP A. et al, 2014. British Trust for Ornithology, Bird Study, 1–7.

[61] https://www.dogadernegi.org/en/bird-conservation-programme/

Figure 5-44 Main migration route for migratory birds around İstanbul (green arrow), and the location of the motorway (white line)

5.3.5.1.1 Migration Bird Surveys

A total of 89 bird species were recorded during the spring and autumn bird migration surveys within the AoI. One species is listed under the IUCN Red List as globally threatened (VU), 62 are listed on Annex II of the Bern Convention, of which 24 are also Revised Annex I of Resolution 6 of the Bern Convention. Of the species recorded during surveys and listed in Annex II of the Bern convention, 14 were categorized as breeding.

A detailed list of the birds recorded during the Spring and Autumn Migration Bird Surveys and any incidental sightings recorded that are Annex II Bern Convention species or IUCN NT or above, is provided in Annex 11.

The Küçükçekmece Basin IBA qualifying interest feature pygmy cormorant and great cormorant were recorded at the Sazlıbosna Reservoir Area during the spring migration bird surveys and during the fauna surveys. The Mediterranean gull, which is a passage qualifying feature of the Büyükçekmece Lake IBA, was also recorded within the Küçükçekmece Basin IBA at the Sazlıdere Reservoir.

The Büyükçekmece Lake IBA is not crossed by the project however is considered to be relevant to the Project as some of its qualifying species were recorded in the AoI. The IBA is noted to support thousands of migrating white stork and this species was recorded at both the Sazlıbosna Reservoir Area and the Meadow near Bahşayış Village. Incidental observations noted this species at all five sites during the fauna surveys. The Büyükçekmece Lake IBA qualifying interest feature yellow-legged gull was recorded at all three sites during the migration surveys and incidental observations were noted at all five sites during the fauna surveys.

Sazlıbosna Reservoir Area

During the spring bird surveys at the Sazlıbosna Reservoir Area (study area 1) a total of 57 bird species were recorded, 24 of which were identified as breeding. Only species categorized as IUCN Least Concern were encountered during the surveys at this site during the spring survey.

During autumn surveys, a total of 43 bird species were recorded, including wading birds. The globally threatened Eurasian turtle dove (*Streptopelia turtur*), listed as Vulnerable by the IUCN, was recorded at this site with the remaining autumn species categorized as IUCN Least Concern. A peak count of one Eurasian turtle dove was recorded on three occasions. The Eurasian turtle dove is a widespread and common migrant across Turkey. There was no roost of similar concentration of the species noted.

Species of highest abundance at this location during spring were Alpine swift (*Tachymarptis melba*) (a peak count of 35), Mediterranean gull (50), common tern (*Sterna hirundo*) (100) and yellow-legged gull (200).

Species of highest abundance at this location during autumn were Alpine swift (50), wood sandpiper (*Tringa glareola*) (30), black-headed gull (*Chroicocephalus ridibundus*) (80), yellow-legged gull (*Larus michahellis*) (300), great cormorant (30), Eurasian honey-buzzard (*Pernis apivorus*) (28), Eurasian magpie (*Pica pica*) (53), Eurasian jackdaw (*Corvus monedula*) (45) and barn swallow (*Hirundo rustica*) (51).

Forty-nine species listed in Annex II of the Bern convention were recorded, of which the following were identified as breeding:

- Black-winged Stilt (*Himantopus himantopus*);
- Booted Eagle (*Hieraaetus pennatus*);
- Common Nightingale (*Luscinia megarhynchos*);
- Eastern Olivaceous Warbler (*Iduna pallida*);
- Eurasian Golden Oriole (*Oriolus oriolus*);
- European Bee-eater (*Merops apiaster*);

- Great Egret (*Ardea alba*);
- Common Whitethroat (*Sylvia communis*);
- Northern Wheatear (*Oenanthe oenanthe*);
- Pygmy Cormorant (*Microcarbo pygmaeus*); and
- Short-toed Snake Eagle (*Circaetus gallicus*).

During the survey, special attention was paid for the birds moving between the Sazlıdere Damlake and Küçükçekmece Lake, along the Sazlıdere steam, on a daily basis. These are birds that move between feeding grounds and roosting grounds, the latter involves safe and quiet sites, reeds, island, etc. where they can spend time for resting or sleeping. The species recorded were:

- Mallard (*Anas platyrhynchos*);
- Black-headed Gull;
- Mediterranean Gull;
- Yellow-legged Gull;
- Common Tern;
- Pygmy Cormorant;
- Great Cormorant;
- Grey Heron (*Ardea cinerea*);
- Great Egret; and
- Little Egret (*Egretta garzetta*).

Most species were recorded at flight height between 50 and 300 meters. The height of the tower is planned as 196 m above ground, and the height of the road as 80 m. The half of the cross section between 79 m and 196 m correspond to the cross-section covered by the suspension cables of the bridge. That means that the current height of the bridge is on the flight height of the bridge. Some birds are expected to fly at road height.

Riparian Habitat near Nakkaş

During the spring bird surveys at the riparian habitat near Nakkaş (study area 3) a total of 50 bird species were detected, 11 of which were identified as breeding. During autumn surveys, a total of 35 bird species were recorded. The Eurasian turtle dove (*Streptopelia turtur*), listed as Vulnerable by the IUCN, was recorded at this site as was the meadow pipit (*Anthus pratensis)* which is categorized as Near Threatened (NT).

Species of highest abundance were corn bunting (*Miliaria calandra*) (30) and black-headed bunting (*Emberiza melanocephala*) (50).

There were 38 species recorded either within the Spring or Autumn surveys at this site which are listed in Annex II of the Bern convention (Annex 11). Species listed in Annex II that were also recorded as breeding resident birds or breeding summer migrants at this site are listed below:

- Black-headed Bunting (*Emberiza melanocephala*);
- Common Nightingale (*Luscinia megarhynchos*);
- Eastern Olivaceous Warbler (*Iduna pallida*);
- Common Whitethroat (*Sylvia communis*);
- Red-backed Shrike (*Lanius collurio*); and
- Short-toed Snake Eagle (*Circaetus gallicus*).

Meadow near Bahşayış Village

Prior to the design change an additional site was also considered at Meadow near Bahşayış Village. The proposed route runs approximately 3 km away from this survey area but not through it. Surveys at the Meadow near Bahşayış Village (study area 2) identified a total of 48 species during the spring and autumn surveys. All but five of these species were recorded at the other study locations. The five species only recorded at the Meadow near Bahşayış Village site were:

- Black Stork (*Ciconia nigra*);
- Cirl Bunting (*Emberiza cirlus*);
- Common Raven (*Corvus corax*);
- European Roller (*Coracias garrulous*); and
- Feral Pigeon (*Columba livia*).

All five are categorized as Least Concern by the IUCN. The black stork, cirl bunting and European roller are listed under Annex II of the Bern Convention with the latter two also listed under the Revised Annex I of Resolution 6. As habitats that support these species are present within the AoI, the species were considered to be potentially present within the Project area.

5.3.5.1.2 Incidental Bird Observations

The fauna survey reports produced by Professor Mustafa Sözen included details of incidental bird observations recorded at the five original study areas as well as the three batch plant sites, and a list of bird species not recorded during the survey but considered to be potentially present within the Project area.

A total of 256 bird species were listed, 67 of which were species directly observed at the Project site. No behavioural detail was provided to indicate if the incidental species recorded were migratory or whether the bird was using the site or passing over it. Of these 67 incidental observations, the majority are classified as Least Concern by the IUCN, the exception being lapwing (*Vanellus vanellus*) which was recorded at study point 2 and is categorised as Near Threatened. Forty three of these 67 species incidentally recorded are listed on Annex II of the Bern Convention.

The remaining 189 species were not directly observed but considered to be potentially present within the Project area. This list includes three Endangered species: the white-headed duck (*Oxyura leucocephala*), Egyptian vulture (*Neophron percnopterus*) and steppe eagle (*Aquila nipalensis*). Species classed as Vulnerable were the red-breasted goose, pochard, greater spotted eagle, and the imperial eagle (*Aquila heliacal)*. There were 11 species classed as near threatened and 129 species listed on Annex II of the Bern Convention.

The 31 species of bird directly observed during the migration surveys or through incidental sightings that are listed on the Revised Annex I of Resolution 6 species.

6 bird species observed during 2021 surveys

English Name	Latin Name	IUCN	BERN
Black Stork	*Ciconia nigra*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Black-winged Stilt	*Himantopus himantopus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Booted Eagle	*Hieraaetus pennatus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Calandra lark	*Melanocorypha calandra*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6

English Name	Latin Name	IUCN	BERN
Collared Flycatcher	*Ficedula albicollis*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Common Tern	*Sterna hirundo*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Eurasian Honey-Buzzard	*Pernis apivorus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Eurasian Marsh-Harrier	*Circus aeruginosus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
European Roller	*Coracias garrulous*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Glossy ibis	*Plegadis falcinellus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Great Egret	*Ardea alba*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Greater Flamingo	*Phoenicopterus roseus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Greater Short-toed Lark	*Calandrella brachydactyla*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Hen Harrier	*Circus cyaneus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Kingfisher	*Alcedo atthis*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Lesser Grey Shrike	*Lanius minor*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Lesser Kestrel	*Falco naumanni*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Levant sparrowhawk	*Accipiter brevipes*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Little Egret	*Egretta garzetta*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Long-legged Buzzard	*Buteo rufinus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Masked shrike	*Lanius nubicus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Peregrine Falcon	*Falco peregrinus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Pygmy Cormorant	*Microcarbo pygmaeus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Red-backed Shrike	*Lanius collurio*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Short-toed Snake Eagle	*Circaetus gallicus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Sparrowhawk	*Accipiter nisus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Syrian Woodpecker	*Dendrocopos syriacus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Tawny Pipit	*Anthus campestris*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6

English Name	Latin Name	IUCN	BERN
White Stork	*Ciconia ciconia*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
White-winged Tern	*Chlidonias leucopterus*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6
Wood Sandpiper	*Tringa glareola*	Global IUCN LC	Annex II Bern Convention and Revised Annex I of Resolution 6

5.3.5.2 Bats

During the surveys nine bat species were recorded:

- Savi's pipistrelle (*Hypsugo savii*)
- Greater noctule (*Nyctalus lasiopterus*);
- Lesser noctule (*Nyctalus leisleri*)
- Common noctule (*Nyctalus noctula*).
- An unidentified pipistrelle (*Pipistrellus kuhlii/nathusii*)
- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- A Plecotus species; and
- Particoloured Bat (*Vespertilio murinus*).

All species are common and widespread with the exception of greater noctule which is identified as Vulnerable on the IUCN Red List. All species are listed under the EU Habitats Directive as Annex IV species and all are Annex II species under the Bern Convention apart from the common pipistrelle. None of these species are included in Revised Annex I of Bern Resolution 6.

Bat activity at both transect and static sites was dominated by moderate levels of common pipistrelle activity (peak 557, range 84-712). These were widespread and found at all sampling sites in all months.

Kuhl’s/Nathusius’s pipistrelle (a difficult species pair that is usually only separable on social calls) was the second most commonly encountered bat but at considerably lower activity levels (peak 34, range 5-34). It was present on the south west shore of the dam, at the dam, and at the southern part of the dam.

The greater noctule was recorded on two occasions, once in July (south west shore) and once in September (southern part of the dam) at low activity rates (peak 6 passes). The lesser noctule was recorded during August and September by static detectors located at the camp near Sazlıdere Dam with a peak of 4 passes. Common noctule was reported in July (south west shore), and in August and September, (by static detectors located at the camp near Sazlıdere Dam) single passes on all nights.

Soprano pipistrelle was recorded in July (south west shore), August September (southern part of the dam) and October (by static detectors located at the camp near Sazlıdere Dam and the southern part of the dam

A Plecotus species and Particoloured Bat were reported in September by static detectors located at the camp near Sazlıdere Dam (peak 2 and 5 passes respectively). Savi's Pipistrelle was reported once in August (by static detectors located at the camp near Sazlıdere Dam).

The surveyors highlighted that the Yarimburgaz cave to the south of the dam is a former bat roost but is now too disturbed to support bat populations. The site below the dam is subject to regular treatment with insecticides. Development and agriculture further reduce the quality of the habitat for bats.

Additional bat species identified through desk study as potentially present within the AoI but not directly observed during field survey.

5.3.5.3 Other Mammals, Amphibians and Reptiles

5.3.5.3.1 Mammals

No mammal species were directly observed during the fauna field surveys with the exception of the brown rat (*Rattus norvegicus*). The burrows and foot prints of some mammals were determined with evidence of blind mole rat (*Nannospalax leucodon*), European mole (*Talpa europea*), Harting's vole (*Microtus hartingi*), lesser mole rat (*Nannospalax leucodon*) and a vole species *Microtus spp.* recorded during the survey.

According to the location of the Project site and general habitat type, 58 mammal species (including those listed above) were considered potentially present within the AoI (Annex 11). The mammals of ecological interest based on their IUCN status, inclusion as Annex II or IV species under the Habitats Directive (35 species) or inclusion in Annex-II of the BERN Convention and/or Revised Annex I of Resolution 6 are presented in Table 5-24.

None of the mammal species are endemic, however, three of the species are listed in threatened categories of IUCN as Vulnerable; the long-fingered bat (*Myotis capaccinii*), greater noctule bat (*Nyctalus lasiopterus*), Mehely's Horseshoe Bat (*Rhinolophus mehelyi*) and marbled polecat (*Vormela peregusna*).

European souslik (*Spermophilus citellus*) were not recorded during the field surveys but were considered of importance and potentially present within the study area. This species is listed as Endangered by the IUCN and is an Annex II and Annex IV species on the habitats directive and an Annex II species of the Bern Convention. Its habitat preference is short-grass steppe habitat on well drained soils in the Thrace region, the south eastern extent of its range.

Table 5-24 Mammals of higher conservation value considered potentially present in the Project Area

English Name	Latin Name	IUCN	BERN	EU Habitat Directive
Alcathoe bat	*Myotis alcathoe*	Global IUCN DD	Annex II Bern Convention	Annex IV Habitats Directive
Bechstein's bat	*Myotis bechsteinii*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Blasius's horseshoe bat	*Rhinolophus blasii*	Global IUCN LC	Annex II Bern Convention	Annex II and IV Habitats Directive
Brandt's bat	*Myotis brandtii*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Brown Long-eared Bat	*Plecotus auritus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Caucasian squirrel	*Sciurus anomalus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Common bent-wing bat	*Miniopterus schreibersii*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Common noctule	*Nyctalus noctula*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive

English Name	Latin Name	IUCN	BERN	EU Habitat Directive
Common pipistrelle	*Pipistrellus pipistrellus*	Global IUCN LC	-	Annex IV Habitats Directive
Daubenton's bat	*Myotis daubentonii*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Eurasian otter	*Lutra lutra*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
European souslik	*Spermophilus citellus*	Global IUCN EN	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Forest Dormouse	*Dryomys nitedula*	Global IUCN LC	-	Annex IV Habitats Directive
Geoffroy's bat	*Myotis emarginatus*	Global IUCN LC	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Greater horseshoe bat	*Rhinolophus ferrumequinum*	Global IUCN LC	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Greater mouse-eared bat	*Myotis myotis*	Global IUCN LC	Annex II Bern Convention	Annex II and IV Habitats Directive
Greater noctule bat	*Nyctalus lasiopterus*	Global IUCN VU	Annex II Bern Convention	Annex IV Habitats Directive
Grey Long-eared Bat	*Plecotus austriacus*	Global IUCN NT	Annex II Bern Convention	Annex IV Habitats Directive
Kuhl's pipistrelle	*Pipistrellus kuhlii*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Lesser horseshoe bat	*Rhinolophus hipposideros*	Global IUCN LC	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Lesser mole rat	*Nannospalax leucodon*	Global IUCN DD	-	-
Lesser mouse-eared bat	*Myotis blythii*	Global IUCN LC	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Lesser noctule	*Nyctalus leisleri*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Long-fingered bat	*Myotis capaccinii*	Global IUCN VU	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Marbled polecat	*Vormela peregusna*	Global IUCN VU	Annex II Bern Convention	-
Mediterranean horseshoe bat	*Rhinolophus Euryale*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Mehely's Horseshoe Bat	*Rhinolophus mehelyi*	Global IUCN VU	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Nathusius's pipistrelle	*Pipistrellus nathusii*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Natterer's bat	*Myotis nattereri*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive

English Name	Latin Name	IUCN	BERN	EU Habitat Directive
Parti-coloured bat	*Vespertilio murinus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Savi's pipistrelle	*Hypsugo savii*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Serotine bat	*Eptesicus serotinus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Soprano pipistrelle	*Pipistrellus pygmaeus*	Global IUCN LC	-	Annex IV Habitats Directive
Steppe Whiskered Bat	*Myotis aurascens*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Western Barbastelle	*Barbastella barbastellus*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Whiskered bat	*Myotis mystacinus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive

N.B. Species directly observed or with field signs of presence observed are indicated in bold.

5.3.5.3.2 Amphibians

There is one water channel that is crossed by the proposed route that has conditions suitable for amphibians in addition to the presence of various ponds. The channel connects the Sazlıdere dam Lake to Küçükçekmece Lake.

A total of nine amphibian species are considered to be potentially present within AoI and listed in Annex 11. Of these species, only the marsh frog (*Pelophylax ridibundus*) was directly observed (at ponds at survey sites 1 and 4 as well as at C2). The amphibian species listed are not endemic and not listed in threatened categories of IUCN.

Six of the amphibian species are listed under the Habitats Directive; the European fire-bellied toad (*Bombina bombina*) under both Annex II and IV and the following as Annex IV species; green toad, green frog (*Hyla orientalis*), Syrian spadefoot (*Pelobates syriacus*), agile frog (*Rana dalmatina*) and the Balkan-Anatolian crested newt (*Triturus ivanbureschi*).

According to Bern Convention Appendices, five amphibian species considered to be potentially present within AoI are listed in Annex II (Strictly protected fauna species), and the remaining four species are in Annex III (Protected fauna species). The European fire-bellied toad is the only species to be listed under the Revised Annex I of Resolution 6 of the Bern Convention.

5.3.5.3.3 Reptiles

A total of 28 reptile species are considered to be potentially present within the AoI (Annex 11). None of the species are endemic. The following species are considered of ecological importance due to their IUCN status:

- Common or Mediterranean Spur-thighed Tortoise – this species is listed as Vulnerable by the IUCN and is an Annex II and IV species on the Habitats Directive; and Annex II and Revised Annex I of Resolution 6 of the Bern Convention. It inhabits forest and shrub habitats and was observed at study point C2; and
- European pond turtle – this is a trigger species for the Büyükçekmece Lake KBA. It is listed as Near Threatened by the IUCN. It is listed as an Annex II and IV species in the Habitats Directive; and Annex II and Revised Annex I of Resolution 6 of the Bern Convention. It occurs in freshwater habitats – ponds, lakes, brooks, streams, rivers and drainage canals and was observed at study point C2.

Table 5-25 lists the reptiles observed or considered potentially present in the AoI and outlines their levels of protection.

Table 5-25 Reptiles observed or considered potentially present in the AoI

English Name	Latin Name	IUCN	BERN	EU Habitat Directive
Aesculapian snake	*Zamenis longissimus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Balkan green lizard	*Lacerta trilineata*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Balkan wall lizard	*Podarcis taurica*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Blotched snake	*Elaphe sauromates*	Global IUCN LC	-	-
Caspian whip snake	*Dolichophis caspius*	Global IUCN LC	-	Annex IV Habitats Directive
Common wall lizard	*Podarcis muralis*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Dahl's whip snake	*Platyceps najadum*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Dice snake	*Natrix tessellate*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Eastern Montpellier snake	*Malpolon insignitus*	Global IUCN LC	-	-
European glass lizard	*Pseudopus apodus*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
European green lizard	*Lacerta viridis*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
European pond turtle	*Emys orbicularis*	Global IUCN NT	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
European ratsnake	*Zamenis situla*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Grass snake	*Natrix natrix*	Global IUCN LC	Annex II Bern Convention Revised Annex I of Resolution 6	-
Italian wall lizard	*Podarcis sicula*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Kotschy's gecko	*Mediodactylus kotschyi*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Mediterranean spur-thighed Tortoise	*Testudo graeca*	Global IUCN VU	Annex II Bern Convention Revised Annex I of Resolution 6	Annex II and IV Habitats Directive
Nose-horned viper	*Vipera ammodytes*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Red whip snake	*Platyceps collaris*	Global IUCN LC	-	-
Ring-headed dwarf snake	*Eirenis modestus*	Global IUCN LC	-	-

English Name	Latin Name	IUCN	BERN	EU Habitat Directive
Sand Boa	*Eryx jaculus*	Global IUCN LC	-	Annex IV Habitats Directive
Slow worm	*Anguis fragilis*	Global IUCN LC	-	-
Smooth snake	*Coronella austriaca*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Snake-eyed lizard	*Ophisops elegans*	Global IUCN LC	Annex II Bern Convention	Annex IV Habitats Directive
Snake-eyed skink	*Ablepharus kitaibelii*	Global IUCN LC	Annex II Bern Convention	-
Soosan snake	*Telescopus fallax*	Global IUCN LC	Annex II Bern Convention	-
Western caspian turtle	*Muaremys rivulata*	Global IUCN NE (LC Europe)	-	-
Worm snake	*Typhlops vermicularis*	Global IUCN LC	-	-

N.B. Species directly observed or with field signs of presence observed are indicated in bold.

According to Bern Convention Appendices, 18 reptile species potentially within the AoI are listed in Annex II (Strictly protected fauna species).

5.3.6 Aquatic ecosystems

The key aquatic features that the Project passes near are the Sazlıdere Dam and the Küçükçekmece Lake. Streams in the Project are the Sazlıdere (which feeds Sazlıdere Dam) and the Nakkas which discharges into Küçükçekmece Lake.

The Project is approximately 6 km north of Küçükçekmece Lake and approximately 5 km north Büyükçekmece Lake.

5.3.6.1 Aquatic habitats

The first sampling point was a seasonal stream with no water-flow at the time of survey. It was seen that terrestrial vegetation was present in the stream due to the absence of flow in the stream bed over a long period of time.

The second sampling point was at another dry stream bed in a section close to the first sampling point. In the evaluations made at this point it was seen that the stream habitat was completely canalized and concreted therefore noted to be a modified habitat with no natural flow.

Photo 5-15 The first aquatic sampling location

Photo 5-16 The second aquatic sampling location

The third sampling area located just below Sazlıdere Dam was a channelled section with a wide stream bed of which the bottom part is completely covered with mud. There was a very small current created by the water leaking from the dam body. The water-flow was quite low and it was considered that this station had stagnant water characteristics.

The riparian vegetative zone was confined to a very small area due to the proximity of agricultural areas. The middle parts of the creek and shores had a swampy appearance with reeds as the dominant plants. This station, where eutrophic conditions were clearly observed, was rich in submerged marshes. A vegetated bank habitat structure was dominant with agricultural surrounding areas. There were no tree communities along the bank of the stream, but it was completely covered with agricultural areas which provided no shading effect in terms of aquatic life. Ground and surface waters from these agricultural areas and pesticides, nitrogen and phosphorus compounds reaching the stream in the study area were seen as important sources of pollution. Since the coastal part of the stream is lined with thick stones and is covered with vegetation, it does not have the characteristics of a problematic area in terms of erosion.

The current was quite low and the habitat noted to have eutrophic features due to the low water circulation, high temperature and nutrient contents. Aquatic vegetation was dominated by Cyanophyceae (blue-green algae) and Chlorophyceae (green algae).

Physical properties in terms of water quality, were recorded within normal values. Muddy and loam areas were dominantly observed in terms of inorganic substrate contents of the stream.

The habitat was found to be optimal in terms of epifaunal substrate and sediment deposition. It is possible to attribute this situation to the dense vegetation on the bank and the density of algae, especially from submerged plants. In terms of channel alteration, there is a post-dam channel structure arrangement. Therefore, there is a situation below the optimal limits, as there are interferences to the stream in terms of channel alterations. Pool substrates and channel flow status are sub-optimal, and have habitat characteristics within the marginal limits due to the intensive agricultural activities in the area outside the riparian vegetative zone. The Riparian vegetative zone is confined to a very small area due to the limitation by agricultural areas.

Overall, this sampling point had the characteristics of an aquatic habitat with unfavourable conditions and the negative impact of agricultural lands and some domestic pollution sources and previous interventions to the stream bed.

Showing the third aquatic sampling location below Sazlıdere Dam

Photo 5-17

Photo 5-18

The fourth aquatic sampling location was at a seasonal stream that was considered at risk of drying up after a short time. There was very little water in this stream, and it was observed that a significant part of this flowing water was sewage. In terms of its bottom structure, mud and vegetative banks habitat types were dominant. Rooted submergents and attached algae were the dominant groups of aquatic vegetation types. Reeds, diatoms and filamentous algae were also recorded. There was no erosion hazard in terms of stabilization at this sampling location. Tree communities were almost non-existent on bank zone of the stream.

No fish species were caught during electrofishing at this site. It was observed that there was no natural flow and all the water in the stream was considered to be sewage. Accordingly, the water quality was very poor and the level very low with intense pollution. These unfavourable conditions do not allow fish to live.

The fourth aquatic sampling location and the sewage discharge in the area of the motorway crossing

Photo 5-19

Photo 5-20

5.3.6.2 Fish

All aquatic sampling studies were carried out at the 3rd and 4th stations as water was not found at two of the four aquatic sampling points. The first of the aquatic sampling points was completely dry therefore no samples could be taken there and the second sampling point was completely enclosed in concrete canals, so the natural aquatic habitat was destroyed. In addition, there was no natural flow in this station, instead there were sewage inputs showing very little flow.

Fish samples were caught at study area three and five with no fish caught at study area four. A total of nine species were caught including the following:

- Common carp (*Cyprinus carpio*) which is considered to be Vulnerable by the IUCN Global Red List; and

- European bitterling (*Rhodeus amarus*) which is included in Annex II of the Habitats Directive and Annex III of the Bern Convention.

The distribution of the species identified in the study areas according to stations where they were caught and information on various protection statuses are given on Table 5-26. The fish species caught in the studies were of high density and widespread in the basins of the whole Thrace and İstanbul region.

Electro-fishing in the canal below Sazlidere dam did not record any larger species such as sturgeon. Sturgeon rely on clean freshwater supply and oxygen-rich waters. Although there may be parts of Sazlidere that support these species, below the dam is not considered to be suitable habitat as there is little to no connection downstream (no spillway, fishway or ladder to accommodate fish migration) and the canal is highly eutrophic.

Table 5-26 Fish species recorded during aquatic survey

English Name	Latin Name	Introduced (I)/ Native (N)	Level of Protection
Freshwater bream	*Abramis brama*	N	Global IUCN LC
Prussian carp	*Carassius gibelio*	I	Global IUCN NE (LC Europe)
Common carp	*Cyprinus carpio*	N	Global IUCN VU
Dnieper chub	*Petroleuciscus borysthenicus*	N	Global IUCN LC
Chub	*Squailus cephalus*	N	Global IUCN LC
European bitterling	*Rhodeus amarus*	N	Global IUCN LC Annex III Bern Convention Annex II Habitats Directive
Pike-perch	*Sander lucioperca*	I	Global IUCN LC
Round goby	*Neogobius melanostomus*	N	Global IUCN LC
Monkey goby	*Neogobius fluviatilis*	N	Global IUCN LC Annex III Bern Convention

5.3.6.3 Freshwater algal species

The existence of suitable habitats for algae was observed at the sampling stations. The presence of stagnant and flowing water environments at the stations allowed the sampling of attached and planktonic forms. This was one of the main reasons for the high number of subspecies in the region. A total of 126 taxa (species and subspecies) belonging to 7 different algal classes were identified in the research area. Across the two sampling locations there was no endemic, rare or endangered algal species specific to the region.

5.3.6.4 Zooplanktonic organisms

The main widely-spread areas of zooplanktonic ratios are stagnant waters and they are represented by high species in lakes and ponds structures. Since the motorway region is passing through the downstream of Sazlıdere Dam in the project area and has a relatively stagnant water environment, it was represented with a high number of species in terms of zooplanktonic organisms. A total of 29 taxa belonging to Cladocera, Copepoda and Rotifera were identified among the zooplanktonic organisms during the studies carried out in the study area. Zooplanktonic species identified in the area were cosmopolitan and widespread.

5.3.6.5 Benthic organisms

A total of 50 benthic invertebrate species belonging to three large groups were identified in the samplings at 2 different stations in the study area. Of these, three taxa belonging to Mollusca, eight taxa to Annelida and 39 taxa belong to Arthropoda branch, were identified. Within Arthropoda, three taxa belong to Crustaceae and 36 taxa to Insecta classes were noted.

In aquatic ecosystems, benthic organisms have significant indicator species. These organisms are also the indicator groups of communities that are polluted or under stress as a result of anthropogenic effects. According to the sampling results, the species belonging to Annelida clade, which can be considered as a pollution indicator, and some members of the Diptera Order from the Insecta class, and from Artropada, were found quite abundantly in the loam and mud ground. Species belonging to these groups are abundant in stagnant areas. The muddy areas formed by the accumulation of sediments in the area were unsuitable in terms of water quality. Especially at creek banks, very dense Gastropoda members were observed.

In addition, good water quality indicator species belonging to Gammarus of Crustacea and Ephemeroptera, Odonata and Trichoptera of Crustacea, were rarely encountered. These species are found in fast-flowing, pebble, stone and rocky areas. These habitats were observed at very few sections of the studied stations.

5.3.7 Invasive Species

Two species of fish were identified as invasive during the electrofishing surveys Prussian carp (*Carassius gibelio*) and pike-perch (*Sander lucioperca*). No other invasive plants or fauna were recorded during field surveys.

5.4 Social Environment

This chapter provides a description of the current socio-economic baseline conditions in the AoI based on a combination of desktop and primary information collected during the field surveys carried out by ERM and GEM (RAP related studies) from February to November 2021.

The Project Area includes the footprint of all Project activities and a larger working strip typically of 500 m either side of the corridor (in total 1000 m) to include the areas in which a direct or indirect impact on social or cultural environment might occur.

The primary AoI includes those communities, which are crossed by the road and will therefore experience more direct impacts. The remaining settlements of the general AoI are considered secondary AoI settlements.

5.4.1 Data Collection Methodology

5.4.1.1 Desktop Data Collection

The desktop data collection process comprised review of information primarily from the following sources by ERM and GEM[62]:

- Published literature including supporting literature (previous reports, existing studies, etc.) sourced from websites/Governmental data portals, academic and research institutions, social organizations, etc. Most of the data was recent (2021) with some data from the previous years in cases where up-to-date information was not available.
- Online Government databases and statistical information, in particular the following:
  - *TUIK*, the İstanbul Statistics Office;

[62] Source: RAP, GEM 2022

- *IBB İstanbul*, the Official Open Data Portal of the city of İstanbul

- References from previous studies that are publicly available for recent projects in the same geographic region or of similar nature.
- Satellite imagery (including archives available through Google Earth).
- Reports published by multilateral organisations, such as the Organisation for Economic Co-operation and Development (OECD), International Labour Organisation (ILO), International Monetary Fund (IMF), The Food and Agriculture Organization (FAO) of the United Nations or World Health Organisation (WHO).
- Non-technical literature (newspaper articles, etc.).
- Expropriation Plans (issued by the third-party engineering firm "Mekan Harita" in June 2021).
- Structure Identification Survey reports (in excel) identifying the affected buildings and structures along the full Project alignment (issued by the third-party engineering firm in August 2021).
- Turkey Statistical Institute (TurkStat) and the Address Based Population Registration System (ABPRS) indicators.
- Land acquisition related correspondence with the authorities (e.g. KGM, municipalities, authorities responsible from the operation of existing infrastructure) and affected owner/shareholders.
- Official information from Institutions and Organizations.

5.4.1.2 Primary Data Collection

Primary baseline data was collected by ERM and GEM (data collection for RAP related studies) between February 2021 and December 2021, through discussions with Government officials from provincial and district level authorities, municipalities, *Muhtars* (village heads), Project Affected People (PAPs) and Project Affected Businesses (PABs) and vulnerable groups.

Some of the face-to-face engagements were limited and phone calls, questionnaires via mail, official correspondences via postal were given the restrictions to carry out field surveys due to the imposed several lockdowns in Turkey between April-June 2021.

Information gaps were addressed by engaging with stakeholder sources such as:

- Key Informant Interviews with *Muhtars,* although no responses were provided at the time of writing by the *Muhtars of the settlements of Şahintepe, Hadimköy, Firuzköy and Bahçesehir 1.*
- Questionnaires with stakeholders (details presented in Annex 12).

5.4.1.2.1 Additional studies conducted by GEM within RAP Scope

- Community level interviews with the heads of the Project Affected Settlements (PASs)[63] (in all PASs);
- Business level interviews with the Project Affected Businesses (PABs) (covering owners, and direct and contracted employees of the PABs) (at all PABs);
- Household level interviews with the Project Affected People (PAPs) (through parcel-based sampling);
- Field investigation and business interviews by the Valuation Expert as part of the Valuation Review Study; and
- Meetings were held with vulnerable groups in the AoI such as people with disabilities or chronic diseases.

[63] Settlements (neighbourhoods) with parcels located within the Project expropriation corridor.

The RAP survey team, which conducted the questionnaires and the interviews with the target groups of the study, consisted of female and male surveyors, led by two senior sociologists. The focus group discussions with the employees of the affected businesses were led by the labour expert.

5.4.2 Baseline Structure

This socio-economic baseline chapter presents relevant socio-economic information, as available, at various geographic levels, with particular focus at the Province, District and local levels. This baseline chapter is organised into the following sections:

- *Context overview*: Overview of the Area of Influence and the settlements along the 1 km corridor.
- *Governance and Administration:* Presentation of administrative structures and organisations, local and regional institutions, Regional and District development plans and government policies with direct or indirect consequences for the social context of the Project, overview of the socio-economic characteristics of the districts in the AoI;
- *Human Rights issues including* labour context, local communities' rights, gender equality, gender-based violence and harassment, use of force by public and private security, community safety, security, retaliation and reprisal risks*:* Overview of the human rights context in the Project Area;
- *Demographic Profile:* Summary of socio-economic characteristics of Turkey, İstanbul and the settlements in the AoI with a focus on population composition and trends, ethnicity, language and religion, migration and population change;
- *Land Use and Ownership:* Land use and ownership status in the AoI, description of mainland uses and identification of built structures in the primary Area of Influence;
- *Employment:* Summary of resources and activities at the national, District and local level, including unemployment rates and formal and informal economies;
- *Livelihood Activities:* Characterisation and evaluation of the natural resources-based livelihoods particularly in agriculture and animal husbandry;
- *Literacy and Education:* Community education profile, including distribution of schools;
- *Community Health, Safety and Security:* Understanding of the community health and identification of the potential impact to health arising from the current situation in settlements in the AoI;
- *Infrastructure and Public Services:* Identification of infrastructures and services in the AoI, including communication services and public and private infrastructure.
- *Vulnerable Groups:* High level identification and qualification of vulnerable groups residing in the AoI and main issues in each settlement reported by *Muhtars*; and
- *Cultural Heritage:* Identification of tangible and intangible cultural heritage affected by the Project as a result of desktop research, field visits and Stakeholder Engagement.

5.4.3 Governance and Administration

5.4.3.1 Administrative divisions in Turkey

The Turkish administrative system is organised in a two-tier structure, with central and local government. The central administration consists of central bodies (ministries, agencies), with its de-concentrated but centrally appointed (by the central government) branches disseminated on the territory.

This administrative de-concentration divides Turkey into 81 provinces, which are further divided into 957 districts. The administration of the provinces is based on the principle of devolution of powers (Article 126 of the Constitution). The local administration is organised in three autonomous types of government, elected locally – special provincial administrations, municipalities and villages. There are

81 special provincial administrations, one in each province. The provinces' governors are appointed by the Ministry of Internal Affairs and represent central government at the provincial level. Governorships accommodate provincial and district directorates of ministries and other state institutions as regulative agencies in their respective areas (i.e. directorates of health, education, and environment).

In addition, there are currently approximately 1,394 municipalities[64]– down from over 2,400 since many town municipalities were merged into district centres in a local government reform in 2013, and 18,247 villages. The municipalities are organised in several types: metropolitan municipalities (30 overall), province capitals (51 overall), district municipalities (519 in metropolitan municipalities, 400 in other provinces), and town municipalities (394)[65]. Each district also hosts its municipality, while many small settlements are organised as town municipalities.

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. 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 central government appoints the Governors; the Mayors and *Muhtars* are elected through local elections.

In the city, *Muhtars* are autonomous 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. While government and state institutions deal with regulations, administration and national public services; the urban public services like water/electricity distribution, cleaning and waste disposal, city transportation are delivered by municipalities.

5.4.3.2 İstanbul Province

İstanbul Province is governed by the İstanbul Metropolitan Municipality (IMM) and has 39 district municipalities and 962 neighbourhoods. The İstanbul Regional Development Agency provides planning and financial support on development of İstanbul. Currently the 2014-2023 development plan is in execution, which is available on the website of the agency.[66] The plan focusses on increasing competitiveness of the city, accelerating innovation and creativity. It is important to note that the plan also puts an emphasis on "fair sharing and inclusiveness" in the city. To implement the plan, the agency funds projects in the public sector, NGOs and private sector under regular grant programmes.

Municipalities prepare zoning plans at different levels in order to plan development of cities, manage and control expansion, ensure hygiene/health, and protect natural assets and cultural heritage. The IMM has approved zoning and landscaping plans at the metropolitan level, which are accessible through the website of the planning department.[67] In addition to these management plans required by law, the IMM also has developed other strategic management plans (which are available at the planning department), comprising the following:

- İstanbul Strategic Tourism Master Plan;
- İstanbul Urban Transformation Strategic Plan and Master Plan;

64The criteria to establish a new municipality is to have at least 5,000 inhabitants, while the number of 750,000 inhabitants is required for establishing a new metropolitan municipality.

65 European Committee of the Regions. Turkey. 2016. Available from: https://portal.cor.europa.eu/divisionpowers/Pages/Turkey.aspx

66 İstanbul Kalkinma Ajansi. 2014. 2014-2023 İstanbul Development Plan. Available from: https://www.istka.org.tr/planlama/İstanbul-bolge-plani/

67 İstanbul Büyüksehir Belediyesi. 2014. 2014-2023 Development plan. Available from:

https://sehirplanlama.ibb.İstanbul/arsiv/

- İstanbul Urban Area Transportation Plan.[68]

District municipalities develop and approve relevant zoning plans and other plans about public services.

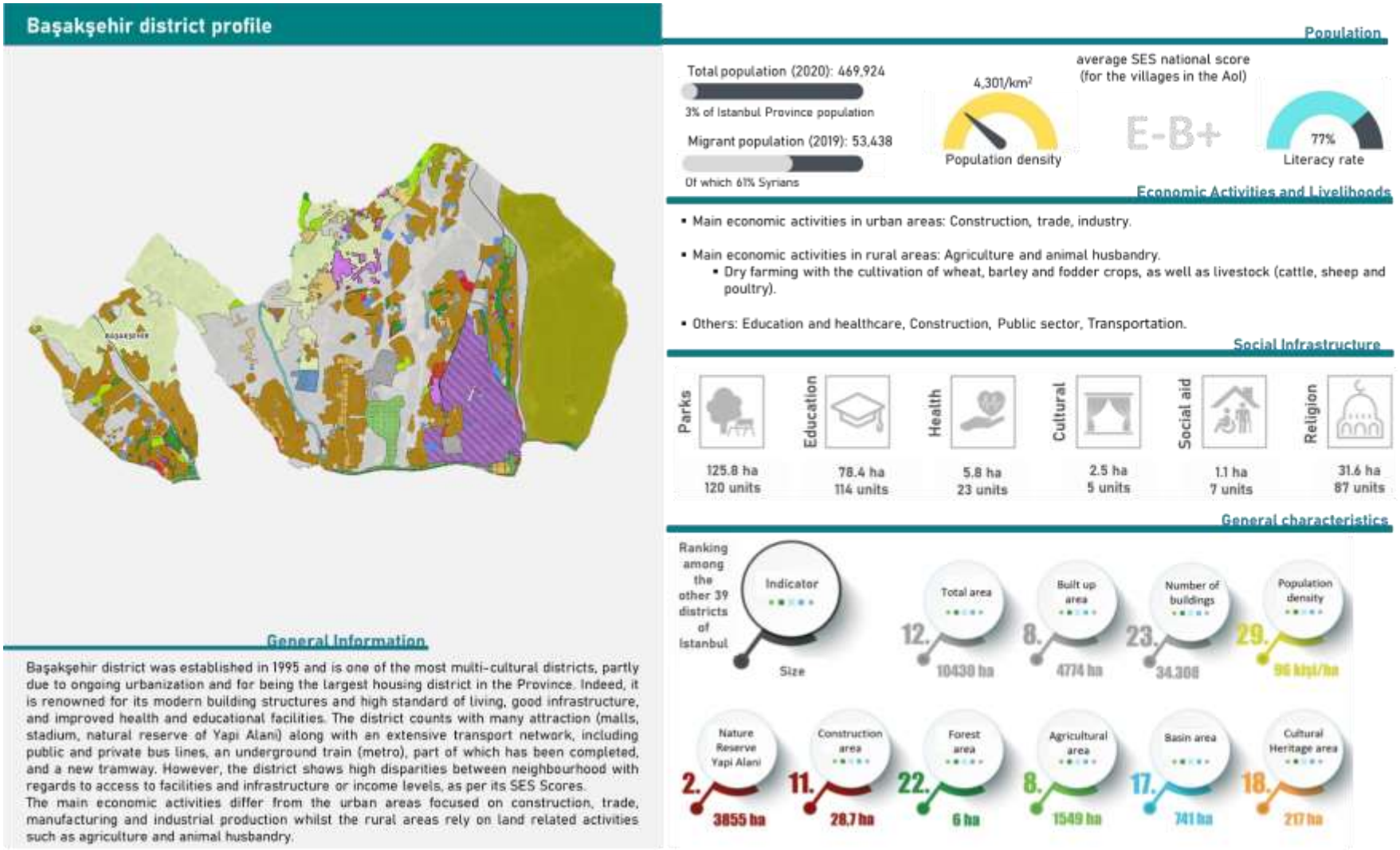
State planning coordination is handled by provincial and district planning coordination boards headed by the governor. Boards convene the participation of directors, public officials and other relevant experts as needed. Boards may also convene special committees. These Boards focus on monitoring and facilitation of implementation of central development plans, investments and economic development. It also facilitates coordination of state response to socio-economic issues.

5.4.3.3 Districts Profile

An infographic per district located in the Project's AoI is presented in Figure 5-45 to Figure 5-49 below. The infographic presents a general summary describing each district, demographic data, average Socioeconomic status (SES) national score[69] for the settlements located in the AoI, economic activities and natural resources-based livelihoods, general land use characteristics and social infrastructures.

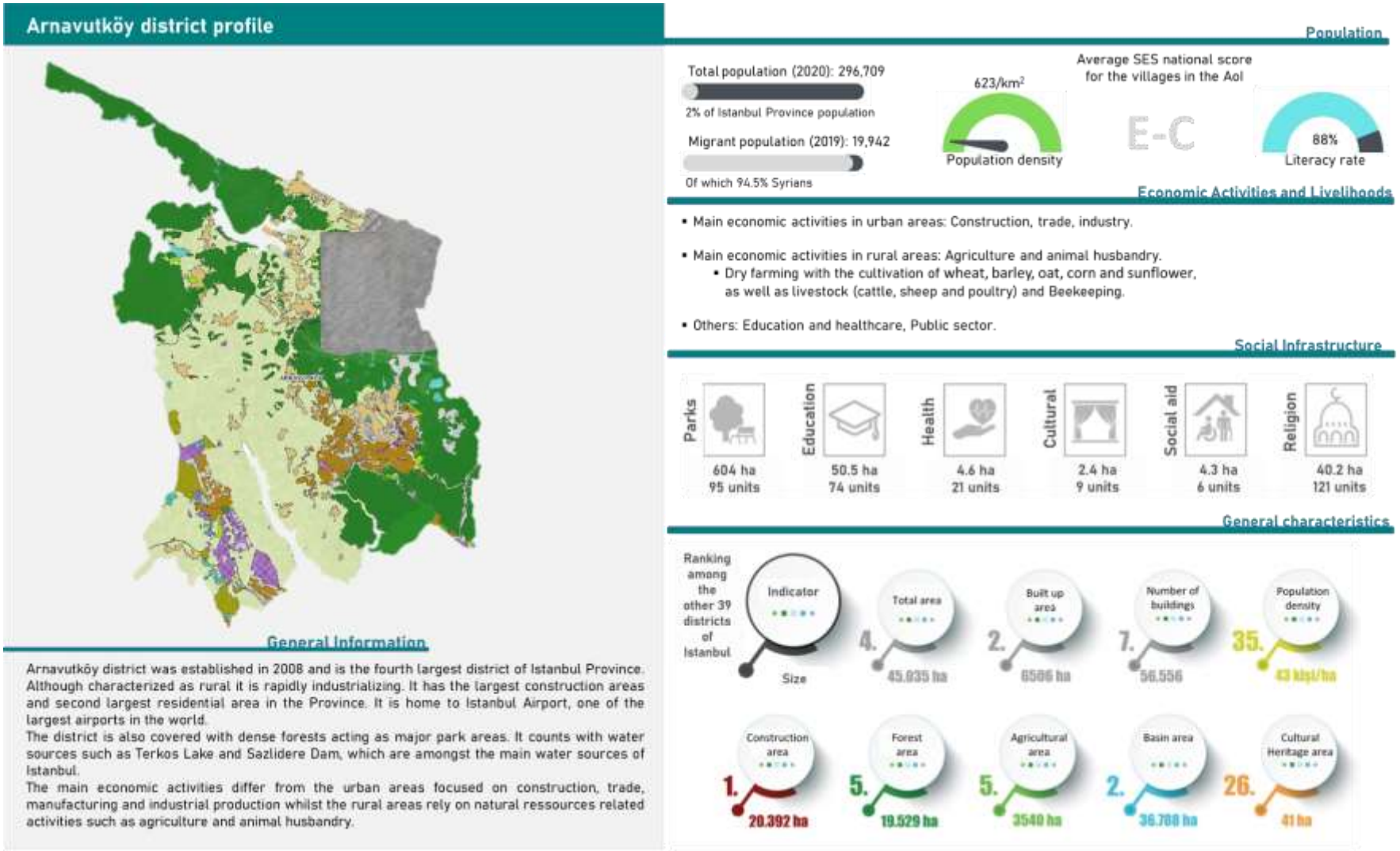
[68] İstanbul Büyüksehir Belediyesi. May 2011. İstanbul Metropoliten Alani Kentsel Ulasim Ana Plani (IUAP). Available from: http://www.ibb.gov.tr/tr-TR/kurumsal/Birimler/ulasimPlanlama/Documents/%C4%B0UAP_Ana_Raporu.pdf

[69] Resource-based measures implemented by the University of İstanbul including measures of educational attainment, total family income, labour market earnings, wealth, and SES composite scores (measuring socioeconomic status). This measure helps the government of Turkey to spot where further investments are needed. This score is attributed to each neighbourhood of İstanbul, and ranks from E to A+ (12.5 to 100).



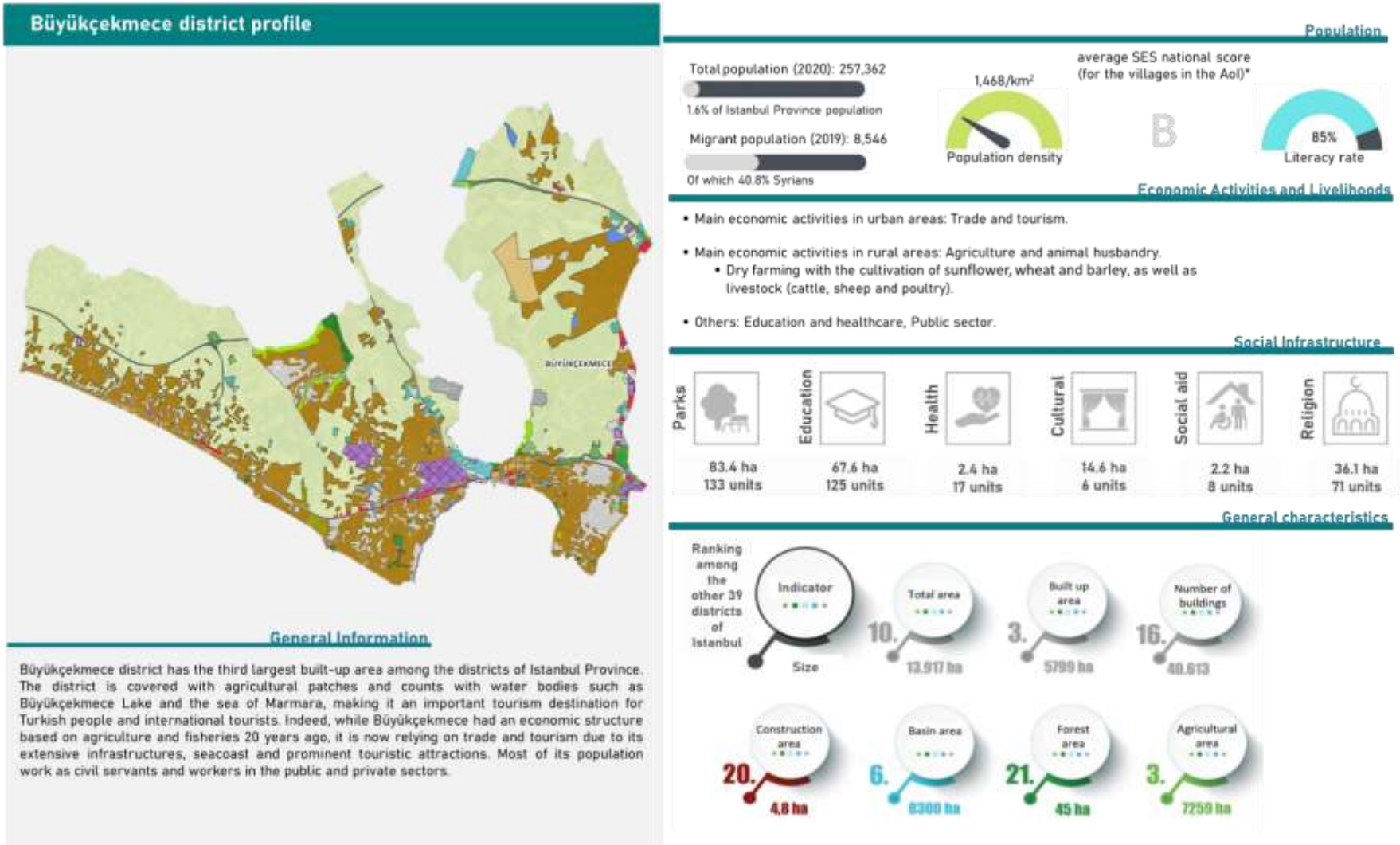
Source: IBB İstanbul statistical data. Prepared by ERM.

Figure 5-45 Başakşehir district profile



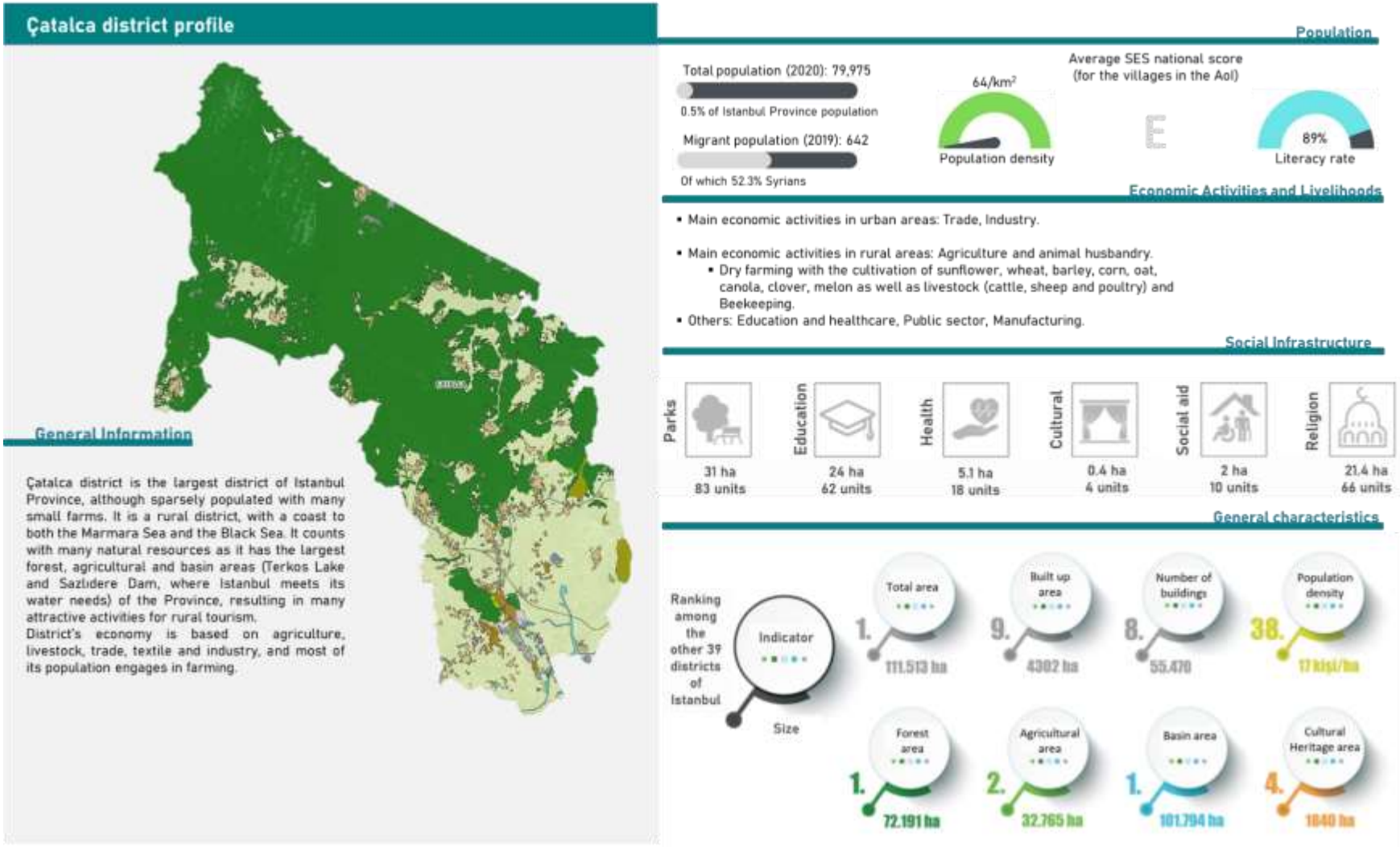
Source: IBB İstanbul statistical data. Prepared by ERM.

Figure 5-46 Arnavutköy district profile



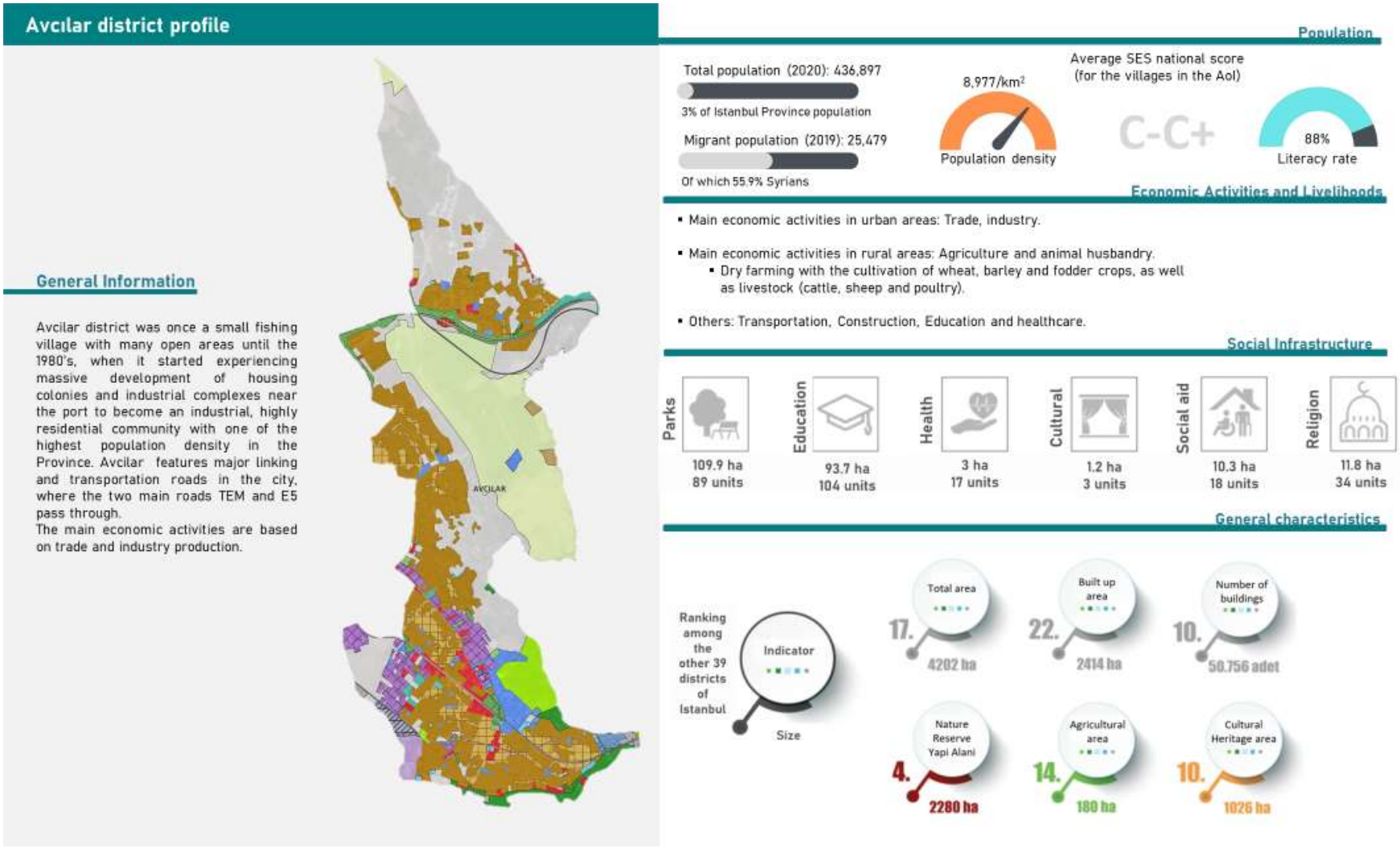
Source: IBB İstanbul statistical data. Prepared by ERM, 2021.

Figure 5-47 Büyükçekmece district profile



Source: IBB İstanbul statistical data. Prepared by ERM, 2021.

Figure 5-48 Çatalca district profile



Source: IBB İstanbul statistical data. Prepared by ERM, 2021

Figure 5-49 Avcılar district profile

5.4.4 Human Rights

5.4.4.1 Human Rights

This objective of this section is to provide an overview of the human rights situation in Turkey including the salient risks in relation to the potential impacts and the embedded mitigation measures of the Project's footprint and activities. The wider objective is to ensure that the rights of stakeholders, directly or indirectly affected by the Project, are protected, and not negatively impacted by the activities.

In addition, the section also aims to provide information on the existing human rights regulatory framework in Turkey (including international commitments), and the summary of the Country's performance in the protection of human rights.

Understanding the broader human rights context is of relevance to the Project as this can provide insights into potential human rights risk factors in the Social AoI (for instance, where the domestic law is not at par with international standards or where certain cultural practices could end up creating situations of discrimination).

As with gender and vulnerability, this socioeconomic baseline has integrated consideration of human rights throughout the study, in line with best practice. This section presents the consolidated discussion of human rights, as it relates to the Project baseline.

The section is divided into the following subsections:

- Human Rights Regulatory Framework
- Risks related to Labour Context
- Gender Equality and Gender-Based Violence and Harassment (GBVH)
- Risks related to Local Communities' Rights
- Risks related to the Use of Force by Public and Private Security
- Risks related to the Retaliation and Reprisal
- Embedded Measures

5.4.4.2 Human Rights Regulatory Framework

Human rights in Turkey are protected by multiple international laws and treaties, which, according to Article 90 of the Constitution of 1982, shall prevail over domestic legislation. Some human rights commitments entered by Turkey are expressed in Part Two of the 1982 Constitution, which guarantees fundamental rights and freedoms (right to life, security of person, right of property, etc.). Furthermore, the observance and improvement of human rights is one of the responsibilities of the Human Rights and Equality Institution of Turkey and the Ombudsman Institution since 2012.

Turkey is party to sixteen UN human right conventions. The core international human rights commitments signed are:

- The Universal Declaration on Human Rights (UDHR);
- The International Convention on the Elimination of All Forms of Racial Discrimination (ICERD);
- The International Covenant on Civil and Political Rights (ICCPR);
- The International Covenant on Economic, Social and Cultural Rights (ICESCR);
- The Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment;
- The Convention on the Rights of the Child (CRC);
- The International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (ICMW);

- Convention on the Rights of Persons with Disabilities (CRPD).

Turkey is party to 121 of 225 conventions of the Council of Europe, including the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECtHR), as well as recognising the jurisdiction of the European Court of Human Rights.

As stated in the EBRD Turkey Country Strategy 2019-2024 report[70], some of the main issues the country faces regarding Human Rights included free, fair, and competitive elections, Civil society, media and participation and Civil and political rights.

In regard to human trafficking, Turkey is making an effort to comply with all of the Trafficking Victims Protection Act (TVPA)'s minimum standards however there are still serious issues reported by international and national institutions. Victims of human trafficking are mainly from Central and South Asia, Eastern Europe, Azerbaijan, Indonesia, Morocco, and Syria[71]. Syrian refugees, including children, are especially vulnerable to human trafficking. The government created the Prevention of Human Trafficking Act of 2014 to establish cooperation between the public and private sector to fight human trafficking.

5.4.4.3 Risks Related to Labour Context

Turkey has ratified all of the fundamental ILO conventions. These include conventions No. 29 and 105 on the elimination of forced labour, conventions No. 138 and 182 on elimination of child labour, No.111 on the discrimination convention and 100 on the equal remuneration convention, as well as the conventions No. 87 and 98 on freedom of association and the right to organize.[72] See the details of national requirements on labour Chapter 2.2.1.

This being said, Turkey has yet to ratify ILO convention No. 190 on violence and harassment. Furthermore, some gaps exist between ILO conventions ratified by Turkey and its national laws (e.g. ILO No. 87 and ILO No. 98 and the national law on Trade Union and collective bargaining.

Some of the conditions implemented for employment in Turkey include a minimum wage of 11,402 TRY (as of 2023), a maximum of 11 hours a day and no more than 45 per week and a minimum age of 15 (subject to some limitation) and 18 for the rest of positions[73].

One of the biggest areas of risk in the construction sector is linked to labour rights issues, as they are known for widespread informal workers. Many of these informal workers are Turkish natives, as well as refugees and other vulnerable populations such as ethnic minorities and migrants. With the arrival of refugees in 2011, the Syrian influx led to higher competition in the job market that often replaced Turkish and other migrants (from Turkmenistan, Azerbaijan, etc.) informal workers with Syrians. Informal workers are vulnerable to abuse, due to the fact that they work under precarious conditions, have no benefits, insurance nor protections (for accidents, sickness, etc.).

Forced labour is another systematic issue as noted in ILO Committee of Experts on the Application of Conventions and Recommendations (CEACR) 2021 Report[74] on the application of international labour standards. Turkey has been as destination and transit country for trafficked women, men and children.

In regard to human trafficking, Turkey is making an effort to comply with all of the Trafficking Victims Protection Act (TVPA)'s minimum standards. Victims of human trafficking are mainly from Central and South Asia, Eastern Europe, Azerbaijan, Indonesia, Morocco and Syria. Syrian refugees, including

[70] EBRD Turkey Country Strategy 2019-2024 report

[71] US State Department. 2020. Trafficking in Persons Report, 20th Edition. Available from: https://www.state.gov/wp-content/uploads/2020/06/2020-TIP-Report-Complete-062420-FINAL.pdf

[72] ILO, 2020. Ratifications of Conventions. Turkey.
https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:103495

[73] ICLG. 2022. Employment and Labour Laws and Regulations Turkey 2022. Available from: https://iclg.com/practice-areas/employment-and-labour-laws-and-regulations/turkey

[74] https://www.ilo.org/ankara/areas-of-work/labour-law/WCMS_779029/lang--en/index.htm

children, are especially vulnerable to human trafficking. The government created the Prevention of Human Trafficking Act of 2014 to establish cooperation between the public and private sector to fight human trafficking.

Although the law prohibits all forms of forced labour, such laws are enforced unevenly. Forced labour prevails generally among refugee and migrant families. Furthermore, child labour persists, driven by the pandemic, taking place mainly in the construction and agricultural sector, small or medium industry, and street work.

CEACR 2021 report also highlighted their 2018 observations of the Confederation of Turkish Trade Unions (TÜRK-İŞ) alleging that workers employed temporarily via private employment agencies could not enjoy trade union rights.

COVID-19 brought restrictions that forced many companies to close their businesses. Workers took unpaid leave or earn less than minimum wage. Young people, especially young women, were among the groups of workers that endured heavier employment losses.[75] Furthermore, informal workers who were already vulnerable faced a higher risk of losing their jobs and had less access to safe environments and equipment.

Occupational Health and Safety (H&S) violations are particularly common in the construction industry, where accidents and fatalities are frequent, and regulations are inconsistently enforced. According to the Turkish Health and Safety Labour Watch (İSİG), in 2020 at least 2,427 workers lost their lives in work-related accidents[76]. About 101 of those deaths were immigrants/asylum seekers/refugees. In the first six months of 2021, 1,155 worker deaths were recorded, including 10 minors, 13 women and eight (8) migrants[77].

Construction workers face dire conditions and poor labour safety in the construction sector with regards to the poor living standards at accommodation camps particularly operated by the subcontractors.

Supply chain issues are covered under Section 6.3.3.3.1.

5.4.4.4 Gender Equality and Gender Based Violence and Harassment (GBVH)

In 1934, Turkish women were among the first in Europe to achieve the right to vote and run for elected office. In Turkey, gender equality is being addressed through established mechanisms, programmes and plans for gender mainstreaming. Turkey's 11th National Development Plan 2019-2023 contains goals and measures to empower women, prevent discrimination against them, and ensure that women have equal access to the rights, opportunities, and facilities available to men. Other policy documents adopted include the National Strategy and Action Plan on Women's Empowerment (2018-2023), the National Action Plan on Combating Violence and Women (2016 – 2020) and the National Action Plan on Women's Employment (2016-2018).

Women are given equal rights under the Constitution; however, inequalities in education, employment, health and access to land for women remain prevalent across the country. Indeed, women's equal rights to access, own and control land, adequate property are recognized under the Turkish Civil Code and the international commitments including the United Nations Charter, the Human Rights Declaration (1948), and the Convention on the Elimination of All Forms of Gender Discrimination were implemented.

[75] International Labour Organization. December 2020. The impact of the pandemic on employment in Turkey: What would have happened without COVID-19? Available from: https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/publication/wcms_765261.pdf

[76] Evrensel Daily (13 January 2021) In 2020, at least 2,427 workers lost their lives in Turkey; of 741 died due to COVID-19. Available from: https://www.evrensel.net/daily/423520/in-2020-at-least-2-427-workers-lost-their-lives-in-turkey-of-741-died-due-to-covid-19

[77] Stockholm Center for Freedom. (19 July 2021) At least 1,155 workers died in Turkey in first half of 2021: report. Available from: https://stockholmcf.org/at-least-1155-workers-died-in-turkey-in-first-half-of-2021-report/

In 2012, Turkey was the first of 35 Member States to ratify the İstanbul Convention. The Council of Europe's İstanbul Convention is the most recent international instrument that helps provide a roadmap for the elimination of Gender Based Violence against women and girls; alongside the UN Declaration on the Elimination of Violence against Women, the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Beijing Platform for Action. Nevertheless, on March 2021, it announced its decision to withdraw from the İstanbul Convention by Presidential decree.

Turkey's Human Development Index (HDI) for 2019 is 0.820. However, when the value is discounted for inequality, the HDI falls to 0.683, a loss of 16.7 percent due to inequality in the distribution of the HDI dimension indices. The inequality adjusted HDI also influence the HDI ranking of Turkey which fall with 11 places in the overall country ranking. The 2019 female HDI value for Turkey is 0.784 in contrast with 0.848 for males, resulting in a GDI value of 0.924, placing it into Group 4 comprising countries with medium to low equality in HDI achievements between women and men.

Turkey has a Gender Inequality Index (GII) value of 0.306, ranking it 68 out of 162 countries in the 2019 index. Women's political participation and representation in national and local elected bodies in Turkey remains below the global average. According to the World Economic Forum's Global Gender Gap Report 2021, Turkey ranks 114th in political empowerment for women and 140th in economic participation and opportunity.

Women's political participation and representation in national and local elected bodies in Turkey remains below the global average. According to the World Economic Forum's Global Gender Gap Report 2021, Turkey ranks 114th in political empowerment for women and 140th in economic participation and opportunity. As of 2021, one of 17 government ministers is a woman, and only 17 % of parliamentarians in the Turkish Grand National Assembly (TGNA) are women, which shows a slow improvement of 2 % since 2016 (Figure 5-50) well below the global average of 25.5 %. Women are also significantly under-represented in local politics. As of 2019, only 3 % of mayors, 11 % of municipal councillors and just over 2 % of *Muhtars* (village heads) were women.[78]

Indeed, Turkey's ranking lags behind in terms of gender equalities in political participation, compared to its neighbours the Western Balkans countries.

[78] UN Women, 2021. Turkey profile. Available from: https://eca.unwomen.org/en/where-we-are/turkey/leadership-and-political-participation

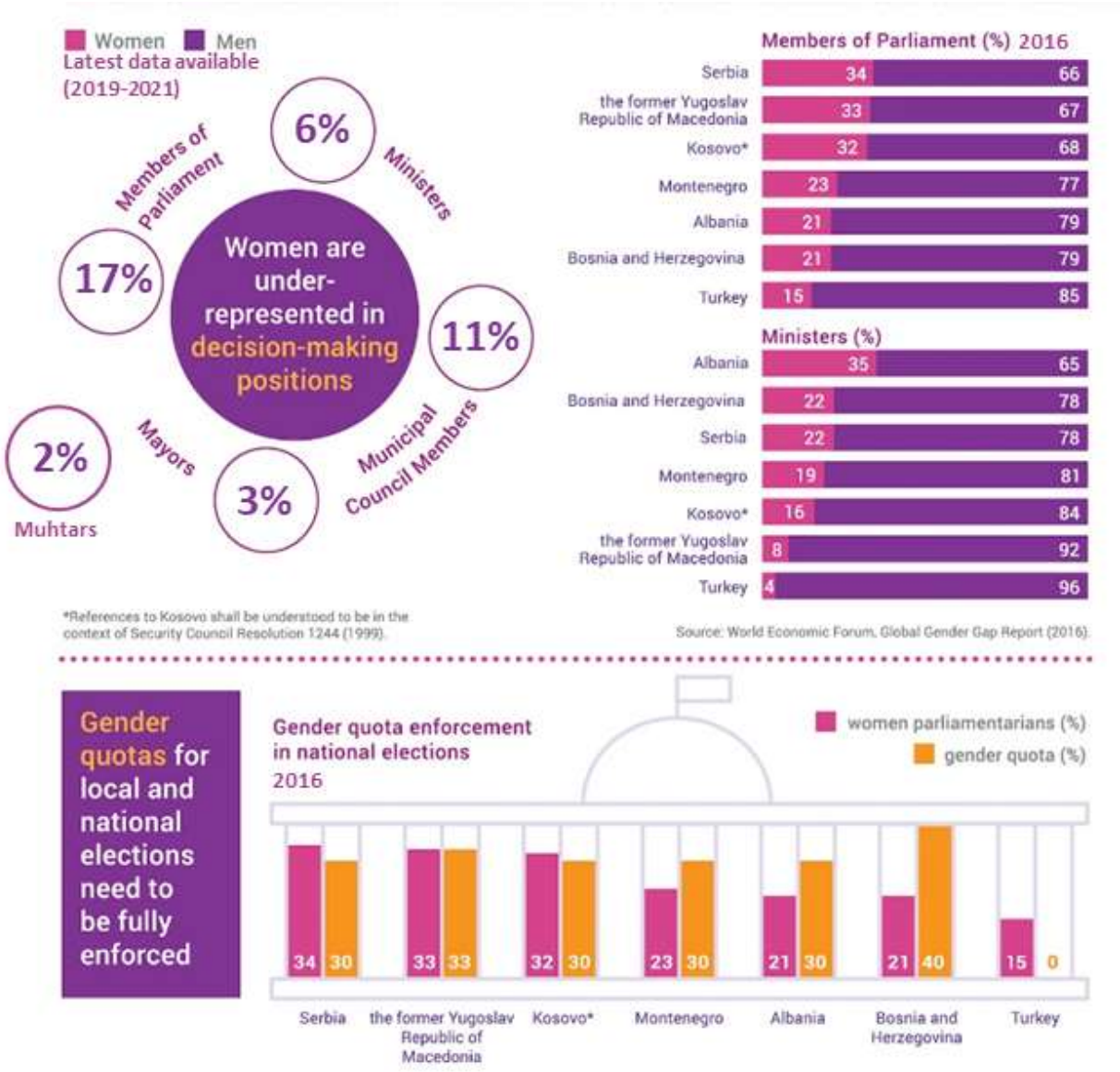


Figure 5-50 Gender inequalities in political participation in the Western Balkans and Turkey, 2016

Source: UNDP, 2016. Reworked by ERM based on UN Women data.

Turkey has an overall rank of 133 in the World Economic Forum (WEF) global gender gap index, with a declining rank since 2018 where it ranked 130. In 2020, global gender gap index for Turkey was 0.64. Global gender gap index of Turkey increased from 0.59 in 2006 to 0.64 in 2020 growing at an annual rate of 0.62%. Improvements at this pace means that a woman in Turkey must wait 167 years for the gender gap to have closed completely, according to the WEF report[79]. The four main components of the index; economic participation, educational attainment, health and survival, and political empowerment show different scale of progress. The change in Global Gap Index (GGI) score from 2020 to 2021 is -3 indicating an increasing gender gap. This is mainly due to an increase in the gender gap in health and survival, and political empowerment, which has both seen an increased gender gap in 2021 compared to 2020.

[79] World Economic Forum, 2019. Gender

According to the European Commision's report on Turkey from 2021, due to the Covid-19 pandemic, the labour market in the country was highly affected. As a result, the female participation and employment decreased to particularly low levels in Turkey[80].

There are some gender disparities within the field of transportation, which is not gender equal. According to a report by the European Institute for Gender Equality, mobility is experienced differently by women and men, as they will use transport for different purposes and means. Some of the main differences in gender included patterns of mobility, accessibility, and behaviours[81]. Indeed, a great barrier for women's equality is the safety in the transport sector, often limiting their mobilization. Ensuring equal acces to transport is key to supporting Gender Equality.

The average workforce per month during overall construction period is estimated at 1,959 personnel. The influx of significant workforce is the driver of main gender impacts of the Project. Influx of construction workers may cause tension between the local population and non-local workers due to the belief that non-locals are taking the economic opportunities of the resident population.

Furthermore, interactions between male-workers and women living in the local communities may create frictions within the community. At the same time, influx of male workers may pose a threat to women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence.

It is often the case with large construction projects that individuals move to the area looking to benefit either from direct work or from indirect economic opportunities. Such influx of opportunity seekers would be unmanaged and, should it be significant, is likely to pressurize the limited services and infrastructure in the local communities. A high degree of influx could result in other effects such as inflation, socioeconomic tensions, and changes to behavioural norms.

Table 5-27 summarizes the Project related gender impacts and risks which have gender implications. The gender implications described for each of the listed impacts are in many cases included in the mitigation measures in ESIA and in Gender Action Plan.

[80] European Commision. 2021. Key findings of the 2021 Report on Turkey. Available from: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_5282

[81] European Institute for Gender Equaility. 2017. Gender in Transport. Available from: https://eige.europa.eu/publications/gender-transport

Table 5-27 Summary of Project related gender impacts and risks

Aspect	Impact summary	Gender implications
Labour and working conditions		
Direct employment	It is estimated that an average of 1,959 personnel will be employed throughout the duration of the Project, with peak of 3,465 workers during construction. The Project is expected to generate positive effects on local economic and employment conditions at the regional level throughout its life cycle. Primary impacts are expected to take place during the construction phase through the creation of temporary employment opportunities. The Project will also create of long-term benefits associated with capacity enhancement of local labour through on-the-job training, allowing them to improve skills and gain experience that can improve opportunities for future employment within the construction sector. The operation phase will generate limited long-term employment opportunities mainly for toll collection, road maintenance, environmental, health and safety, and monitoring activities. The exact size of the workforce needed for operation is not determined at this stage.	Women are less likely to benefit from enhanced employment opportunities in the construction and transport sector. While efforts are made to enhance women's employment in the construction and transport sector, women's participation remain low. Generally female engineers are working less in construction than other engineering related jobs. However, it is understood the Rönesans already employ a significant number of female engineers. Unemployment rate among female engineers is higher than for the male counterparts.
Indirect employment	The Project will represent an opportunity for Turkish companies to tender for work on different project-related components and basic services such as food supply and maintenance.	There are generally less women led business and entrepreneurs in Turkey, and they are less likely to benefit from the Project as few of them are construction related businesses.
Working conditions and occupational health and safety	As any large-scale construction activity, the Project have several risks associated with the working conditions and OHS, including: ■ Risk of violations of working conditions and OHS in the construction industry. ■ Risk related to the widespread use of informal workers, including migrant and refugees.	There may be differences in the risk that working conditions pose to men and women. ■ Risk of gender-based discrimination during recruitment and subsequent working conditions offered. ■ Risk of OHS decision not based on gender-responsive approach resulting on women not having access to PPE specifically designed for them.

Aspect	Impact summary	Gender implications
Construction workers accommodation	Construction personnel will be provided with facilities for accommodation, meals, sanitation, and welfare at campsites.	Women have specific needs in relation to facilities such as sanitation and accommodation. As women are facing risk of GBVH in the workplace in general and workers' accommodation in particular, the need for safe and private facilities are important. Lack of access to clean, safe, secure, and separate sanitation facilities can create or exacerbate health problems for workers as well as put them at risk of violence, including sexual violence. There are currently 1033 workers (976 men workers, 57 women workers). 71 REC workers and 608 subcontractor workers have been staying in campsites. There are no women staying in campsites. There is rent assistance for women.
GBVH at the workplace	Any large workplace has risk of GBVH, especially in settings where male workers are more often in a supervising position. Turkeys' withdrawal from the Istanbul Convention, has increased the risk of GBVH.	Violence against women, more than any other form of sex discrimination in the workplace, violates fundamental human rights. Workplace violence represents a significant barrier to women accessing jobs and progressing to successful careers.
Community Health, Safety and Security		
Increased traffic	The Project will lead to increased traffic during construction and operation.	There may be significant gender differences in the mobility patterns of population in the neighbouring communities. Such differences should be considered when designing the transport routes of heavy construction materials, waste disposals etc.
Increased transmission of communicable diseases	The presence of workforce living in work camps could lead to increased transmission of communicable diseases including COVID-19 and STDs, within the workforce and the nearby communities.	Women are more susceptible and vulnerable to STDs, including HIV.
Increased risk of GBVH	The construction will result in changes in local communities, including influx of workers and changes in households' dynamics that can exacerbate the risk of GBVH in both public and private spaces. The COVID-19 pandemic has exacerbated the prevalence of GBVH. The presence of security personnel during construction may constitute risk to communities if not appropriately trained.	Women are most often disproportionately affected by influx of workers. Particular at risk are women experiencing dual or multiple vulnerabilities. Women's more marginalised position in relation to economic opportunities, access to resources and participation in decision-making can increase vulnerability and exacerbate risk of GBVH. According to EBRD/IFC/CDC *'Addressing GBVH in the Construction Sector'* and *'Emerging Good Practice for the Private Sector on Addressing GBVH'*, risks of GBVH may also occur in the land acquisition processes or during public consultation processes in general.
Access to infrastructure and services		
Disruption to infrastructure and utilities during construction	Construction activities will induce impacts on utilities and infrastructure, mainly due to site clearance works, excavation and movement of soil, embankment construction and construction of various elements of the highway. This is likely to generate pressure on existing local utility supplies (which already have temporary	As women are likely to spend more at home and responsible for most of the housework, therefore experiencing more direct impacts from utility disruption such as water supply and electricity during construction hours. According to the RAP survey nearly half of the project affected women say they are housewives.

Aspect	Impact summary	Gender implications
	disruption), disturbance of traffic and transportation due to road crossings, and short term planned and unplanned disruption of electricity, telecommunication, sewerage, storm water lines, natural gas and water supply for irrigation, domestic, drinking, and industrial purposes.	
Community cohesion		
Disturbance from presence of workforce	Tension between the local population and non-local workers may arise due to the perception of local population of missing out on opportunities. Influx of opportunity seekers is likely to put pressure on utilities, services, and infrastructure in the local communities. A high degree of influx could result in other effects such as inflation, socioeconomic tension, and changes to behavioural norms.	Any tension in the communities is likely to adversely affect vulnerable households, including female headed households and women in the community in general. Women with dual vulnerability is at higher risk.
Community severance	The construction of the highway is likely to cause communities, households, and individuals to be affected by severance of resources, infrastructure, and communities. Severance issues includes households no longer having direct access to part of their land, social infrastructure, or other neighbourhoods etc, due to physical barrier posed by the Project. The harmful effects on community severance are not limited to restriction of movement, but also include psychological consequences on individuals which, experienced collectively, permeate the social fabric of the community.	Severance is likely to impact women and vulnerable people more, as they may have less opportunity for mobility and at the same time depend more on the social connectivity in the community or neighbourhoods in which they live. Women experiencing dual vulnerabilities are most at risk.
Land acquisition and easement		
Permanent loss of land, residential houses, and businesses	Within the expropriation corridor for the Project there will be permanent removal of houses and structures, land clearance and permanent removal of all crops and vegetation, and permanent restricted access. Landowners and users lose land bases livelihoods and loss of land will also impact households engaged in animal husbandry as they lose access to grazing areas. All affected businesses to be relocated are small to medium sized businesses. Almost all business owners anticipate facing a temporary business interruption period (reportedly between 7 days to 150 days, and on average 60 days) due to relocation. Among 14 affected businesses, 4 of them reported informal employees (41 informal employees in total of which 2 are female). In 5 of the affected businesses, migrant workers are reported to be employed (a total of 34 foreign migrant workers of which 3 are female).	Household with low income and high land dependency for subsistence and income generation are most vulnerable to the loss of land. In addition, households with disabled and elderly household members as well as female or child headed households are particular vulnerable to potential loss of livelihoods related to land access restrictions. Households affected includes 40 female headed household (widows/divorced), and 35 female headed households with an economic active male. There is no provision in the Expropriation Law for the consideration of gender aspects in the expropriation process in terms of differential impacts of land acquisition, restrictions on land use and/or involuntary resettlement. Among the economically displaced households surveyed (as a part of RAP), there were no women headed households. Among the surveyed households (as a part of RAP) that do not actively use the lands, 9 of the affected households are female headed. A total of 211 women are affected in the 150 households. Nearly half of the affected women are reportedly

Aspect	Impact summary	Gender implications
		housewives, although some of these in the rural areas are likely to work in agriculture. Informal workers in the agriculture sector, where women are predominant risk not being compensated sufficiently and struggle to find other types of income if available agricultural land is reduced. One of the residential houses inhabited by women experiences multiple vulnerability due to chronical disease, age and being female headed. Another household vulnerable due to a disabled child may be relocated during operation phase. As indicated in RAP, there are a total of 243 employees as reported by the 14 business owners (3 of them are owners of the affected business structure and 11 of them are formal tenants at the affected business structure) in June 2022 – 33% are female: Ca. 40% of the formal employees are female (80 out of 202 formal employees) Ca. 5% of the informal employees are female (2 out of 41 informal employees). Migrant workers are identified among the employees at the affected businesses. Where such workers are women, they face double vulnerabilities.
Loss of livelihoods	The Project will impact on both physical and natural resources and related livelihoods. Several households will have permanent loss of livelihoods and household income due to the permanent land restrictions (safety zones) and resettlement. The Project may also cause changes in land values post construction in peri-urban and rural areas due to building restrictions. The biggest issue in AoI that enhance the vulnerability of the population is the rising prices, decline in agricultural production and income obtained from the trade of agricultural products due to the rapid urbanization of some districts.	Generally, few women own or inherit land in Turkey. According to the RAP survey, women in the AoI do have access to ownership of land, with most settlements having a majority of male owners/shareholders, except of Karaagac where there are more female landowners of privately-owned parcels than males. Women who lose their livelihood and are struggling to restore it to an equal level, risk becoming vulnerable to exploitation and abuse.

5.4.4.5 Risks related to Local Communities' Rights

Local communities can be directly affected by the construction and operation phases of the Project. Potential impacts on communities include the loss of land, production, or access to resources. These impacts are, in many cases, connected to land acquisition, the need for resettlements, environmental impacts, changes in cultural and socioeconomic structures.

Turkey ratified the international conventions applicable to the protection of human rights in relation to land issues (United Nations Human Rights Office of the High Commissioner 2015).

The Turkish Constitution entrenches the right to property in Article 35, stating that everyone has the right to own and inherit property, limited by law only in view of public interest. Furthermore, Turkish law recognizes that a person may have benefits associated with immovable property even without having the rights of ownership, known as "non-ownership", rights, such as servitude rights, etc. Articles 46 and 47 of the Constitution provide for the expropriation and nationalization of private property if the public interest requires it, on the condition of payment of compensation.

The Project involves expropriation and resettlement of private land, including land dedicated to agriculture and animal husbandry. If the RAP is not managed adequately, the Project faces a potential risk to cause forced resettlement without proper compensation, especially for vulnerable groups such as women.

5.4.4.6 Risks related to the Use of Force by Public and Private Security

The handling of workforce and community protests / opposition by security forces poses the risk of escalated conflict and eventual abuse of force. Turkey has ratified the main international human rights conventions protecting the rights to life, freedom of expression and freedom of assembly.

The right to freedom of peaceful assembly is regulated in Article 34 of the Turkish Constitution of 1982. It is stated in Article 34 that everyone has the right to hold unarmed and peaceful meetings and demonstration marches without prior permission. In addition, Article 26 of the Turkish Constitution of 1982 also states that everyone shall be entitled to express their thoughts and opinions by word, writing, drawing or other means alone to freedom of expression and dissemination, either publicly or collectively.

Although Turkey is a country with a broad constitution, there are still serious issues reported by international and national institutions with regard to abuse of power through the use of force. Presence of public and private security at stakeholder meetings throughout the Project maybe a high risk in terms of freedom of speech and protest rights of the communities and NGOs.

5.4.4.7 Risks Retaliation and Reprisal Risks

Retaliation and reprisal risks refer to the potential negative consequences that can occur when an individual, group, or entity takes retaliatory action against another party in response to perceived harm, offense, or negative behavior. The key retaliation and reprisal risk that may arise during stakeholder engagement activities (during ESIA disclosure, construction, and operation stages) which can end up with perpetuate conflicts, harm relationships, and breakdown of trust between the Project parties and stakeholders.

5.4.4.8 Embedded Measures

This section presents the embedded measures (in addition to the existing regulations) put in place by Nakkaş Otoyol A.Ş with regard to the Human Rights aspects as discussed in above sections. The mitigation measures apart from these embedded measures are described in relevant chapters of the ESIA report, SEP, RAP, GAP and in the ESMMP.

Rönesans Holding has Human Rights Policy[82] including zero tolarance to retaliation /repraisals which is followed by Nakkaş Otoyol A.Ş. The Human Rights Policy obliges Rönesans and parties acting on behalf of Rönesans and third parties to act in compliance with the Policy.

In addition to the Human Rights Policy, Nakkaş Otoyol A.Ş has prepared the following policies and plans:

- Human Resources Policy
- Gender Based Violence Harassment Policy
- Security Management Plan
- Gender Action Plan
- Labour Management Plan (including quarterly third-party labour audits)
- Grievance Mechanism

Nakkaş Otoyol A.Ş committed to avoid any retaliation/repraisal risks to communities and NGOs/CSOs in line with Rönesans Human Rights Policy and committed to implement the following mitigation measures:

- **Security:** Separate meetings will be conducted with state and local authorities. Nakkaş Otoyol A.Ş will assess the potential risks that may entail any stakeholders at any stage of the consultation process and will take the required actions in line with the identified risks. No private or official security will be invited to the community and NGO meetings etc.

  If potential safety concerns arise, Nakkaş Otoyol A.Ş will discuss these concerns with participants in advance and devise alternative engagement options to alleviate their apprehension.
- **Confidentiality:** Those visitors who do not wish to divulge any information will be reminded that the Project wishes to know the general whereabouts of their location (i.e. neighbourhood or town) in order to assess the geographic distribution of contribution. Nothing further will be asked to those who state that they wish to remain completely anonymous.
- **Privacy Right:** Personal data, confidential feedback etc. will be managed in line with Rönesans Human Rights Policy and confidential feedback etc will be in line with Personal Data Protection Law numbered 6698 and in line with Rönesans Human Rights Policy.

[82] https://ronesans.com/content/files/05-tr-i-ns-020863528c5bc475f0.61836371.pdf

5.4.5 Demographic Profile

5.4.5.1 National level

According to the Turkish Statistic Institute[83], Turkey had a population of 83,614,362 in 2020. Gender ratio shows that the male population (with a rate of 50.1 %) holds a very slight lead over the female population (49.9 %). The population growth decreased from 13.9 per thousand in 2019 to 5.5 per thousand in 2020. The median age is reported to be 32.7 years in 2020 (slightly higher than the world median age[84]), with 22.8 % of the population being under 14 years old, 67.7 % between 15-65 and 9.5 % over 65 years of age. This combined with a declining fertility rate of 2.2 and an increasing life expectancy of 80.2 means the population has ageing tendencies. This is further illustrated when comparing a population pyramid of 2007 and 2020 (Figure 5-51).

Furthermore, the age dependency ratio (% of working-age population) was reported at 47.7 % in 2020, with a child dependency ratio of 33.7 % and an elderly dependency ratio of 14.1 %. If the elderly dependency ratio keeps on growing, it will have an impact on future growth of the country, savings, consumption, taxation, and pensions, which will require major social adjustments (such as lower pensions and later retirement ages).

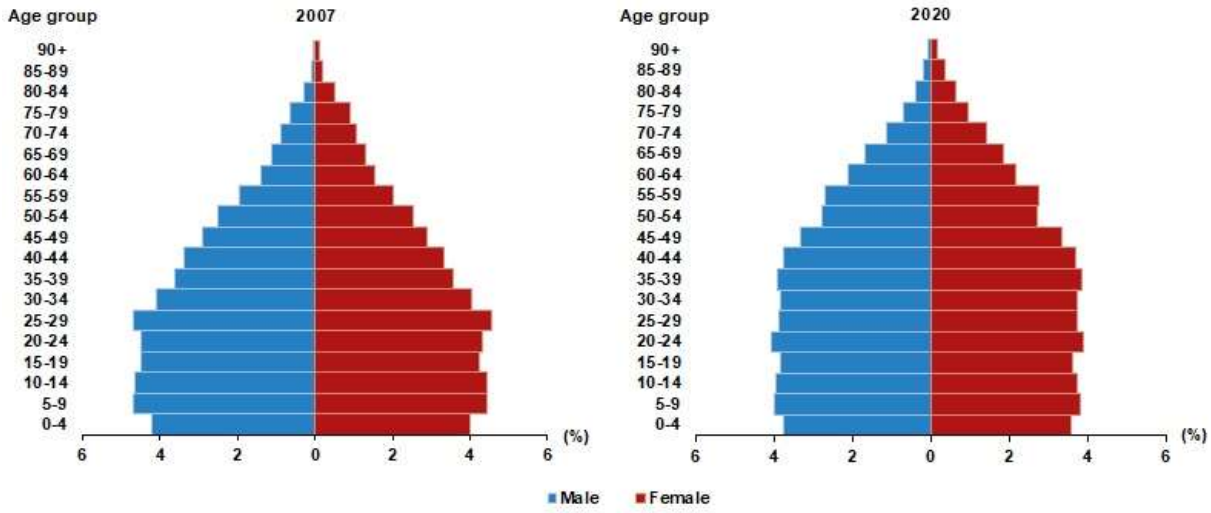


Figure 5-51 Population pyramid Turkey, 2020

Source: Turkish Statistical Institute, 2020

Turkey had a net migration rate of 0.600/1000 population in 2020, which is significantly lower to its net migration rate of 2019 (2.043/1000 population). The current net migration rate is negative at a -0.844, meaning so far in 2021 more people have emigrated from Turkey than migrated to Turkey[85].

5.4.5.2 Province Level

İstanbul is the most populated province of Turkey, with a population of 15,462,452 in 2021, constituting 18.49 % of the country's total population. It has a life expectancy of 78.7 and a total fertility rate of 1.47, considerably lower than Turkey's 2.2. It is the densest province of Turkey, as the average population density stands at 2,967 persons per km^2 in İstanbul. It is one of the largest agglomerations in Europe and fifth largest city in the world in terms of population within city limits. İstanbul city has a high migration

[83] TURKSTAT. 4 February 2021. Address Based Population Registration Results, 2020. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayalı-Nüfus-Kayıt-Sistemi-Sonuçları-2020-37210

[84] Our World in Data. Age Structure. 2019. Available from: https://ourworldindata.org/age-structure

[85] Macrotrends. Turkey Net Migration Rate 1950-2021. Available from: https://www.macrotrends.net/countries/TUR/turkey/net-migration

rate from within the country, as only 28 % of the city's residents are estimated to be originally from İstanbul.

There were 4,595,419 households in İstanbul in 2020, with an average of 3.27 persons per household. The elderly dependency rate is of 10.33 %, and the child dependency rate is of 30.08 %, indicating that the population is slightly younger than the country's average. Finally, the Turkish Statistic Institute reported that the population in İstanbul decreased by 0.34 % in 2020[86]. This decrease could be explained by outmigration from the city, due to the COVID-19 pandemic as a large number of people living in big cities fled to smaller towns or the countryside[87].

Figure 5-52 İstanbul Skyline, 2018

Source: Licensed photo from iStockPhoto, 2018

5.4.5.3 District and Local Level

The district in the AoI with the highest total population is Başakşehir, with 469,924 persons, followed closely by Avcılar with 436,897 persons. Arnavutköy goes third with a total population of 296,709, followed closely by Büyükçekmece with 257,362 inhabitants. The district with the lowest total population is Çatalca, with 74,975 inhabitants. The ratio of men to women is 50 % to 50 % in most districts except for Çatalca and Arnavutköy, which have a ratio of 51 % men to 49 % women. This can be seen in Table 5-28 below.

Table 5-28shows the official total population of each settlement in the AoI, however the total population reported by *Muhtars* during stakeholder engagement was higher in all cases except for Karaağaç (Büyükçekmece). This could be due to the fact that not all residents might be registered and could indicate the presence of irregular migrants. High population gaps can be observed between rural and urban settlements. The most populated settlement is Kayabaşı (Başakşehir) with 99,201 official inhabitants, followed by Başak (Başakşehir) with 71,221 official inhabitants and Tahtakale (Avcılar) with 61,332 official inhabitants. On the other hand, some settlements are sparsely populated. Bahşayiş (Çatalca) is by far the least populated settlement with 393 inhabitants, followed by Yeşilbayır (Arnavutköy) with 573 and Sazlıbosna (Arnavutköy) with 1,100 inhabitants.

[86] Biruni Tuik Gov. Gösterge Uygulamasi. 2021. Available from: https://biruni.tuik.gov.tr/ilgosterge/?locale=tr

[87] Al-Jazeera. 4 February 2021. İstanbul's population falls as countryside beckons during COVID. Available from: https://www.aljazeera.com/economy/2021/2/4/İstanbuls-population-falls-as-countryside-beckons-during-covid

Since 2015, the population has grown in all settlements except for Şamlar (with a decrease of 14.6 %), Sazlıbosna (with a decrease of 11.21 %), Yeşilbayır (with a decrease of 5.75 %), Nakkaş (with a decrease of 1.7 %) and Şahintepe (with a decrease of 8 %). This decrease is due to the youth migrating out of the neighbourhood to find work in other neighbourhood or districts in İstanbul or other municipalities within İstanbul. On the other hand, all the other settlements have had a population increase. The settlements with the higher population increase since 2015 is Deliklikaya (with an increase of 49.18 %), followed by Karaağaç (with an increase of 42.16 %), Kayabaşı (with an increase of 39.32 %) and Tahtakale (with an increase of 23.49 %) (see Table 5-28below). This is due, according to the *Muhtars*, to the construction of new residential areas, improved infrastructure and the development of new industrial zones.

The male to female allocation is globally balanced in the settlements of the AoI. Bahşayiş presents the highest proportion of males (53.9 % male to 46.1 % female) whilst Başak presents the highest proportions of females by a small margin (50.6 % female to 49.4 % male) (see Table 5-28 below).

Table 5-28 Settlements of the AoI and Associated Population, 2015, 2020

District	Settlement	Formal administrative classification (Urban /rural)	Total Population 2015	Total Population 2020	% Female	% Male
Başakşehir	District Total	Urban	-	469,924	50 %	50 %
	Bahçeşehir 1	Urban	19,739	32,724	52 %	48 %
	Bahçeşehir 2	Urban	37,178	51,310	51 %	49 %
	Şamlar	Rural	1,440	1,236	48.2 %	51.8 %
	Kayabaşı	Urban	60,191	99,201	49.8 %	50.2 %
	Şahintepe	Urban	36,196	33,302	49 %	51 %
	Başak	Urban	69,655	71,221	50.6 %	49.4 %
	Güvercintepe	Urban	49,992	68,916	49 %	50 %
Arnavutköy	District Total	Rural	-	296,709	49 %	51 %
	Deliklikaya	Urban	3,730	7,320	47.9 %	52.1 %
	Hadımköy	Urban	20,207	24,998	49 %	51 %
	Ömerli	Urban	6,637	7,154	47.6 %	52.4 %
	Sazlıbosna	Rural	1,239	1,100	48.9 %	51.1 %
	Hastane	Urban	7,063	9,772	50 %	50 %
	Yeşilbayır	Rural	608	573	50.3 %	49.7 %
Çatalca	District Total	Rural	-	74,975	49 %	51 %
	Bahşayiş	Rural	376	393	46.1 %	53.9 %
	Nakkaş	Rural	820	806	52 %	48 %
Avcılar	District Total	Urban	-	436,897	50 %	50 %
	Tahtakale	Urban	46,919	61,332	49.8 %	50.2 %
	Firuzköy	Urban	21,716	23,116	49.6 %	50.4 %

Source: TUIK, 2021

The average household composition (number of people per household) in the districts of the AoI are as follows: 3.81 in Başakşehir, 4.14 in Arnavutköy, 2.79 in Çatalca and 3.45 in Avcılar. Furthermore, the average household size in the settlements of the AoI is higher when comparing it to the average size of households in İstanbul province (around five persons per household compared to 3.27).

5.4.5.4 Migration and population change

Historically, Turkey has been a country of emigration, but also a transit point for migrants from the Middle East and Central Asia to European countries due to its key geographic location. Large numbers of Turkish nationals emigrated to western European countries such as West Germany and Austria starting in the early 1960s and well into the 1970s. This is reflected in the net migration rate per 1000 population, as it was negative up until 2008 (Figure 5-53). In the beginning of the 1990s, Turkey started receiving large flows of immigrants from the Balkans and the former Soviet Union, and finally in 2008 the net migration rate per 1000 people became positive. In the early 2000s, most immigrants were from Iraq and refugees from Somalia, Sudan and Afghanistan.

Source: Macrotrends, United Nations – World Population Prospects, 2021

Figure 5-53 Net migration rate per 1000 population, 1950-2021

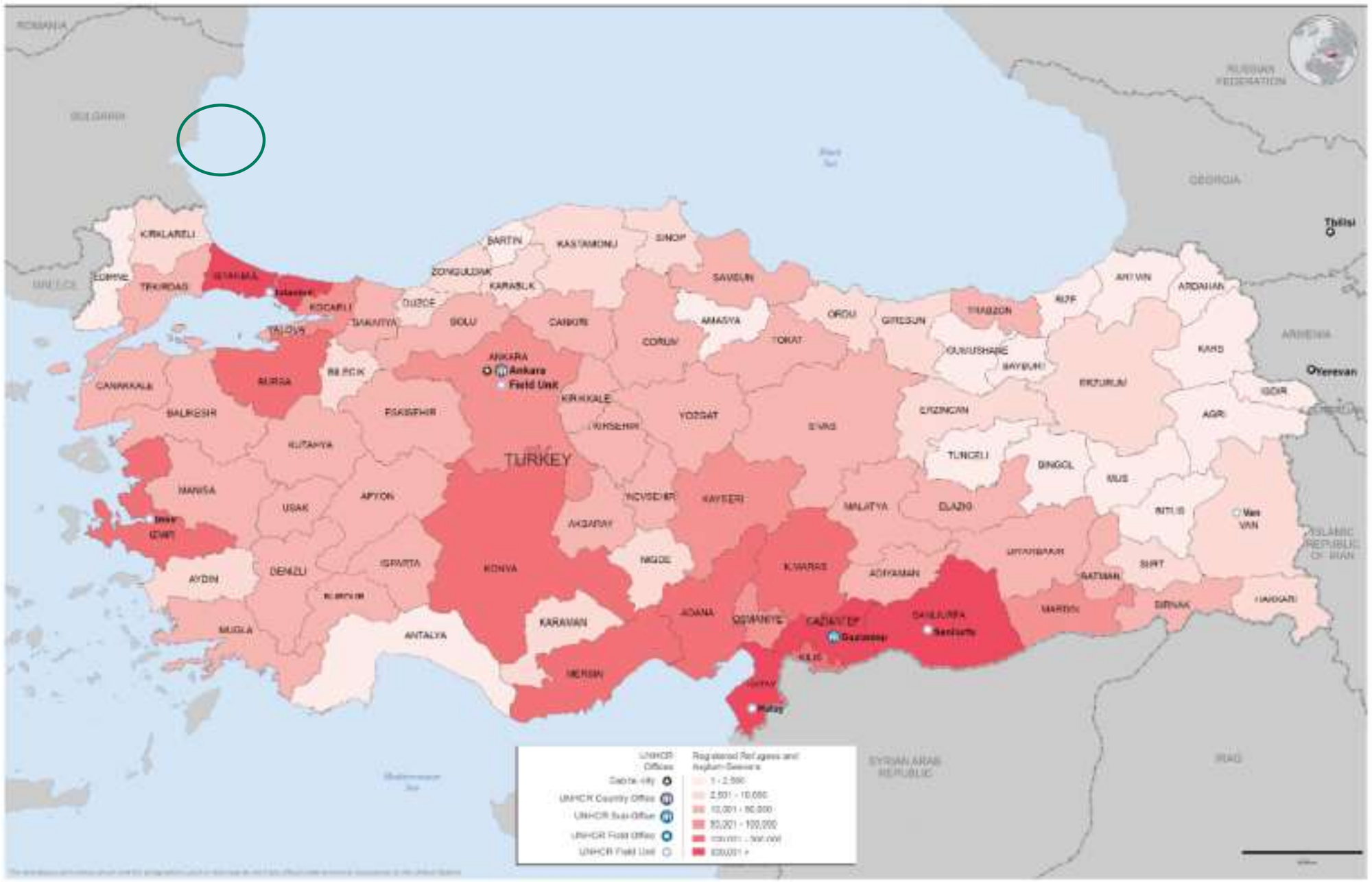
Since the outbreak of the civil conflict in Syria in 2011, the influx of Syrian nationals into Turkey has increased steadily. Today, Turkey hosts approximately 3.6 million Syrian refugees, who constitute the majority of over 4 million asylum seekers and refugees in the country, making it the world's largest host of refugees. In addition to Syrians, more than 300,000 asylum and refugees reside in Turkey. The main nationalities are Iraqis, Afghans, Iranians and many African nations such as Somalia. They were initially housed in designated governmental accommodations centres, however today only 8 % reside in refugee camps and 92 % live in urban or peri-urban areas such as İstanbul city[88], with the majority spread across the provinces of Gaziantep, Şanlıurfa, Hatay, Kilis, Izmir and İstanbul.

Syrian refugees work in different sectors, but the most prominent sector is manufacturing, with many starting their own businesses. This population is particularly vulnerable, as there are many women-headed households, low-income households and over-crowded households (including households with over ten family members[89]).

As shown on Figure 5-54 İstanbul is one of the provinces with the highest number of refugees and asylum seekers in Turkey.

[88] The World Bank Group. 10 Years On, Turkey Continues Its Support for an Ever-Growing Number of Syrian Refugees. 2021. Available from: https://www.worldbank.org/en/news/feature/2021/06/22/10-years-on-turkey-continues-its-support-for-an-ever-growing-number-of-syrian-refugees https://www.worldbank.org/en/news/feature/2021/06/22/10-years-on-turkey-continues-its-support-for-an-ever-growing-number-of-syrian-refugees

[89] IOM UN Migration (May-July 2019). Baseline Assessment in İstanbul Province. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/IST_Baseline_Assessment_Phase5_ENG_29012020.pdf



Source: UNHCR, 2020

Figure 5-54 Provincial Breakdown of Refugees and Asylum-Seekers in Turkey, 2020

Regarding the districts located in the AoI, the share of migrant population[90] is as follow:

- In the sub-province of Arnavutköy, Syrians account for 94.5 % of the total 19,942 migrants. Many of the Syrians arrived at this province because they have relatives in Arnavutköy, and many come from other sub-provinces in İstanbul such as Bağcılar, Fatih, mainly due to low rent and job opportunities. *Muhtars* report the presence of Turkmen and Afghan population working in the agricultural sector, as well as in elderly care and cleaning services, more often than not as informal workers with no access to social security. More specifically, the Muhtar of the neighbourhood of Deliklikaya reported the presence of Egyptians and Syrians in the neighbourhood.
- Başakşehir is one of the most multi-cultural sub-provinces, partly due to its low rents due to ongoing urbanization. Government reported that in 2019 there were 53,438 migrants in the sub-province (although unofficial sources counted 107,203), Syrians accounting for 61 % of the total migrant population. The other main nationalities present in Başakşehir are Saudi, Russian, Uzbek, Iranian, Iraqi, Egyptian, Jordanian, Kuwaiti, and Libyan.
- Çatalca is the host to 642 migrants, again with Syrians constituting the largest group (52.3 %). Çatalca is the sub-province with the third smallest migrant population as it is one of the smallest local inhabitants in İstanbul province, as it has limited job opportunities making it unattractive for foreign nationals.
- In Avcılar, out of 25,479 migrants, Syrians constitute the largest group of migrants (55.9 %). Half of those migrants reside in the mahalles of Yeşilkent and Tahtakale, which is in the AoI. There is also an important presence of Turkmen, Iraqi, Kuwaiti, Qatari and Saudi Arabian nationals.
- Büyükçekmece hosted 8,546 migrants in 2019 (11,710 according to the IOM[91]), with Syrian nationals constituting the majority (40.8 % of the total migrant population). There is also a significant presence of Turkmen and Uzbek foreign nationals. Migrants in Büyükçekmece work in domestic services for high-income families, and the migrant population increases in the summer months as it is on the coast and many high-income families spend their months there. The *Muhtar* of Karaağaç reported the presence of foreigners in the neighbourhood.

[90] IOM UN Migration (May-July 2019). Baseline Assessment in İstanbul Province. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/IST_Baseline_Assessment_Phase5_ENG_29012020.pdf

[91] IOM UN Migration. Baseline Assessment in İstanbul Province. 2019. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/IST_Baseline_Assessment_Phase5_ENG_29012020.pdf

5.4.6 Land ownership and use

5.4.6.1 Land Ownership

Land acquisition and ownership in Turkey is governed by well-settled laws. The Turkish Constitution entrenches the right to property in Article 35 in which it states that everyone has the right to own and inherit property, limited by law only in view of public interest. Furthermore, Turkish law recognizes that a person may have benefits associated with immovable property even without having the rights of ownership, known as “non-ownership”, rights. Turkish law mandates that certain land remain state-owned under the authority of the Under secretariat of Treasury or the General Directorate for Foundations. Articles 46 and 47 of the Constitution provide for the expropriation and nationalization of private property if the public interest requires it, on condition of payment of compensation. All other land may be privately-owned, by Turkish nationals or foreign individuals under certain conditions. For example, foreign individual ownership of real estate cannot exceed 10 % of land in any designated town, and foreigners cannot buy property in villages. Ordinary legislation such as the Turkish Civil Code and the Turkish Penal Code give further detail regarding the exercises and limitations of these constitutional rights.

These are the most common types of tenure governed by the Constitution and the Turkish Civil Code:

- *Public land*: controlled by the Government, including forests, uncultivated land and unregistered land;
- *Freehold*: which consists in the right to use, benefit from and dispose of a piece of property;
- *Condominium*: the individual units of a building of flats are owned separately, however the common areas of the apartment building are held jointly;
- *Lease*: contractual lease between a landlord and a tenant;
- *Easement*: provide limited property rights, including usufruct rights, construction rights, rights to water, etc. which are held separately to freehold ownership.

Under Article 10 of the Constitution, everyone is equal before the law without discrimination, and therefore women and men have the same land ownership rights. In practice, however, very few women own or inherit land, especially in rural Turkey, as the biggest barrier against women’s property acquisition is social tradition.

According to the GEM RAP, total number of women owners/shareholders of the privately owned parcels (1,239) is approximately 30%. Among the women owners/shareholders approximately 13% (222 persons) have full ownership on the affected parcel.

Turkish law references customary ownership in the civil code. Customary rights can be acquired by prescription. Additionally, a “shared title” (*hisseli tapu*) exists as an Ottoman form of ancient land ownership and is particularly common in squatter communities (G*ecekondu).* As it is not legally recognised, residents have no legal claim to the land, and the land is legally owned by the state.

5.4.6.1.1 Project AoI Level (1 km width)

The type of land ownership varies in the different districts and neighbourhoods. In some of the neighbourhoods of Başakşehir and Arnavutköy (especially those located more on the eastern side of the route), *Muhtars* reported not knowing the official land owners as they (the landowners) were not official residents of these districts.

Furthermore, *Muhtars* stated that for almost all villages, agricultural land is rented out for farming purposes. Some people also rent treasury land through payment (*ecrimisil*). Some of the rural and remote areas in the northwest and southwest parts also accommodate informal users without any formal contracts hosting activities such as small-scale barns and small-scale greenhouses.

In Başakşehir district, the *Muhtars* that participated in the settlement profiling stated that the neighbourhood of Şamlar declared that 78.78 % of the land ownership is classified under treasury, and

6.06 % is pastureland. In Kayabaşı, the *Muhtar* declared that 17.09 of the land ownership is classified as treasury, and 35.89 % is private.

In the Arnavutköy district, the *Muhtar* declared that in Ömerli, 2 % is treasury land, 97 % is private and 1 % is pastureland. In Sazlıbosna, 2 % consists of treasure land, 62.5 % is private land, 16.6 % is pastureland and 18.75 % belongs to the village legal entity.

In Çatalca district, the *Muhtars* that participated in the settlement profiling declared that in Bahşayış, 2 % is treasury land, and 4 % is pastureland. In Nakkaş, 4.28 % is treasury land, and 3.71 % is pastureland.

Almost all *Muhtars* stated that the few meadows/grazing areas present in the Project area are not used anymore and cattle are mostly kept in barns and fed with fodder. On the other hand, sheepherders prefer to graze their flocks over empty lands. A couple of the *Muhtars* interviewed claimed that they received letters requesting change of status of the meadows present in their village and stated that they would provide their consent to the requests.

As seen in Table 5-29, over 62 % in the settlements of the AoI is private land and approximately 2 % are used for pastures. It is estimated that around 10 % of the private land will be identified as agricultural lands. Parcel and owner figures were not provided for the scoping study but a large number of private landowners are expected to be impacted by the Project. Some landowners do not reside in the neighbourhood and land is rented for farming.

Table 5-29 Categories of land ownership, 2021

Land ownership classification	Percentage (%)
Private	81.36 %
Public	8.40 %
Treasury	2.10 %
Pasture	0.46 %
Unregistered (roads, streams, parks, etc.)	7.68 %
TOTAL	**100 %**

Source: Rönesans, 2021

5.4.6.1.2 Property ownership

Houses and businesses will also be affected by the implementation of the Project. Within the Expropriation Corridor, affected houses[92] (inhabitable or non-inhabitable), added up to 8 parcels according to the RAP. Out of these, only two are permanent residences, four non-permanent and two were not used for residential purposes. Table 5-30 shows the distribution of the households per type of impact and use.

[92] The building types indicated in the Structure Identification Reports include (i) house (*ev*), vineyard house (*bag evi*), and container house (*konteyner ev*).

Table 5-30 Distribution of Houses in the AoI per type of Impact and Use

Type of impact	Number of households per type of use			Total
	Permanent use	Non-permanent use	Not in use	
Physical displacement due to loss of inhabitable (residential) house	1	1		2
Loss of inhabitable structure used non-permanently for supporting agricultural activities, etc		4		4
Loss of non-inhabitable/ruin structures			2	2
Number of houses	**1**	**5**	**2**	**8**

Source: HHQ, RAP, GEM 2023

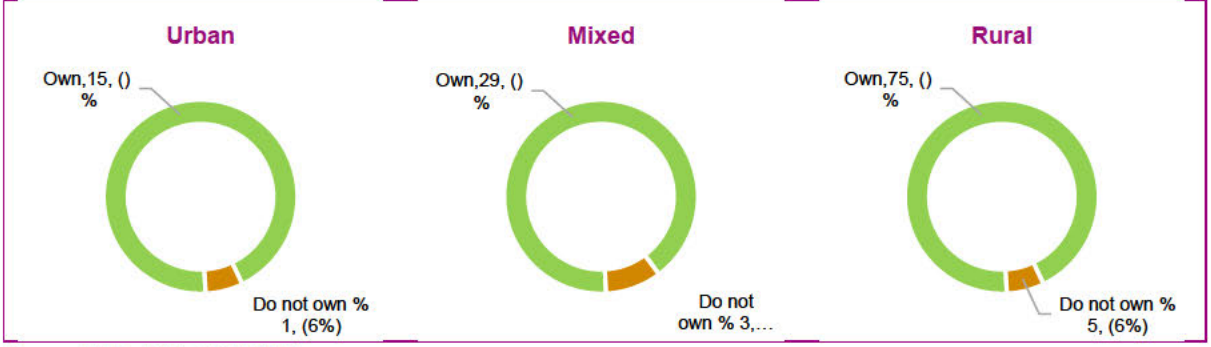
The businesses within the Expropriation Corridor have been identified based on the Structure Identification Reports conducted as part of the Valuation Study done per Expropriation Law. Affected businesses that will be relocated and that will continue operations at the existing premises amount to 19. Out of those, one is already partially relocated, thirteen are to be relocated, one has no business activity and four don't need relocation.

5.4.6.1.3 Primary Area of Interest (Right of Way)

According to the Household Questionnaires (HHQs) conducted by GEM, the majority of households (79%) have their own land. Out of 150 households covered in the HHQs, 45 households (30%) reported that they do not conduct agricultural activity on their land and 34 households (23%) provided no response (Table 5-31).

Table 5-31 Land Ownership Status of the Project Affected Households

Do you have your own land?	Households in the PASs			Total
	Urban	Mixed	Rural	
Yes (Own)	15	29	75	119
No (Do not own)	1	3	5	9
Total	**16**	**32**	**80**	**128**
No response				22
Grand total				**150**



Source: HHQ, RAP, GEM 2023

5.4.6.2 Land Use

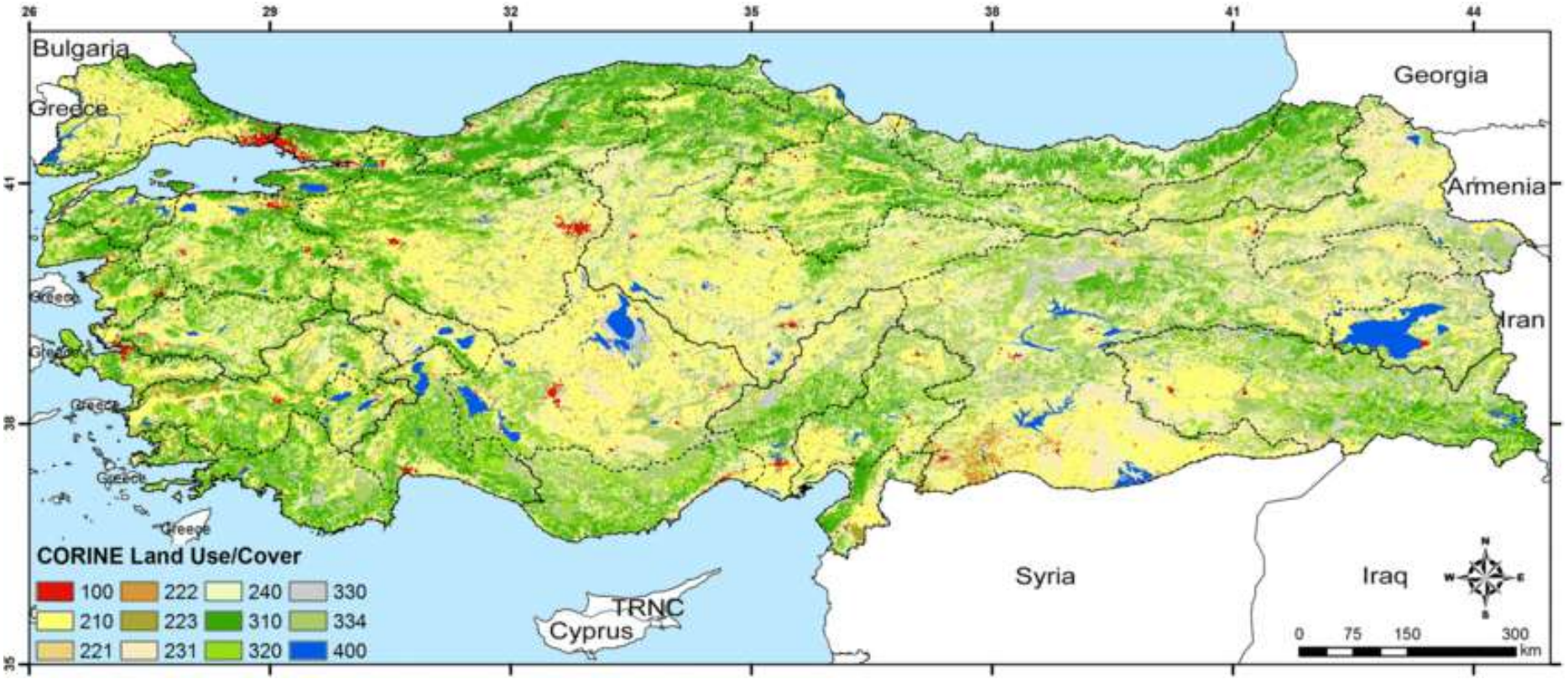
Turkey has historically been an important agriculture-based country, however with urbanization and development residential areas and water surfaces have expanded, whereas agricultural areas have decreased in size. The total land use of the country is as follows:

- Agriculture: 40 %
- Forest: 28 %
- Pasture and grassland: 26 %
- Other areas: 6 %

Comparing the data from 2020 to 2010's, agricultural land has decreased by 3.9 % and forest has increased by 13 %[93].

As per Figure 5-55, which provides an overview of CORINE Land cover types in 2020, Turkey is covered is still mainly rural. Urbanized areas (red patches on the map) are mainly located in İstanbul and Ankara.

[93] OECD (2011). The Governance of Land Use: Country Fact Sheet Turkey. Available from: https://www.oecd.org/regional/regional-policy/land-use-Turkey.pdf



Source: Berberoglu, S. et Al. 2020. Spatial and temporal evaluation of soil erosion in Turkey under climate change scenarios using the Pan-European Soil Erosion Risk Assessment (PESERA) model.

Figure 5-55 CORINE land cover types, 2020

Although forest areas in İstanbul province have decreased[94] and converted into residential areas, it still constitutes 48.5 % of the land cover. There has also been an increase in pasture areas, accompanied by a decrease in agricultural areas.

5.4.6.2.1 AoI Level

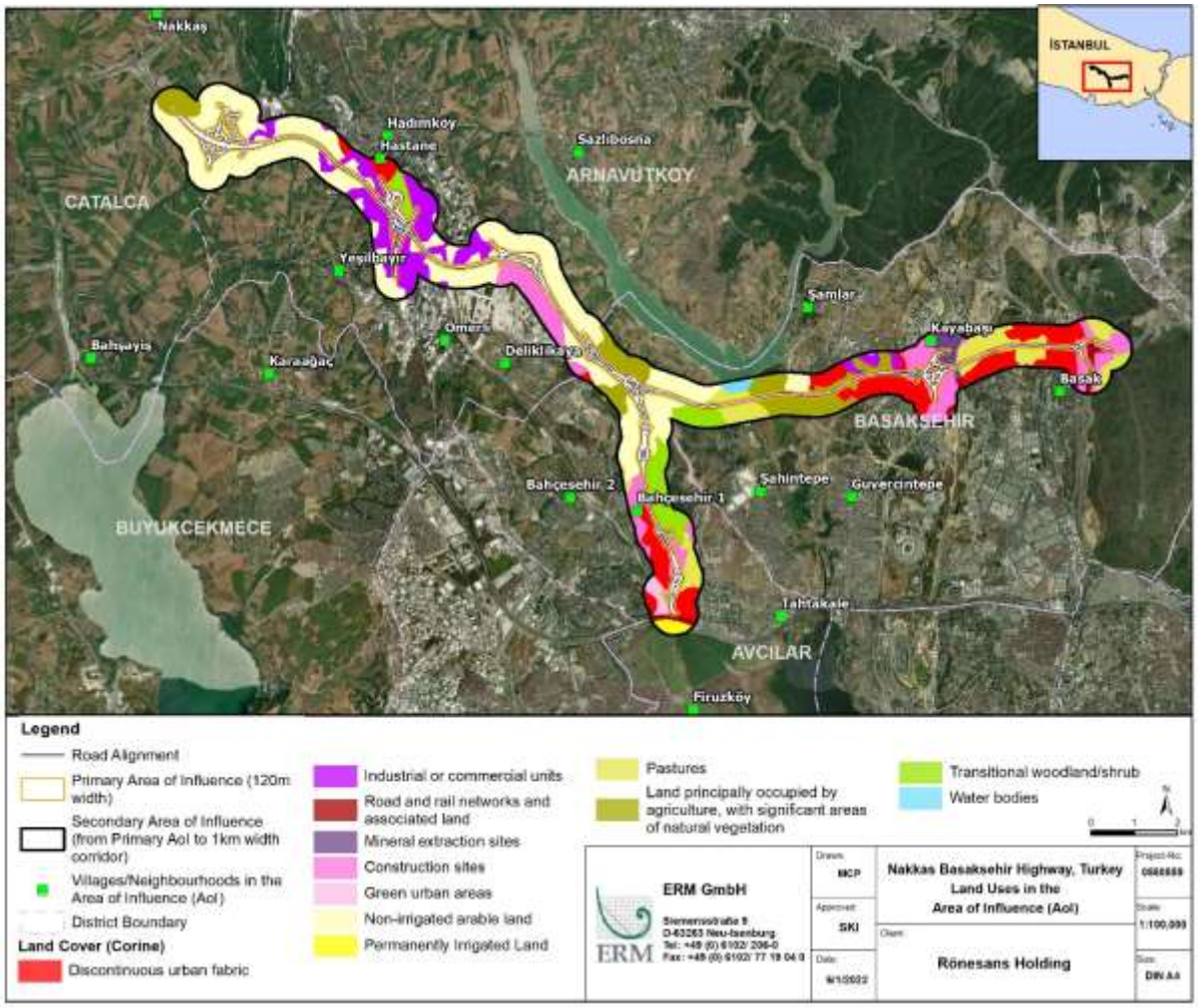
As shown in Table 5-32 below, and illustrated by Figure 5-56, the AoI is primarily arable land and pasture, followed by construction and industrial use.

Table 5-32 Type of Land-Use in the AoI, 2018

Land Use	Primary AoI		Secondary AoI	
	Ha (thousands)	%	Ha (thousands)	%
Discontinuous urban fabric	36	5 %	1065	14 %
Industrial or commercial units	58	7 %	660	8 %
Road and rail networks and associated land	35	4 %	115	1 %
Airport	0	0 %	0	0 %
Mineral extraction sites	8	1 %	74	1 %
Construction sites	91	12 %	781	10 %
Green urban areas	2	0 %	48	1 %
Non-irrigated arable land	401	51 %	3292	42 %
Permanently Irrigated Land	2	0 %	136	2 %
Pastures	55	7 %	616	8 %
Complex cultivation patterns	0	0 %	3	0 %
Land principally occupied by agriculture, with significant areas of natural vegetation	57	7 %	465	6 %
Forest	0	0 %	3	0 %
Natural grassland	0	0 %	32	0 %
Transitional woodland/shrub	47	6 %	405	5 %
Water bodies	0	0 %	181	2 %
TOTAL	**792**	**100 %**	**7875**	**100 %**

Source: CORINE, 2018.

[94] Yücmer, A. A. (2020) The Land Use in Turkey: A General Assessment and Affecting Factors. Available from: https://www.scirp.org/journal/paperinformation.aspx?paperid=103467



Source: CORINE, 2018. Prepared by ERM.

Figure 5-56 Land Cover in the AoI, 2018

5.4.6.2.2 Primary Area of Interest (RoW)

As seen in Table 5-33, over 90.15 % of the RoW is categorised as greenfield, 5.79 % is arable land used for pasture and animal grazing, 3.53 % is agricultural land and only 0.67 % is dedicated to commercial and industrial uses.

Table 5-33 Type of Land-Use in the Project RoW 2021

Land-Use Classification	Total ha	%
Greenfield	348,000	90.15
Arable land used for pasture and animal grazing	22,370	5.79
Agricultural land	13,630	3.53
Commercial, industrial	2,600	0.67
Total	**386,000**	**100**

Source: Rönesans, 2021

Formal/Informal Use of Affected Private Lands for Agriculture

As presented in RAP, informal and formal agricultural users of affected parcels in affected settlements have been identified based on field surveys and interviews conducted with the settlement heads, leader farmers and other farmers in the settlements. To date, a total 80 users have been identified along the full Project alignment, including 35 users cultivating parcels entered to date.

With regard to parcels that have been entered to date (for topsoil stripping or active construction):

- There was agricultural use on 372 of the affected parcels (private and public).
- Number of agricultural users cultivating these parcels is 35 (32 informal and 3 formal).
- Nakkaş Otoyol A.Ş. has executed mutual agreements and completed crop payments to all users as of August 2022 (to 35 agricultural users on 372 affected parcels) to cover the loss of crops between 2021-2022.

Should the expropriation process delays and extends into another cultivation-harvesting period, further compensation payments will be made by Nakkaş Otoyol A.Ş. to the users of the lands (for the year 2022-2023).

As indicated in the RAP, for the parcels that have been entered so far, interviews have been conducted with 18 of the users. Key data on the users is summarised below.

- Non-irrigated farming is practiced on all parcels cultivated by the users. Wheat, barley, oat and sunflower (every 2 years) are the typical crops grown by almost all households. Rotation of crops (wheat-sunflower-barley) is practiced except for 2 households – mainly wheat, sunflower and barley/oat rotation schemes. Canola and ryegrass are crop types that have been recently experienced by few households.
- Only 2 of the owners cultivate the lands they own in addition to lands they cultivate without being the owner (informal use).
- All users affected by the Project have lands that they cultivate outside of the Project expropriation corridor.
- Except for 3 households, all households own bovine and/or ovine animals. There is one household conducting beekeeping (owns 40 beehives – paid employee at the municipality and beekeeping has not been reported among the top 3 main income sources).
- Half of the households have lands affected by other activities and developments conducted in the region such as electricity transmission line projects, Sazlidere Dam project, and housing projects of TOKI.

- The household-level vulnerabilities are presented in RAP.
- The majority of the users want to acquire various agricultural equipment and machinery such as harvesters, seeders, feed mixers, baler machine or want to renew their existing equipment and machinery in order to improve their agricultural and animal husbandry activities.

Sazlıbosna neighbourhood constitutes a unique example in terms of formality/informality of land use. During the RAP field surveys, it has been declared by the survey participants that the parcels in this settlement, which had been previously/customarily used by the local people for agricultural purposes without any legal property rights, have been registered and divided into relatively small pieces (in 1950s) and sold to people living in İstanbul or other provinces in Turkey or outside of Turkey. As the new owners have purchased these parcels for investment purposes, they have not used the parcels for agriculture and the previous customary users have continued their agricultural activities up until this date. Part of these users are reported to pay rent to the current owners through real estate agencies.

Formal/Informal Use of Affected Public Lands for Agriculture

Among the 284 state-owned parcels (treasury, legal entity, non-registered) located along the RoW (170 has been entered for topsoil stripping and active construction and 114 has not been entered to date), 29 were used for agriculture by 25 users (that were already identified among the 80 users listed in Section 2.5.1.4 “Informal and Formal Agricultural Users of Lands”. Except for 2, all users of state-owned parcels and parcels owned by legal entities also use privately-owned parcels. Thus, they have alternative lands to continue their agricultural production.

State-owned parcels used by PAPs for agriculture along the RoW (including land entered and not entered to state) are listed in Table 5-34 State-owned Parcels used by PAPs for Agriculture. It should be noted that, in the RAP surveys of 2021, 71% of the households with agricultural use of public lands in the settlements (including the lands outside the expropriation corridor) reported formal use of the respective lands through rent/adequate pay (ecrimisil) noting that the respondents may have had hesitations about reporting informal use.

Table 5-34 State-owned Parcels used by PAPs for Agriculture

District	Settlement	Parcel	Ownership status of the Parcels	Total Title Deed Area (ha)	Area to be Acquired (ha)
Arnavutkoy	Hadimkoy	0/5179	Housing Development Administration of Türkiye (TOKI)	0.67	0.67
		0/5180		0.73	0.16
		0/5181		5.44	5.44
		0/5182	Istanbul Metropoliatn Municipality	7.62	0.23
	Omerli	111/26	Treasury Land	0.01	0.01
	Sazlibosna	0/5956	Arnavutkoy Municipality	1.26	1.08
		0/1333	Housing Development Administration of Türkiye (TOKI)	4.03	1.61
	Yesilbayir	202/2	Housing Development Administration of Türkiye (TOKI)	22.05	3.29
		202/4		1.49	1.19
Basaksehir	Samlar	0/1026	Basaksehir Municipality	0.61	0.61
		0/1723	Treasury land	1.94	1.10
		0/1841		0.53	0.53
		0/1725	Turkish Electricity Distribution Corporation (TEDAS)	0.01	0.01

District	Settlement	Parcel	Ownership status of the Parcels	Total Title Deed Area (ha)	Area to be Acquired (ha)
	Sahintepe	1446/3	General Directorate of State Hydraulic Works (DSI)	2.08	2.00
	Tatarcik	126/6	Basaksehir Municipality	0.58	0.58
		126/16		4.06	2.18
		YOL-2	Non-registered	0.82	0.82
	Ikitelli-2	0/3852	Basaksehir Municipality	0.03	0.03
		0/3853		0.19	0.17
		0/3854		0.19	0.17
		0/3855		0.90	0.90
		0/3856		0.03	0.03
		0/3857		0.06	0.06
		0/3858		0.01	0.01
		0/3860		0.01	0.01
Catalca	Nakkas	132/56	Housing Development Administration of Türkiye (TOKI)	1.18	1.06
		132/76	Treasury Land	0.94	0.03
		136/14		0.52	0.18
		135/7		0.41	0.41

Source: RAP Surveys, June 2022.

Further interviews will be conducted with the users of parcels that have not been entered to date (e.g. Nakkas, Yesilbayir) to collect information on the formality of land use and use of public lands (with or without adequate pay "*ecrimisil*").

The list of informal users identified to date are presented in RAP which will be updated throughout RAP implementation if/when additional users are identified.

Temporary Land Use for Construction

Table 5-35 below presents the land use and ownership information for the temporary facilities used/planned to be used in the scope of the Project.

Table 5-35 Project Facilities Outside the Expropriation Corridor

Location	ID	Main Facility Name	App. Motorway KM	Distance to the RoW	District/ Settlement	New Facilities or Existing Facilities Operated by Third Party Supplier	Currently Used by the Project (Yes/No)	Description of Use Prior to Project	Parcel No.	Parcel Type	Area of Parcel (ha)	Area to be Used within the Parcel (ha)	Duration of Usage by the Project (months)	Ownership	Land Use Permit Status	Permit Date (Duration)
Mobilization Sites																
Lot 2	6	EAK Mobilisation Site (Sazlidere Camp Site, Asphalt Plants, Mechanical Plant, Batch Plant)	51+400	200 m	Istanbul/ Basaksehir/ Sahintepe	New	Yes (for campsite) No (for plants)	PAPs in Sahintepe reported previous use by their community for agriculture and grazing	[redacted]	Plot	20.04	14.76	42	Housing Development Administration of Türkiye (TOKI) (190.88 ha) Emlak Planlama Construction Corp. (EPP-semi-official institution) (522.79 m2) Private Company – Construction (8,970.62 m2) Private owner (36.41 m2)	Mutual agreements have been completed with all shareholders as of October 2022.	TOKİ – 26.08.2022 (agreement valid until end of 2025) EPP – 22.08.2022 Private company - 29.06.2022 Private owner – 22.08.2022
	8	Olimpiyat Mobilisation Site (Campsite)	55+800	Within the RoW	Istanbul/ Basaksehir/ İkitelli-2	Existing	Yes	Previous industrial use for City Hospital Project	1477/1	Plot	78.90	5.5	42	Ministry of Health	Allocation to KGM by Ministry of Health is ongoing, KGM will allocate to Company	20.04.2021 Site access approval date by KGM
Excavated Material Storage Areas																
Lot 2	1	Bolluca Excavated Material Storage Area (Dumpsite) (far from route – considered as an alternative)	In the wider region	14.8 km	Istanbul/ Arnavutkoy/ Bolluca	Existing	No	Previous industrial use for Istanbul Airport construction	Not Registered	Forest	The parcel is indicated as non-registered in the Public Database of the TKGM	79.09	33	General Directorate of Foresty	Completed	11.04.2022
	2	Mahmutbey Excavated Material Storage Area (Dumpsite)	In the wider region	8.5 km	Istanbul/ Basaksehir/ Mahmutbey	Existing	Yes	Previous industrial use for Northern Marmara Motorway construction	0/6354	Plot	1,246.83	3.00	30	Ministry of National Defence (Treasury)	Completed	09.07.2021
	3	Pirincci Excavated Material Storage Area (Dumpsite)	In the wider region	8.7 km	Istanbul/ Eyupsultan/ Pirincci	Existing	No	This is a mining pit to be refilled. ISKI reportedly encourages use of this site for excavated material disposal due existing H&S risks posed by the pit lake. Users (if any) to be identified based on further PAP consultations.	0/580	Forest	146.78	49.2	33	General Directorate of Foresty	Ongoing	Permit application under evaluation (anticipated to be finalised by September 2022)
	4	Şamlar Excavated Material Storage Area (Dumpsite)	In the wider region	6.5 km	Istanbul/ Arnavutkoy/ Samlar	New	No	To be identified	[redacted]	Forest	112.7		33	General Directorate of Foresty	Ongoing	Permit application under evaluation (anticipated to be finalised by September 2022)
Lot 1	5	Nakkas Excavated Material Storage Area (Dumpsite)	35+300	200 m	Istanbul/ Catalca/ Nakkas	New	No	No previous industrial use – Community users (if any) to be identified based on further PAP consultations	[redacted]	Agricultural field	6.44	6.4	30	Ministry of Treasury and Finance (Treasury)	Ongoing	Permit application under evaluation (anticipated to be finalised by September 2022)

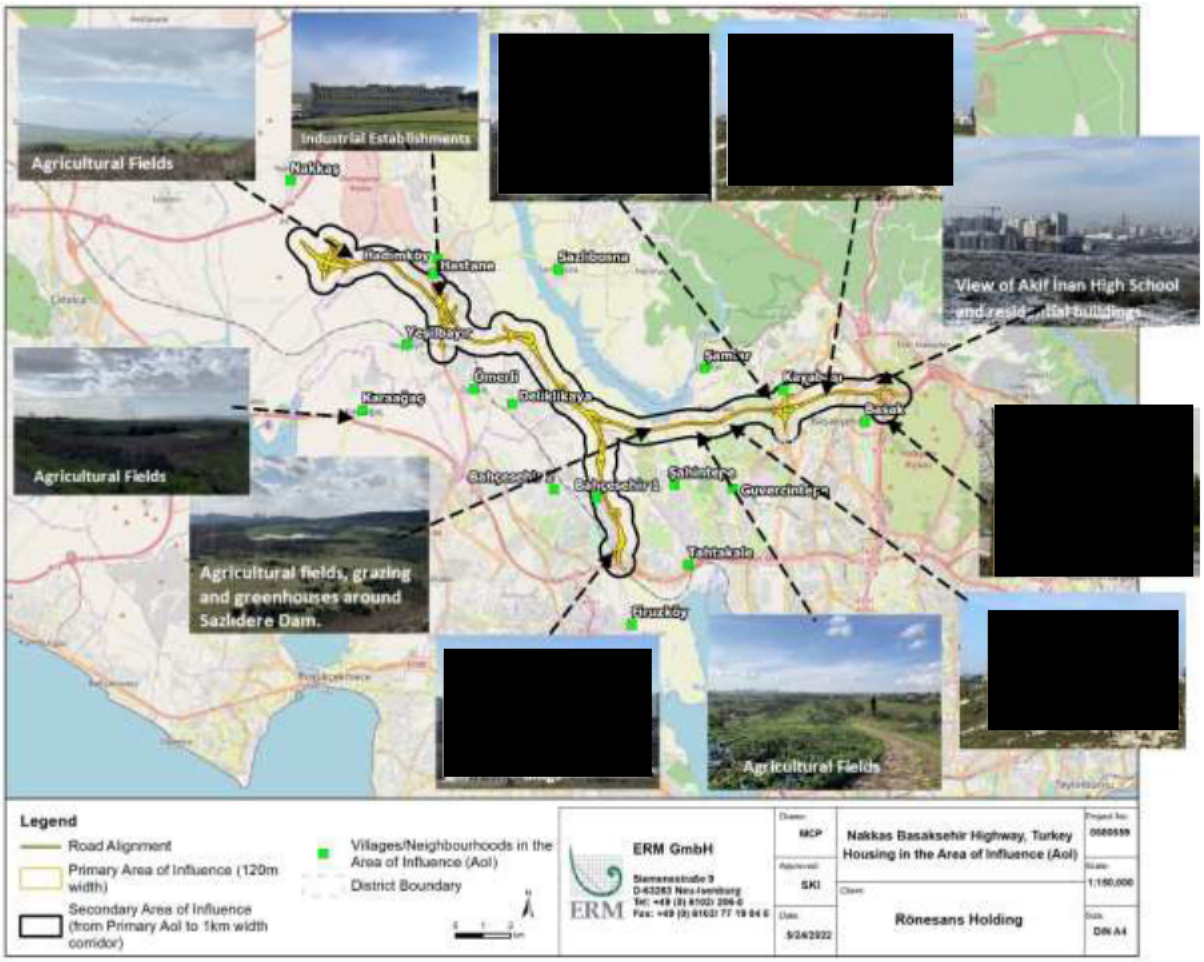
Location	ID	Main Facility Name	App. Motorway KM	Distance to the RoW	District/ Settlement	New Facilities or Existing Facilities Operated by Third Party Supplier	Currently Used by the Project (Yes/No)	Description of Use Prior to Project	Parcel No.	Parcel Type	Area of Parcel (ha)	Area to be Used within the Parcel (ha)	Duration of Usage by the Project (months)	Ownership	Land Use Permit Status	Permit Date (Duration)
Material Borrow Site																
Bahcesehir Connection Road	4	Hosdere Material (Lime) Borrow Site (to be backfilled upon completion of material extraction)	1+700	0.4 km	Istanbul/ Basaksehir/ Hosdere	New	No	No previous industrial use – Agricultural use by an informal user from Bahcesehir-1 (Tatarcik) 1 user	Not Registered	Unregistered	The parcel is indicated as unregistered in the Public Database of the TKGM	3.55	33	The parcel is indicated as unregistered in the Public Database of the TKGM	Ongoing	Permit application under evaluation
Plants																
Lot 1	9	Yesilbayir Concrete Plant (Batch Plant)	37+500	200 m	Istanbul/ Arnavutkoy/ Yesilbayir	New	No	No previous industrial use – Agricultural use (informal) by Yesilbayir PAPs 5 users	[redacted]	Agricultural field	22.05 14.90	1.5	24	TOKI	Completed	31.08.2021
	11	Sahintepe Beam Production Plant, Excavated Material Storage Area	51+400	Adjacent to the RoW at KM 51+400	Istanbul/ Basaksehir	New	Yes	No previous industrial use – PAPs in Sahintepe reported previous use by their community for grazing.	[redacted]	Plot	11.86	11.86	10	TOKI 2 private owners	Application process has been suspended since the site will not be used for further activities and will be reinstated to original ground conditions. Acquisition/compenstation will be carried out in accordance with RAP for the land that has already been used.	Not applicable. Please see land use permit status column.
Lot 2	12	Ikitelli-1 Mechanic, Asphalt and Beam Production Plant	58+000	3 km	Istanbul/ Basaksehir/ Ikitelli-1	New	No	According to headman, it didn't use before.	0/2125	Agricultural field	279.69	5.3	28	Ministry of National Defence (Treasury)	Ongoing	Permit application under evaluation
	15	Sahintepe Beam Production Plant	50+200	300 m	Istanbul/ Basaksehir/ Sahintepe	New	No	No previous industrial use – PAPs in Sahintepe reported potential use by their community for grazing – to be confirmed via further consultations with the community.	[redacted]	Plot	0.29 0.08 0.37 0.08 3.23 2.33 4.70 3.67 0.18 0.62	13.12	28	Municipality of Basaksehir	Ongoing	Permit application under evaluation
	16	Şahintepe Beam Production Plant	50+300	300 m	Istanbul/ Basaksehir/ Sahintepe			No previous industrial use – PAPs in Sahintepe reported potential use by their community for grazing – to be confirmed via further consultations with the community.	[redacted]	Plot	0.84 0.31 0.48 0.80 4.10	6.5	28	TOKI	Ongonig	Permit application under evaluation

Location	ID	Main Facility Name	App. Motorway KM	Distance to the RoW	District/ Settlement	New Facilities or Existing Facilities Operated by Third Party Supplier	Currently Used by the Project (Yes/No)	Description of Use Prior to Project	Parcel No.	Parcel Type	Area of Parcel (ha)	Area to be Used within the Parcel (ha)	Duration of Usage by the Project (months)	Ownership	Land Use Permit Status	Permit Date (Duration)
Potential Quarries (under consideration and will be decided by Project design team)																
In the wider region	18	Omerli (Used by concrete supplier Limestone	Route Outside	87 km	Istanbul/ Cekmekoy/ Omerli	Existing	Yes	Existing licensed quarry operations by third-party operators	88/16	State-Owned Forest	2828.96	243.4	42	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 27.08.2017-27.08.2037
	19	Cebeci (Used by REC & concrete supplier Sandstone	Route Outside	15.5 km	Istanbul/ Sultangazi/ Cebeci	Existing	Yes	Existing licensed quarry operations by third-party operators	0/953 0/954	Litigious		449.48	42	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 29.11.2018-29.11.2028
	20	Ayazaga (Used by concrete supplier Sandstone	Route Outside	33 km	Istanbul/ Sarıyer/ Ayazaga	Existing	Yes	Existing licensed quarry operations by third-party operators	0/830	State-Owned Forest	946.87	160	42	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 23.07.2014-23.07.2034
	22	Boğazköy (Used by REC and potential usage by pavement supplier)-Sandstone	Route Outside	12.4 km	Istanbul/ Arnavutkoy/ Bogazkoy	Existing	Yes	Existing licensed quarry operations by third-party operators	Not registered	Not registered	The parcel is indicated as unregistered in the Public Database of the TKGM	75	33	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 24.02.2014-24.02.2024
	23	Ciftalan (Potential usage by pavement supplier)-Sandstone	Route Outside	29 km	Istanbul/ Eyupsultan/ Ciftalan	Existing	No	Existing licensed quarry operations by third-party operators	103/1	State-Owned Forest	1305.838	60.28	24	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 05.11.2018–05.11.2023
	24	Sefaalan (Potential usage by pavement supplier)-Basalt	Route Outside	64 km	Tekirdag/ Saray/ Sefaalan	Existing	No	Existing licensed quarry operations by third-party operators	171/1	Forest	3487.390	24.6	30	Existing licensed quarry operations by third-party operators	Completed	Mining Operation Permit 13.05.2020-13.05.2030

Source: RAP, GEM 2023.

5.4.6.2.3 *Properties and Structures in the Primary AoI*

The Project crosses a great variety of agricultural fields in rural areas and urban housing blocks in urban areas (Figure 5-57).

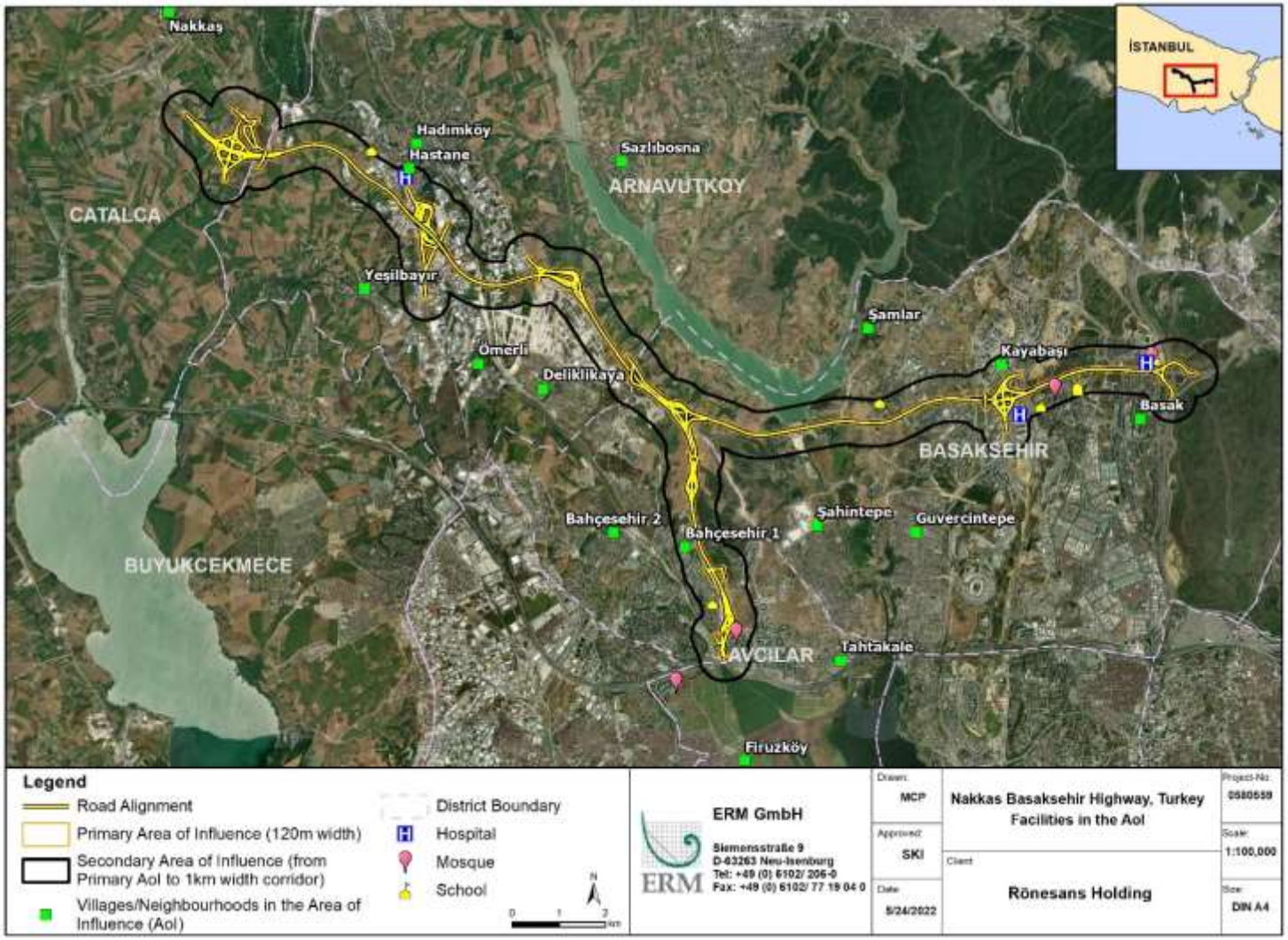


Source: ERM, 2022

Figure 5-57 Land use examples in the AoI

As per Figure 5-58, there are many sensitive facilities (schools, mosques, hospitals and leisure infrastructures such as malls, parks and wedding halls) located near the road within the Project's AoI. According to the RAP, there are parcels registered as parks within the Expropriation Corridor, more specifically three (3) in Başak, 38 in Bahçeşehir 2, one (1) in Şahintepe and 13 in Kayabaşı, all located in the district of Başakşehir.

In terms of total area to be expropriated, it will be 3.89 hectares in Başak, 10.06 hectares in Bahçeşehir 2, 1.34 hectares in Şahintepe and 18.02 in Kayabaşi. Furthermore, there are wedding halls within the Expropriation Corridor located in Başak (Başakşehir district) and in Ömerli (Arnavutköy district).



Source: ERM, 2022.

Figure 5-58 Sensitive facilities in the AoI

5.4.6.3 Land Acquisition

As defined by the EBRD, land acquisition includes both outright purchases of property and purchases of access rights, such as easements or rights of way[95].

Amongst the PR 5 of EBRD requirements, are included:

- Project Design: the client will consider the alternatives to the project design in order to minimize the physical and/or economic displacement.
- Consultation: The Project will disclose the relevant information and perform consultation with the relevant stakeholders in order to involve them in the decision-making process. These will take place prior to the implementation of the Project as well as throughout it.
- Grievance mechanism: in accordance with PR10, a grievance mechanism will be put in place in order to address the potential concerns regarding the compensation or relocation of the affected parties.
- Resettlement planning and implementation: a socioeconomic baseline and Resettlement Action Plan has been developed when involuntary resettlement is unavoidable.

The Project-related land acquisition process will be executed by the KGM as per the Expropriation Law. The Project-related land acquisition includes[96]:

- Expropriation of the privately-owned parcels
- Allocation of the state-owned parcels (e.g. parcels owned by the related municipalities, State Hydraulic Works – DSI, Housing Development Administration of Turkey – TOKI) including treasury parcels, pasture parcels, etc. to the Project (for permanent use by the Project or temporary use by the Company during construction period)
- Constitution of the servitude (easement rights) for immovable assets that are not required to be expropriated in cases the ownership rights of the owners are not prevented.

Coordinating the process of identification of affected infrastructure and above ground facilities of other institutions overlapping with the Project and executing official correspondence with all relevant institutions – requiring the Company to conduct any follow up correspondence or communication as required.

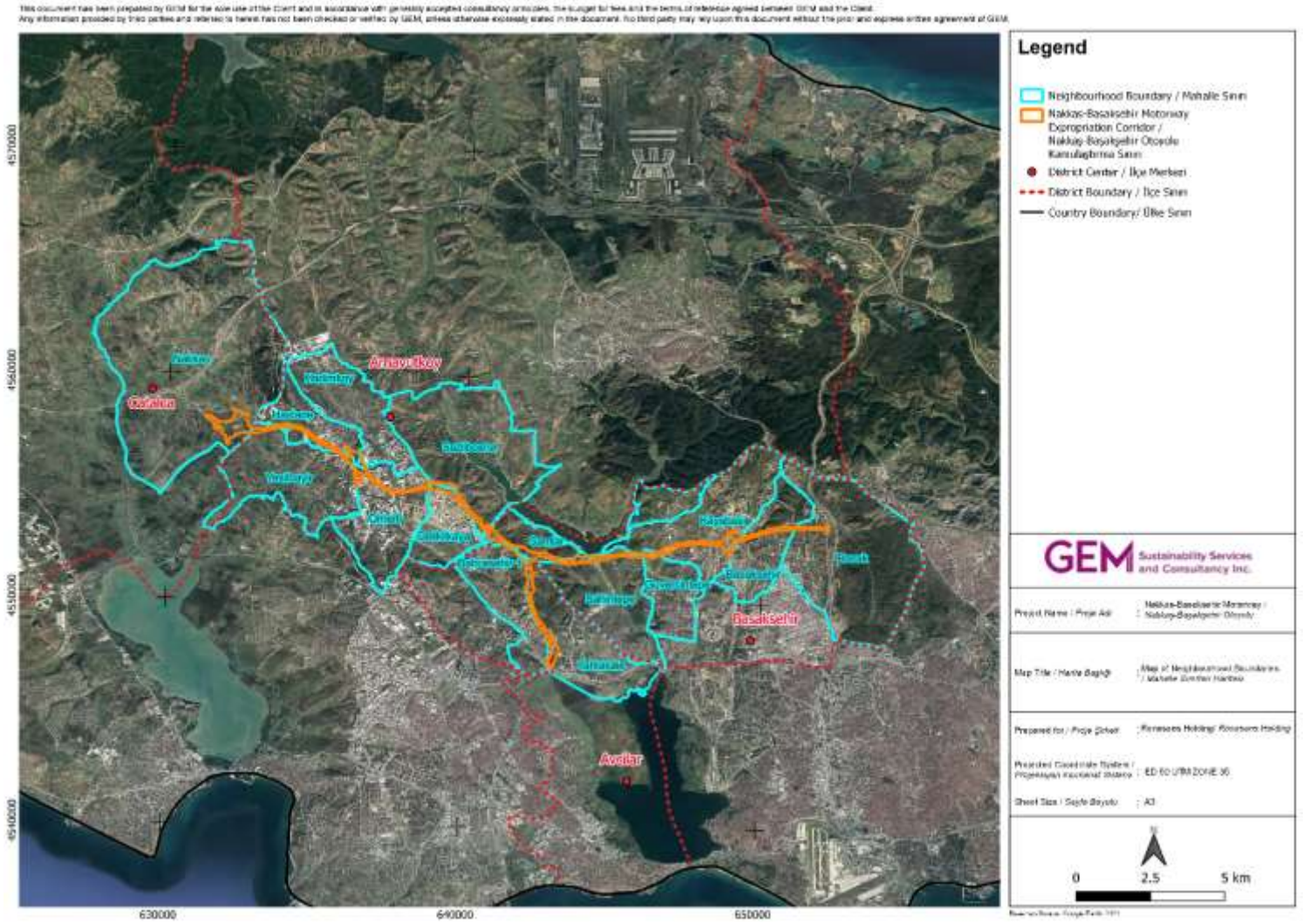
In 2020 and 2021[97], Presidential Decrees were issued for accelerated expropriation in line with the Article 27 of the Expropriation Law. Following this, expropriation works in line with the Expropriation Law has started in 2021. Based on the Accelerated Expropriation Decisions, KGM has the right to initiate court cases in line with the construction schedule and depending on the current expropriation budget available for payment to right holders – prioritising the parcels that are required for construction relatively earlier than other parcels. On the other hand, in this Project, KGM has prioritised negotiated settlements through Article 8 process (purchasing method) under the Expropriation Law and completed sending official notifications inviting owners/shareholders of parcels that had priority in construction to negotiating with KGM following the completion of assets inventory by December 2021. Current status of land acquisition/expropriation of privately-owned parcels according to their land entry status is presented in detail in RAP – Section 2.6 on Current Land Acquisition/Expropriation Status.

[95] EBRD. 2019. ERBD Performance Requirement 5. Land Acquisition, Involuntary Resettlement and Economic Displacement. Available from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjKk-yD7vPyAhXyEWMBHZ-_BVYQFnoECAcQAQ&url=https%3A%2F%2Fwww.ebrd.com%2Fdocuments%2Fenvironment%2Fperformance-requirement-5.pdf&usg=AOvVaw33p4S_ef2Bfluv0gpGS2kY

[96] RAP, GEM 2022

[97] Presidential Decree of 2021 was issued to cover additional parcels required to be acquired in line with latest Project design.

The settlements affected from Project related land acquisition have been considered in the RAP study (Figure 5-59). In addition, this ESIA study has considered the settlements, which are not affected from Project related land acquisition but may be potentially affected from Project's E&S impacts during the construction and operation phases.



Source: RAP, GEM 2022

Figure 5-59 Project Route and Settlements affected from the Project-related Land Acquisition

5.4.6.3.1 Parcels to be affected within the Expropriation Corridor

Table 5-36 summarizes the number of parcels per settlement per ownership type, namely private (including privately-owned and owned by legal entities) and public parcels (including treasury land and other public lands such as roads, bridges, etc.) that will be affected within the Expropriation Corridor. There is a grand total of 1,523 parcels affected within the Expropriation Corridor.

Private parcels will be the most affected with a total of 1,239 parcels. In addition, a total of 128 parcels owned by legal entities, and 156 public parcels will be affected (39 treasury parcels and 117 other public parcels such as non-registered). In other words, 81.4 % of all affected parcels within the Expropriation Corridor are privately owned, 8.4 % are owned by legal entities and 10.2 % are publicly owned.

Table 5-36 Number of Parcels affected within the Expropriation Corridor per Ownership Type

Road Part	District	Settlement	Number of Private Parcels			Number of Public Parcels			Total
			Privately-Owned	Owned by Legal Entities	Total Private	Treasury Land	Other Public Lands (road, bridge, etc.)	Total Public	
Main Road	**Arnavutköy**	Hastane	225	15	**240**	9	21	**30**	**270**
		Hadımköy	-	1	**1**	-	-	**0**	**1**
		Deliklikaya	16	-	**16**	-	2	**2**	**18**
		Ömerli	51	3	**54**	3	12	**15**	**69**
		Sazlıbosna	730	10	**740**	1	6	**7**	**747**
		Yeşilbayır	11	3	**14**	2	4	**6**	**20**
	Başakşehir	Başak	7	5	**12**	4	6	**10**	**22**
		Basaksehir (Ikitelli-2)	5	52	**57**	3	16	**19**	**76**
		Bahçeşehir 1	9	2	**11**	-	2	**2**	**21**
		Şahintepe (*)	6	10	**16**	-	4	**4**	**20**
		Şamlar	32	6	**38**	5	2	**7**	**45**
		Kayabaşı	36	15	**51**	3	35	**38**	**89**
		Güvercintepe	3	1	**4**	-	-	**0**	**4**
	Çatalca	Nakkaş	79	3	**82**	7	0	**7**	**89**
Bahcesehir Connection Road	**Avcılar**	Tahtakale	21	2	**23**	2	7	**9**	**32**
	Basaksehir	Bahcesehir 1. Kisim (Hosdere and Tatarcik)	8	-	**8**	-	-	**-**	**8**
	Total	**1,239**	**128**	**1,367**	**39**	**117**	**156**	**1523**	

Source: RAP, GEM 2022

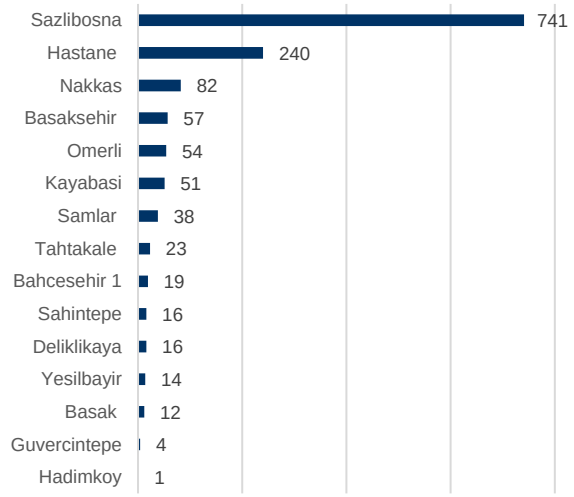
(*)Parcel no. [redacted] which is registered in Sahintepe and located out of the corrior is included in the number of privately-owned parcels (1,239).

As seen inFigure 5-60, the settlement that has the highest total number of privately-owned parcels affected within the Expropriation Corridor is Sazlıbosna (Arnavutköy district) with a total of 740 parcels (730 privately-owned and 10 owned by legal entities).

Sazlıbosna is followed by Hastane (Arnavutköy district) with 240 private parcels affected (225 privately-owned and 15 owned by legal entities) and Nakkaş (Çatalca district), with 82 private parcels affected (79 privately-owned and three (3) owned by legal entities).

The settlement with the least amount of private parcels affected within the Expropriation Corridor is Hadımköy settlement (Arnavutköy district), with one parcel owned by legal entities affected.

Regarding public parcels within the Expropriation Corridor, Kayabaşı (Başakşehir district) is the settlement with the highest total parcels affected with 38 parcels (three (3) treasury lands and 35 other public lands), followed by Hastane (Arnavutköy district) with 30 public parcels affected (nine (9) treasury lands and 21 other public lands). For more information, please see the RAP, GEM 2023.



Source: RAP, GEM 2023

Figure 5-60 Privately-owned parcels per settlement affected within the Expropriation Corridor

5.4.6.3.2 Area to be expropriated

As seen in Table 5-37, in terms of total area to be expropriated, a grand total of 550.06 ha will be expropriated in all settlements.

Privately-owned land will have the most area expropriated with a total of 378.55 ha (307.86 privately-owned and 70.69 owned by legal entities), whereas there will be 171,51 ha of public land expropriated (26.96 ha treasury land and 144.55 ha of other publicly owned land).

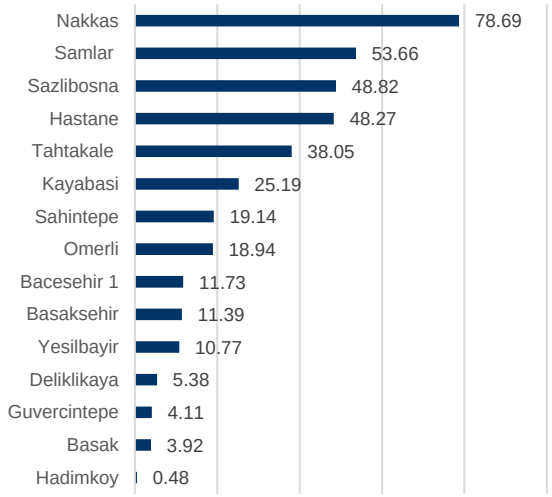
In other words, 68 % of all land to be expropriated will be private land (56 % privately owned and 12 % owned by legal entities) and 31 % will be public land (5 % treasury land and 26 % other public land).

Table 5-37 Total Area to be Expropriated per Settlement per Ownership Type

Road Part	District	Settlement	Area to be Expropriated (ha)				Settlement Total (ha)
			Privately-Owned	Owned by Legal Entities	Treasury Land	Others (road, bridge, etc.)	
Main Road	**Arnavutköy**	Hastane (Hadımköy)	31.07	17.21	11.33	9.36	68.97
		Hadımköy	0	0.48	0	0	0.48
		Deliklikaya	5.38	0	0	0.92	6.3
		Ömerli	18.28	0.67	1.27	10.66	30.88
		Sazlıbosna	42.59	6.23	0.25	3.98	53.05
		Yeşilbayır	5.95	4.82	0	0.26	11.03
	Başakşehir	Başak (İkitelli-1)	2.02	1.89	2.36	4.7	10.98
		Başakşehir (İkitelli-2)	2.32	9.07	1.13	12.09	24.61
		Bahçeşehir 1 (Hoşdere and Tatarcık)	3.64	2.76	0	2.47	8.87
		Şahintepe	8.49	10.65	0	7.44	26.58
		Şamlar (Şamlar and Hacimasli)	49.3	4.36	7.07	0.99	61.71
		Güvercintepe	2.79	1.32	0	0	4.11
		Kayabaşı	15.59	9.61	1.35	57.74	84.28
	Çatalca	Nakkaş	77.48	1.21	2.09	0	80.78
Connection Road	**Avcılar**	Tahtakale (Ispartakule and Firuzköy)	37.72	0.33	0.1	33.95	72.1
	Başakşehir	Bahcesehir 1 (Hosdere and Tatarcik)	5.26	0.07	0	0	5.33
Total			**307.86**	**70.69**	**26.96**	**144.55**	**550.06**

Source: RAP, GEM 2023

The most affected settlement in terms of area to be expropriated will be Kayabaşı (Başakşehir district) with a total of 84.28 ha to be expropriated. Kayabaşı (Başakşehir district) is also an exception among all the settlements with land to be expropriated as the majority of it will be publicly owned (59.09 ha) instead of privately-owned (25.2 ha).The second most affected in terms of total land to be Nakkaş (Çatalca district), with 80.78 ha to be expropriated (78.69 ha privately owned and 2,09 ha public land).



Source: RAP, GEM 2023

Figure 5-61 Total expropriation area of privately-owned parcels per settlement (ha)

5.4.6.3.3 Parcels and total area to be affected within the Expropriation Corridor and expropriated per land use (agriculture, pasture, plot, parks, roads, others)

As seen in Table 5-38, the most common type of land that will be affected within the Expropriation Corridor are plots (802 parcels) followed by agricultural parcels (515).

The settlement that will have the most parcels affected within the Expropriation Corridor will be Sazlıbosna with 748 parcels, followed by Hastane with 270 (both located in the Arnavutköy district). As seen in Table 5-1, the settlement with the most agricultural parcels that will be affected within the Expropriation Corridor is Hastane with 220 agricultural parcels, followed by Sazlıbosna with 113 parcels (both in Arnavutköy district). Only three (3) settlements will have pasture parcels affected within the Expropriation Corridor, namely Hastane, Ömerli (Arnavutköy district) and Nakkaş (Çatalca district).

Furthermore, in terms of expropriated land, agricultural parcels will have the largest total area expropriated, with 223.88 hectares. As summarized in Table 5-38, the settlement with then biggest total area to be expropriated is Kayabaşı (Başakşehir district) with a total of 84.28 hectares, followed by Nakkaş (Çatalca district) with 80.78 hectares.

The settlement with the biggest agricultural area to be expropriated is Nakkaş (Çatalca district) with 79.75 hectares expropriated. This neighbourhood reported during the Settlement Profiling having issues accessing land prior to the project due to the Northern Marmara Motorway roadwork. The settlement with the second most agricultural area to be expropriated will be Şamlar (Başakşehir district) with 53.64 hectares.

Table 5-38 Parcels and hectares per Settlement per Land Use

Road Part	District	Settlement	Number of Parcels within the Expropriation Corridor								Area to be Expropriated (ha)							
			Agricul.	Pasture	Plot	Park	Road	Forest	Other	Total	Agricul.	Pasture	Plot	Park	Road	Other	Forest	Total
Main Road	**Arnavutköy**	Hastane	220	5	15	0	21	1	8	270	29.90	11.00	11.99	0	9.36	1.26	5.44	68.96
		Hadımköy	0	0	1	0	0	0	0	1	0	0	0.48	0	0	0	0	0.48
		Deliklikaya	14	0	2	0	2	0	0	18	4.58	0	0.80	0	0.92	0	0	6.30
		Ömerli	24	1	31	0	12	0	1	69	6.36	0.12	13.51	0	10.66	0.23	0	30.88
		Sazlıbosna	113	0	623	0	6	0	6	748	31.44		16.11	0	3.98	1.52	0	53.05
		Yeşilbayır	11	0	2	0	4	0	3	20	10.15	0	0.29	0	0.26	0.34	0	11.03
	Başakşehir	Başak	9	0	2	3	7	0	1	22	4.09	0	1.76	3.89	1.23	0.01	0	10.98
		Basaksehir (Ikitelli 2)	0	0	12	38	20	0	6	**76**	0	0	4.58	10.06	9.92	0.06	0	**24.61**
		Bahçeşehir 1	1	0	10	0	0	0	2	**13**	0.36	0	6.04	0	0	2.47	0	**8.87**
		Şahintepe	0	0	16	1	3	0	0	**20**	0	0	19.14	1.34	6.10	0	0	**26.58**
		Şamlar	36	0	5	0	0	0	4	**45**	53.64	0	7.07	0	0	1	0	**61.71**
		Güvercintepe	0	0	4	0	0	0		**4**	0	0	4.11	0	0	0	0	**4.11**
		Kayabaşı	6	0	48	13	21	0	1	**89**	3.60	0	22.94	17.98	39.63	0.12	0	**84.28**
	Çatalca	Nakkaş	81	1	0	0	0	0	7	**89**	79.75	0.03	0	0	0	1	0	**80.78**
Bahcesehir Connection Road	**Avcılar**	Tahtakale	0	0	23	0	9	0	0	**32**	0	0	37.82	0	0	34.28	0	**72.10**
	Basaksehir	Bahcesehir 1	0	0	8	0	0	0	**0**	**8**	0	0	5.33	0	0	0	0	**5.33**
Total			**515**	**7**	**802**	**55**	**105**	**1**	**39**	**1,524**	**223.88**	**11.15**	**151.91**	**33.27**	**82.06**	**42.30**	**5.44**	**550.06**

Source: RAP, GEM 2023

5.4.6.3.4 Affected buildings and structures

The land expropriation process will also affect business and structures contributing to the well-being and cohesion of the communities in the AoI, by enriching the local economy and employment offer, offering leisure and recreation services, and providing education services.

The characteristics and existing operations of the affected businesses have been surveyed as part of the RAP studies. Interviews were conducted with the owners/operators of all affected businesses and focus groups discussions were held with the employees. GEM prepared a summary of the issues key to the planning of relocation process:

- All the affected businesses to be relocated are small to medium sized businesses.
- In general, employees are aware of the Project and that the business structure will be physically affected. Nakkaş Otoyol A.Ş has been engaging closely with the affected businesses since end 2021 and will inform the business owner and employees about the final schedule of land entry once this is determined following the ESIA disclosure. According to the findings of engagement done with the employers to date, none of the businesses have plans of shutting down their businesses. In general, the business owners are looking for relocation sites in the vicinity of the existing vicinity however there are business owner who are also looking for alternative sites in the surrounding provinces that are accessible from Istanbul (e.g. Kocaeli, Tekirdag). Should part of business owners decide moving to those sites, the employees may consider resigning due to distance or other factors even if the business owner considers providing transportation services to the new location. The entitlements to be provided to the employers and employees from the RAP Fund are described in Section 5.7 of RAP. Nakkaş Otoyol A.Ş will continue engaging with the businesses and employees (formal and informal) as the relocation sites are determined by the employers and the employees are informed about the relocation sites so that employee's decisions or requirements regarding the selected relocation sites are also clarified.
- Business owners (owners of the affected structures and tenant business owners) were interviewed in June 2022 to obtain up to date information on their relocation planning and alternative locations considered by the business owners are summarised in RAP. The following have been noted as key considerations related to relocation planning:
  - All business owners, including tenants are aware of the expropriation and upcoming relocation process.
  - Except for one business, none of the business owners have decided relocation sites. Part of the business owners have been evaluating alternatives. On the other hand, in general, tenant business owners reported that they are waiting for a written notification to start making detailed planning for relocation process.
  - Depending on the nature of their business activities, part of the businesses has to prepare the new workplace prior to moving as they have to renew/obtain permits and licenses key to their operations (e.g. workplace permits, fire safety reports, environmental permits and/or licenses, etc.) which will be subject to audit by related authorities prior to issuing permits. As reported part of the business owners, completing permitting process has taken up to 6 months during relocation to the existing premises in the past. Thus, it is important to provide related entitlements in advance of the relocation to allow sufficient time to business owners to have their new workplaces prepared.
  - Business owners are informed of the framework of the entitlements planned to be delivered by Nakkaş Otoyol A.Ş..They are keen to understand the details of the entitlements as this will help their relocation planning. Nakkaş Otoyol A.Ş. will continue engaging with the affected businesses to inform them further about the details of entitlements and support them with the real estate searching and new workplace preparation processes. According to current Project schedule, land entry and relocation of businesses is not planned before Q2 2024.

- A limited part of the affected businesses (4 out of 14) to be relocated have other non-affected facilities in İstanbul but the businesses confirmed that those non-affected facilities in Istanbul are not suitable as replacement structures for relocating their affected businesses (e.g. due to area limitations, disadvantegous location, etc.).
- Less than half of the affected business (6 out of 14) reported that their customers are local. Relocation of affected businesses that have mainly local customers to areas close to the existing sites is important for such businesses to minimise impacts. Alternative relocation site evaluation and relocation planning process for the affected businesses in consideration of the locality of their customers is presented in RAP - Section 4.2.7.3.
- Almost all business owners anticipate facing a temporary business interruption period (reportedly between 7 days to 150 days; on average 60 days) due to relocation. This changes from business to business depending on the nature of their business activity. Some of the businesses have to plan phased relocation as they cannot fully stop production due to characteristics of the machines they use or due to their committed deliveries, whilst some others cannot relocate through a phased process as their business operations necessitate moving in to the new workplace at a single time.
- Most of the affected businesses have made fixed investments/improvements at their existing premises such as water and electrical infrastructure, fire-fighting system, ventilation system, etc. depending on their needs. They will have to make similar investments at the replacement business structure. This will require 1-3 months of preparation time after finding the replacement business structure, as well as compensation for any equipment that cannot be moved.
- Some of the businesses reported need for guidance for finding replacement premises of adequate size and rental cost in the same region.
- Approximately 70 % of the affected businesses need large vehicle access because of the nature of their operations, an issue to be considered in the identification of the replacement premises.
- Transportation/moving of goods, machinery, equipment, furniture, etc. will be needed for all affected businesses.
- The most significant cost items declared by the businesses related to relocation are listed below:
  - Disassembly/assembly and moving
  - Improvements/infrastructure works required to be done at the replacement workplace
  - Cost of business interruption
  - Depreciation of machinery value due to disassembly/assembly
- Depending on the location of the replacement business premises, some businesses may face loss of employees as some of them may not be willing to commute long distances and/or may need to provide transportation services to employees. One of the affected businesses reported the right of the workers to resign in case of relocation, which may cause additional personnel compensation costs for the affected businesses.
- Among 14 affected businesses, 4 of them reported informal employees (41 informal employees in total of which 2 are female). In 5 of the affected businesses, migrant workers are reported to be employed (a total of 3 foreign migrant workers of which 3 are female)..

For some of the businesses that will not relocate but lose land and/or structures, support will be required to ensure that existing operations are not affected (e.g. reinstatement of access, building of retaining walls to minimise project footprint, etc.).

From August to November 2021, some key engagement with local communities was done in parallel to the RAP preparation. These engagements included the sharing of expropriation lists, plans and community meetings to share information on the Project and impacts (Table 5-39).

Table 5-39 Information on Affected Businesses

Ownership/Tenancy Status at the Affected Business Structure	Description of the Business Activity	Number of employees	Presence of an alternative place to move
Owner	Waste collection (non-hazardous recyclables including metal, paper, plastic)	**9**	Already partially relocated.
Tenant	Manufacturing (tulle curtain)	**29**	An alternative location has been considered by the business owner.
Tenant	Manufacturing (Creative box and packaging)	**30**	An alternative location has been considered by the business owner.
Tenant	Metal casting (pots, pans)	23	No alternative location has been considered by the business owner as of June 2022.
Tenant	Branch of Garanti BBVA Leasing	2	A few alternative locations have been considered by the business.
Tenant	Manufacturing and warehouse (Auxiliary chemicals for textile industry)	**9**	Two alternative locations have been considered by the business owner.
Tenant	Import and marketing (Home accessories and glassware)	**12**	An alternative location has been considered by the business owner.
Tenant	Manufacturing (Wet wipes caps, different types of caps and covers, cotton swabs, boxes, etc.)	**45**	An alternative location has been considered by the business owner.
Owner	Manufacturing (Hydraulic breakers and industrial goods)	**25**	An alternative has been considered by the business owner.
Tenant	Waste recycling (plastic)	**15**	An alternative has been considered by the business owner.
Tenant	Local butcher and meat restaurant	**7**	Two alternatives have been considered by the business owner.
Tenant	Excavation works and landscaping	**2**	No alternative have been considered.
Tenant	Import, export, sales and marketing (floriculture and landscaping)	**15**	No alternative location has been considered by the business owner as of June 2022.
Owner	Building construction	**20**	No alternative location has been considered by the business owner as of June 2022.

Source: RAP, GEM 2023

5.4.6.3.5 Affected common properties

The RAP – Section 4.2.5.3 (“Informal/Formal Use of Affected Public Lands for Agriculture") has identified that among the 284 state-owned parcels (treasury, legal entity, non-registered) located along the RoW (170 has been entered for topsoil stripping and active construction and 114 has not been entered to date) , 29 were used for agriculture by 25 users (that were already identified among the 80 users listed in Section 2.5.1.4 “Informal and Formal Agricultural Users of lands” in RAP. Except for 2 of the parcels, all users of state-owned parcels and parcels owned by legal entities also use privately-owned parcels. Thus, they have alternative lands to continue their agricultural production. State-owned parcels used by PAPs for agriculture along the RoW (including lands entered and not entered to date) are listed in RAP. The users reported that they do not have formal tenancy agreements to use the state-owned parcels thus did not declare themselves as formal users. For the state-owned parcels that have been entered to date (170 parcels), 17 users identified to use the affected parcels for agriculture have been provided with crop compensation for the agricultural production period of 2021-2022.It should be noted that, in the RAP surveys of 2021, 71% of the households with agricultural use of public lands in the settlements (including the lands outside the expropriation corridor) reported formal use of the respective lands through rent/adequate pay (*ecrimisil*) noting that the respondents may have had hesitations about reporting informal use.

As reported in the RAP (GEM, 2023), the households engaged in livestock activities among the affected communities mostly prefer intensive stock farming. The registered pasture parcels affected by Project-related land acquisition are not used for animal husbandry but livestock activities are conducted on grazing areas (which are not registered as pasture) consisting of agricultural or vacant parcels noting that the parcels registered as pasture have lost their pasture characteristics and cultivation activities could be observed on majority of such parcels. The RAP has identified that the animal breeders in Sahintepe and Kayabasi communities use the agricultural lands for grazing activities. As such, in Sahintepe (Muratdere locality which is located in the north of settlement centre, 300 m west-southwest of Sazlidere Mobilisation and beam manufacturing facility site), there are 30 households in total with 15 households engaged in livestock activities. The PAPs in Muratdere locality of Sahintepe informed that the parcels corresponding to the beam manufacturing facility and excavated materials storage site (south of Sazlidere Mobilisation Site) in Sahintepe were among their grazing area (noting that the parcels are owned by TOKI – with land registry type of constructible plot not registered pasture). In Kayabasi neighbourhood, there are 7 households engaged in ovine breeding (sheeps and goats) and 50 households engaged in bovine breeding. 4 of the households engaged in ovine breeding are residing at the northern side of the Motorway route whilst their grazing areas (vacant constructible plot parcels) are located at the southern side of the Motorway route. They use the grazing area throughout the entire year. Further information on the engagement with the affected people and measures design to mitigate impacts are presented in RAP.

The Sular Valley, partially located within the Project expropriation corridor at around KM 59+000, is crossed via a viaduct. The impact on decorative pool of the Social Complex at the Valley has been avoided by reducing the number of viaduct foundations and increasing the distance between piers (through utilisation of balanced cantilevel viaduct design – dengeli konsol viyaduk). Nakkaş Otoyol A.Ş. has been engaging with the local communities (e.g. residents of the multi storey housing complexes) and the operator of the Social Complex about the temporary and permanent Project environmental and social impacts to develop and implement adequate avoidance and mitigation measures. Once operational, the viaduct will not pose access restrictions between the northern and southern residential areas and the park area will be restored to pre-construction status ensuring no access restrictions. The local communities are informed of the Project Grievance Mechanism that has been established and will remain in place throughout the Project. The consultations to be done by Nakkaş Otoyol A.Ş. with related stakeholders in line with Project ESIA will further identify and manege any relevant issue during the construction and operation phases.

There is a public park (Kayasehir Millet Bahcesi) located within the Expropriation Corridor at ca. KM 55+500. The northern edge of the park, where an inner road and limited part of the amphitheater, overlaps with the Expropriation Corridor. The local communities are informed of the Project Grievance

Mechanism that has been established and will remain in place throughout the Project. The consultations to be done by Nakkaş Otoyol A.Ş. with related stakeholders in line with Project ESIA will further identify and manage any relevant issue during the construction and operation phases.

According to RAP, there is no parcel owned by village legal entities in the Project as the Motorway is located fully within the boundaries of Istanbul Metropolitan Municipality.

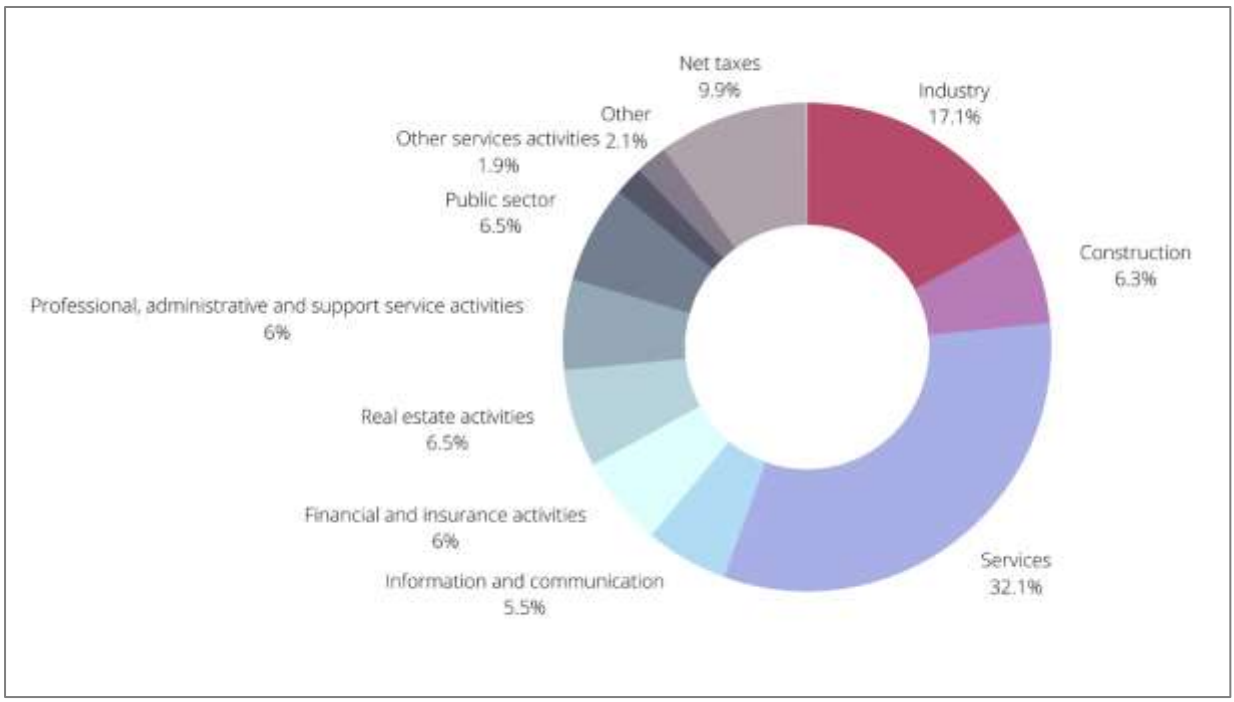
5.4.7 Economy and Employment

5.4.7.1 Economy

5.4.7.1.1 Province level

İstanbul is the largest economic province of Turkey. It contributed to 30.7 % of the national GDP in 2019 and ranked first nationally in GDP per capita with 86,798 TL (approximately 9,000 USD).[98] Its economy is dominated by the service sector (32.1 % in 2019) followed by the industry sector (17.1 % in 2019). The province generates more than 50 % of the country's trade[99].

İstanbul ranks first in all sectors – the province contributed to about 35.6 % of total construction activities in Turkey – except in the agricultural sector, where informal economy is predominant.



Source: TUIK, 2019.

Figure 5-62 Share of GDP per sector in İstanbul Province, 2019

[98] TURKSTAT. 2020. Gross Domestic Product by Province, 2019. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Gross-Domestic-Product-by-Provinces-2019-33663

[99] Governorship of İstanbul. 2016. Turkey's Capital of Commerce, Business, Investment, Finance and Tourism: İstanbul. Available from: http://www.İstanbul.gov.tr/turkiyenin-ticaret-is-yatirim-finans-ve-turizm-baskenti-İstanbul

5.4.7.1.2 District and local level

The province of İstanbul is considered the industrial centre of Turkey, as some of the country's major manufacturing plants are located in the city of İstanbul. The surrounding districts used to be mainly rural and forest areas, in which natural resource based livelihood sources such as farming and animal husbandry constitute the main source of income (see Chapter 5.4.8). The vivid development of İstanbul over the past 10 years resulted in the rapid urbanisation of these surrounding rural districts: first evolving as the suburban areas of İstanbul city, hosting its growing workforce, and later becoming home to industrialized economic activities.

Economic activities in the districts of the AoI are as diverse as dry farming and animal husbandry to services, trade, freight and cargo hubs and industrial production hosting couple of organised industrial zones. Along the AoI there are many small scale businesses and shops in retail goods, food and services. Industrial areas are mostly located on the western areas and internal urban areas in Başakşehir district as well as in Arnavutköy district. These are as diverse as manufacturing (plastic, metal machinery, automotive etc.), international freight, waste recycling facilities and cargo services to storages and food production. The districts of Başakşehir and Avcılar also accommodate professional and highly skilled workers in new residential areas. As per GEM Report 2021, some of these businesses will be losing operational buildings/facilities as they are within the Expropriation Corridor (see Figure 5-63).

As per Table 5-40, Bahçesehir 2 (Başakşehir district), Deliklikaya and Ömerli (Arnavutköy district) are the settlements in the AoI where most people depend on industry, manufacturing and trade. Some more rural settlements of the AoI focus on natural resources based activities and do not depend on industrialized economic sectors (highlighted in blue in the table).

The public sector and construction are also key sectors and employers in the AoI.

Table 5-40 Primary and Secondary Sectors in the AoI

District	Settlement	Settlement Category (urban/rural)	Main Sector	Other Sectors
Başakşehir	Bahçesehir 1	Urban	■ N/A	■ N/A
	Bahçesehir 2	Urban	■ Trade	■ Education/healthcare ■ Construction ■ Transportation ■ Tourism
	Başak	Urban	■ N/A	■ N/A
	Şamlar	Rural	■ Natural resources based economic activities	■ Education/healthcare ■ Trade
	Kayabaşı	Urban	■ N/A	■ Manufacturing ■ Public sector ■ Transportation
	Güvercintepe	Urban	■ N/A	■ N/A
	Şahintepe	Urban	■ Textile	■ Trade
Arnavutköy	Hadimköy	Urban	■ Manufacturing ■ Construction ■ Industry	■ N/A
	Hastane	Urban	■ N/A	■ N/A
	Deliklikaya	Urban	■ Construction ■ Trade	■ Public sector
	Ömerli	Urban	■ Industry	■ Trade ■ Construction ■ Education and healthcare ■ Public sector
	Sazlıbosna	Rural	■ Natural resources based economic activities.	
	Yeşilbayır	Rural	■ Natural resources based economic activities.	
Çatalca	Bahşayiş	Rural	■ Natural resources based economic activities.	
	Nakkaş	Rural	■ Trade	■ Manufacturing ■ Public sector ■ Education/healthcare
Avcılar	Firuzköy	Urban	■ N/A	■ N/A
	Tahtakale	Urban	■ Trade	■ Transportation ■ Construction ■ Education/healthcare

Source: Settlement Profiling, 2021

Despite the rapid development of the province, not all districts have grown to the same extent, and the province has Turkey's highest rates of inequality living standards. There is a significant gap in the socio-economic development levels of the districts of Başakşehir and Büyükçekmece as they are some of the most developed areas of the province, whereas the districts of Arnavutköy and Çatalca have higher levels of poverty and deprivation.

Aluminium cast sheet manufacturing company in Ömerli settlement (Arnavutköy district)

Factory building in Ömerli settlement (Arnavutköy district)

Sheet metal warehouse in Nakkaş settlement (Çatalca district)

Factory in Ömerli settlement, Arnavutköy

Local business Kayabaşı settlement (Başakşehir district)

Sheet metal depot in Hadımköy settlement (Arnavutköy district)

Source: RAP, GEM 2023

Figure 5-63 Examples of businesses in the AoI to be affected within the Expropriation Corridor

5.4.7.2 Employment

5.4.7.2.1 National Level

In Turkey, about 43.4 % of the population aged 15 years and older were employed (34.5 % of women and 71.8 % of men) in 2020, whilst 14 % of the labour force was unemployed (about 15 % of female labour force and 12 % of male labour force). Employment rate drops to 26.7 % for women with kids under the age of three.

Turkey ranked 130th of 149 countries in the World Economic Forum's 2020 Global Gender Gap Index[100]. Indeed, the labour force in Turkey is characterized by a significant gender gap with low female participation and low employment opportunities for women, considering that women constitute half of the country's population.

In terms of sectoral distribution, women are mostly employed in the services sector (56.1 % of employed women), followed by the agriculture sector (28.3 % of employed women) and the industry (15.6 %), whereas men are mostly employed in the manufacturing sector (31.43 %), followed by the wholesale and retail trade sector (16.69 %) and construction sector (14.14 %).

As seen in Figure 5-64 below, in 2014, the majority of women (54.3 %) work on a wage, 33.7 % work as a non-paid family business labourer, 10.8 % are self-employed and only 1.3 % are employers (meaning that they own a business or organization). On the other hand, 66.5 % of men in Turkey are wage workers, 22.3 % are self-employed, 6.5 % are employers and only 4.6 % are unpaid family workers.

High levels of informal employment remain in the country. As previously stated, although the share of informal employment decreased by 10 % between 2003 and 2015, reaching 33.5 %, it is still the main form of employment for a large share of the population[101]. Informal employment also shows higher rates among women (46 % of women compared to 28 % of men), as women are more likely to work in low-paid jobs or the informal sector without social security. About 81 % of the agricultural workforce – dominated by women who represent 94.2 % of workers – is informally employed against 20 % in the industry and services sectors. This can be explained by various factors, such as the high cost of employment, competitive labour market, need for flexible working hours, inflation, unequal income distribution, high unemployment rates and prevalence of SMEs in the labour market.

Overall, gender gaps, youth unemployment and the poverty rate have increased due to the COVID-19 crisis, as levels of participation in the labour market have decreased. The pandemic not only reduced the number of job opportunities, but also discouraged people from going to work. The risk of inequalities has increased in the last few years, and the health crisis is expected to further weaken economic and social gains.[102]

5.4.7.2.2 Province level

İstanbul constitutes 20.3 % of the total workforce in Turkey.[103] In 2020, the workforce amounted to 6.289.000, of which women constituted 31.5 % and men 68.5 %, aligning with national trends. The majority of the workforce was formally employed in the services sector (67.8 %), followed by the industry sector (31.2 %) and less than one percent (0.9 %) of the population in the agriculture sector. About 18.6 % of the workforce in İstanbul was estimated to be informal workers.

As seen in Figure 5-64, the percentage of workers that have a wage is higher in İstanbul than the national average for both men and women. In 2014, 79.9 % of all men in İstanbul were wage workers,

[100] The Global Gender Gap Report benchmarks 149 countries on their progress towards gender parity across four thematic dimensions: Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment.

[101] Registered Employment. 2016. Report. Available from: http://kayitlicalisiyorum.com/kayit-disi-istihdam-nedir

[102] World Bank. Turkey Overview. 2021. Available from: https://www.worldbank.org/en/country/turkey/overview

[103] Governorship of İstanbul. 2016. Turkey's Capital of Commerce, Business, Investment, Finance and Tourism: İstanbul. Available from: http://www.İstanbul.gov.tr/turkiyenin-ticaret-is-yatirim-finans-ve-turizm-baskenti-İstanbul

whereas the rate for women was of 87.6 %. About 10 % of men were self-employed, whereas this rate for women was of 7.4 %. Then, 9 % of men were employers, whereas only 2.3 % of women were employers. Finally, only 0.6 % of men were unpaid family workers, whereas the rate for women was of 2.8 %.

Source: TURKSTAT, 2015

Figure 5-64 Structure of employment by status at work, Turkey and İstanbul, 2014

Unemployment rate in İstanbul was reported as 14.7 % (926,000 people), with 16.8 % for women and 13.7 % for men. It was also reported that there are over 500,000 young people in İstanbul who are classified as “inactive”, meaning young people between the ages of 15-24 who are not registered in school nor in employment.[104]

Most of the job positions available in İstanbul is related to unskilled general labour jobs, on sales representatives or security officers. The rest is unskilled and semi-skilled jobs in services sector.[105] Indeed, economic activities in İstanbul depend heavily on SMEs in the services sector. With regards to earnings and gender gaps, women earned less than men with an average of 5,492.6 TL monthly compared to 5,695.3 TL for men[106].

5.4.7.2.3 District and local level

The unemployment rate in the different districts in the AoI varies greatly. For example, in 2012, the unemployment rate for the province of İstanbul was of 12 %, whereas Arnavutköy had a higher unemployment rate (13 %), the rest of the districts had a lower rate of 11 % for Başakşehir and 7 % for Çatalca. Furthermore, the average income per year varies greatly as well. The district with the highest income in 2019 was Başakşehir, with 47,468 TRY per year (higher than the İstanbul income of 40,749). Büyükçekmece had an income of 38,029 TRY per year, followed by Çatalca with 29,953 TRY per year and Arnavutköy with 27,253 TRY per year.

At local level, it is estimated that in the urban areas of the AoI, women mostly work in the services sector, whereas in the more rural neighbourhoods they majority works as an unpaid family worker in agriculture or in minimum wage-jobs.

[104] İstanbul Statistics Ofice. March 2021. Workforce Report. Available from: https://www.ibb.İstanbul/News/Detail/37716
[105] IŞKUR. 2020. İstanbul Workforce Report, 2020. Available from: https://media.iskur.gov.tr/45171/İstanbul.pdf
[106] IŞKUR. 2020. İstanbul Workforce Report, 2020. Available from: https://media.iskur.gov.tr/45171/İstanbul.pdf

Başakşehir District accommodates industrial production, international freight and storage services, as well as some agriculture and animal husbandry. It registers 635 very diverse companies[107], from small local shops to manufacturing ateliers, factories, industrial production sites and storages. Most of SMEs are in the services sector. Başakşehir also hosts one of the two organised industrial zones in İstanbul, namely the İkitelli Organised Zone is locate at the north of Transit European Motorway (outside of the AoI), which employs between 200 and 500 people. People traffic is quite high and reported as daily around 300,000 people and it is also reported that around 70,000 tonnes of goods move through the zone daily.[108] Başakşehir also hosts food and retails shops along the Project route, owned by Syrian refugees.

Arnavutköy is the other major host neighbourhood in the AoI. In total, 117 enterprises are registered in the district. The majority are SMEs are specialised in small scale manufacturing, construction and industrial production supplies, mostly located in Hadımköy area.

The neighbourhoods that rely primarily on the trade sector are Bahçesehir 2, Karaaağaç, Nakkaş and Tahtakale. The main employment sectors in Deliklikaya are trade and construction, and Ömerli's main employment sector is industry. Other sectors that are present in the AoI are the public sector (Şamlar, Deliklikaya, Ömerli, Karaağaç and Nakkaş) education and healthcare (in Bahçesehir 2, Şamlar, Ömerli, Karaağaç, Nakkaş and Tahtakale), construction (Bahçesehir 2, Ömerli and Tahtakale), transportation (Bahçesehir 2, Kayabaşı and Tahtakale), tourism (Bahçesehir 2) and manufacturing (Kayabaşı and Nakkaş).

The *Muhtar* of Kayabaşı (Başakşehir district) and Karaagaç (Büyükçekmece district) reported the presence of seasonal workers in the public sector. In Yeşilbayır (Arnavutköy district) the seasonal workers work in hay carrying, and in Tahtakale (Avcılar) they work in agriculture, more specifically seasonal cropping. In Şahintepe (Başakşehir district), the seasonal workers work in construction, industry and textile. Nakkaş (Çatalca district) also has seasonal workers.

The neighbourhoods that are more industrialized according to their primary sectors are Bahçesehir 2 (Başakşehir district), Deliklikaya and Ömerli (Arnavutköy district), Karaağaç (Büyükçekmece district), Nakkaş (Çatalca district) and Tahtakale (Avcılar district). Kayabaşı and Şamlar (Başakşehir district) both have urban employments in their secondary sectors.

Within the affected business structures in the Project area, there are 352 employees (35 are women employees), and most of them are in the manufacturing or construction activities.

5.4.8 Livelihood Activities in the AoI

5.4.8.1 Overview

The province of İstanbul is considered the industrial centre of Turkey, as some of the country's major manufacturing plants are located in the city of İstanbul. The surrounding districts are mainly rural and forest areas (48.5 % of the province is forest), in which farming, animal husbandry and manufacturing constitute the main source of livelihood. Although most of the AoI has historically been rural, the expansion of İstanbul city, its suburbs and the surrounding districts has caused loss of forest and agricultural area in the region. Subsequently, animal husbandry has been restricted in some neighbourhoods due to the increasing production costs and decreasing area for grazing. Scale of flocks and animal numbers have decreased quite remarkably in the recent 20 years according to the stakeholders of Arnavutköy.

Agricultural activities are mostly performed in the remote and rural areas in the districts of Arnavutköy, Çatalca, Büyükçekmece and Başakşehir, especially around the Sazlıdere Dam. Animal husbandry is present in Arnavutköy, Çatalca, Avcılar and Büyükçekmece, with ovine and bovine breeding and poultry raising being the predominant types.

[107] İstanbul Business Registry. 2021. Available from: http://www.isfirmarehberi.com/ilce/398/basaksehir/?sayfa=1

[108] iOSB. 2021. General Information. Available from: https://iosb.org.tr/hakkimizda/#nufus-durumu

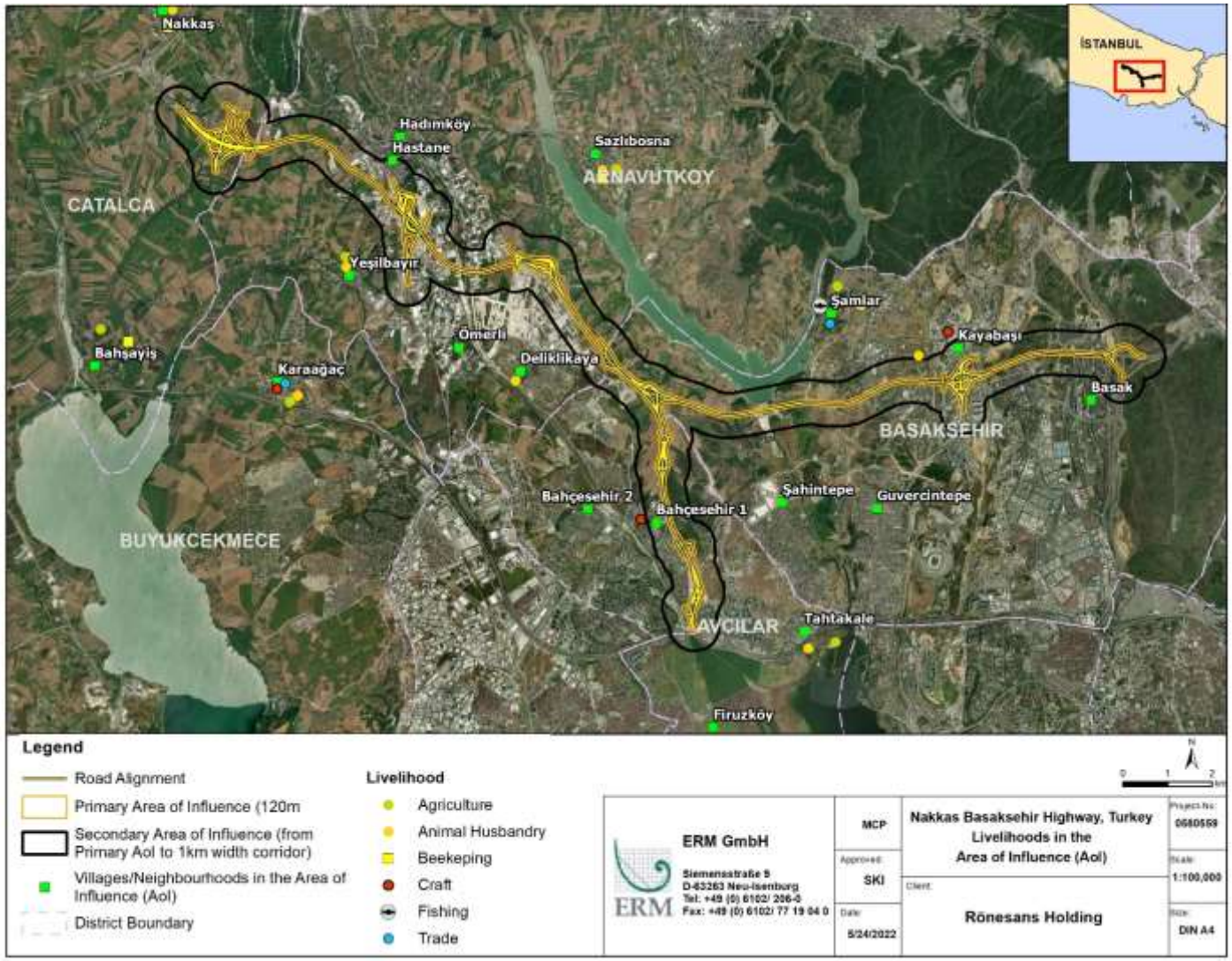
Şamlar, Kayabaşı (Başakşehir district), Sazlıbosna, Yeşilbayır (Arnavutköy district), Karaaağaç (Büyükçekmece district), Bahşayiş and Nakkaş (Çatalca district) are the settlements where most people depend on agriculture and animal husbandry as a primary livelihood activity. There is also beekeeping in Sazlıbosna (Arnavutköy), Nakkaş (Çatalca), and in Şamlar (Başakşehir) where some fishing also takes place due to its location near a river.

The main livelihood activities are described in more detail in the remainder of this section (Table 5-41 and Figure 5-65). Further details on local livelihoods are presented in RAP.

Table 5-41 Primary and Secondary Livelihoods in the AoI

District	Settlement	Settlement Category	Main Livelihood	Other Livelihoods
Başakşehir	Bahçesehir 1	Urban	■ N/A	■ N/A
	Bahçesehir 2	Urban	■ Trade	■ Craft
	Başak	Urban	■ N/A	■ N/A
	Şamlar	Rural	■ Agriculture	■ Animal Husbandry (ovine, bovine and poultry) ■ Beekeeping ■ Fishing ■ Trade
	Kayabaşı	Urban	■ Animal Husbandry (ovine and bovine)	■ Craft
	Güvercintepe	Urban	■ N/A	■ N/A
	Şahintepe	Urban	■ N/A	■ Animal husbandry (ovine, bovine, poultry)
Arnavutköy	Hadimköy	Urban	■ N/A	■ N/A
	Deliklikaya	Urban	■ N/A	■ Animal husbandry (ovine and bovine)
	Ömerli	Urban	■ N/A	■ Animal Husbandry (ovine, bovine and poultry)
	Sazlıbosna	Rural	■ Agriculture ■ Animal husbandry (ovine, bovine and poultry)	■ Beekeeping
	Hastane	Urban	■ N/A	■ N/A
	Yeşilbayır	Rural	■ Agriculture ■ Animal husbandry (ovine and bovine)	■ N/A
Çatalca			■	■
	Nakkaş	Rural	■ Agriculture ■ Animal Husbandry (ovine, bovine and poultry) ■ Trade	■ Beekeeping
Avcılar	Firuzköy	Urban	■ N/A	■ N/A
	Tahtakale	Urban	■ Trade	■ Animal Husbandry (ovine, bovine and poultry)

Source: ERM Settlement profiling, August 2021



Source: ERM Field Survey, 2021

Figure 5-65 Overview of Natural Resources based Livelihoods in the AoI

5.4.8.2 Agriculture, Animal Husbandry and Other Agriculture-related Activities

As previously stated, agricultural activities are mostly performed in the remote and rural areas of the district of Arnavutköy, Çatalca and Başakşehir, especially around the Sazlıdere Dam.

The predominant type of agriculture in the area is dry agriculture and irrigated, however market gardening is also present. Dry farming is carried out with one harvest per year.

The most common types of crops are wheat, barley, oat, sunflower and corn, although some neighbourhoods in Çatalca district also grow canola, clover and melons.

Animal husbandry is present in the districts of Arnavutköy, Çatalca and Avcılar, with ovine and bovine breeding and poultry raising being the predominant types. In Başakşehir district, the breeding meat is mostly used for sacrifice holidays and offerings. The production of milk and dairy products are not widespread. Cattle animals are mostly bred in barns with no access to grazing, when sheep flocks are widespread in grazing areas.

It should be noted that some neighbourhoods' status (such as Bahşayış) changed status recently (from village to neighbourhood). Due to this change, animal husbandry was restricted, and many community members had to stop agricultural activities seeing as it was not financially beneficial anymore, as production costs became higher than selling prices.

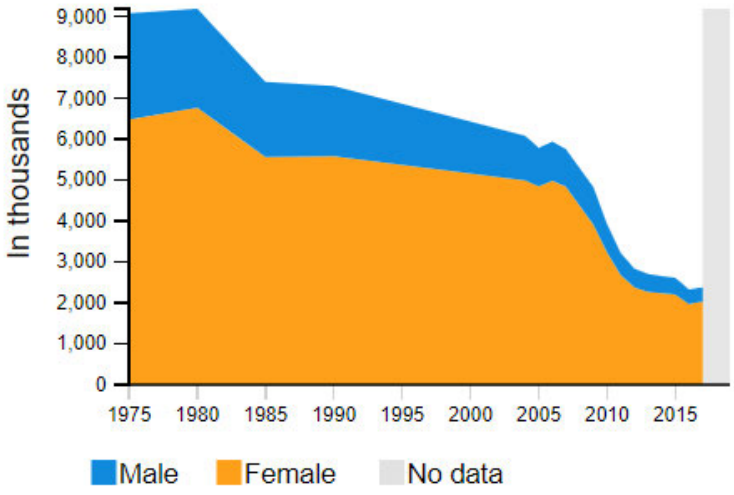
Agricultural and animal husbandry activities observed in the districts crossed by the Project are summarised below including the main types of crops cultivated and animal raised:

- In Başakşehir District the most common agricultural products are wheat, barley, fodder crops. Animal husbandry is performed around the Sazlıdere Dam. During field visit, animal flocks were observed in Şamlar and Şahintepe neighbourhoods. That total cattle in Başakşehir fluctuates between 3,000 to 5,000 and sheep from 1,000 to 1,500.
  - Şamlar is focused on vegetable growing of wheat, barley, oat, corn, and sunflower. The neighbourhood registers 500 cattle, 800 sheep and goat, 1,000 poultry and more than 450 beehives.
  - Kayabaşı breeds 1,000 cattle and 5,000 sheep and goat.
  - Bahçeşehir 2 grows wheat.
- Arnavutköy District is mainly focused on dry agriculture (wheat, barley, oat, corn and sunflower) in the neighbourhoods of Deliklikaya, Sazlıbosna, and Yeşilbayır. Animal husbandry of ovine, bovine, and poultry is performed in all settlements, but in a greater scale in Sazlıbosna. Beehives are located in Sazlıbosna (150) and Yeşilbayır (100).
  - In Deliklikaya performs dry agriculture of wheat and barley. It counts with 150 cattle, the same number of sheep and goat and poultry.
  - Ömerli breeds 30 cattle, 20 sheep and goat and 150 poultry.
  - Sazlıbosna performs dry agriculture of wheat, barley, oat and sunflower. It counts with 450 cattle, 1000 sheep and goat, 2000 poultry and 150 beehives.
  - Sazlıbosna performs dry agriculture of wheat, barley, oat, corn and sunflower. It counts with 100 cattle, 600 sheep and goat, 200 poultry and 100 beehives.
- Avcılar District engages in the husbandry of ovine, bovine, and poultry in the neighbourhood of Tahtakale.
- Finally, the Çatalca District also engages in dry agriculture (sunflower, wheat, barley, corn, oat, canola, clover, melon) and animal husbandry of ovine, bovine, and poultry. Beekeeping is also performed (200 beehives registered in Bahşayış).

5.4.9 Literacy and Education

5.4.9.1 National Level

Turkey has well-established institutions and extensive education public services, with compulsory education lasting 12 years from age 6 to age 17. School enrolment between the ages of 6 and 13 is over 98 % according to a UNICEF[109], however there are significant regional, socioeconomic and gender disparities throughout the country. For example, the literacy rate for youth is of 99.5 %, however, the vast majority of that illiterate youth is female (80.7 %). Indeed, illiteracy rate for women was reported as 6.9 % in Turkey in 2019. This is also the case for adults and elders that are illiterate, as 84.6 % and 84.2 % are female respectively. According to World Bank data, the literacy rate in Turkey is of 96.2 % (people aged 15 and above). The disparities between men and women is further illustrated in Figure 5-66 below.



Source: UNESCO, 2020

Figure 5-66 Share of Illiterate Population in Turkey (15+ years), 2020

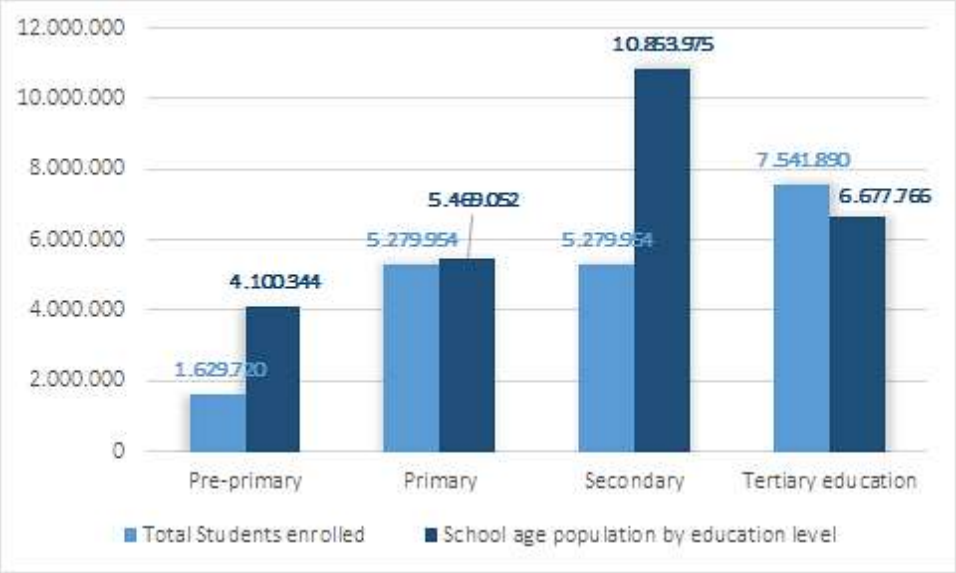
According to latest statistics of the Ministry of National Education for 2019-2020[110], there are a total of 68,589 of formal education institutions, with a total of 18,241,881 students and 1,117,686 teachers, with a rate of 48.2 % female and 51.8 % male. The Ministry of National Education also reported 16.808 non-formal training institutions, with a total of 10,958,359 students (53.95 % women and 46.1 % men). Figure 5-67 below illustrates the total number of students enrolled in each education level compared to the total population per school age. Schooling rate for primary school students in 2020 was 96.8 %, 97.1 % for women and 96.6 % for men. This rate decreases with secondary school, as it was reported to be 85 % for the total population, and 43.3 % for higher education.

University education rate for women is low, with 18.5 %. Employment rate for 15+ women is 28.7 %, whereas 63.1 % for men. This disparity is due, among other things, to the fact that employment prospects increase with educational attainment in Turkey (refer to Chapter 5.4.7.2). In 2019, about 54 % of young adults with below upper secondary education were employed, compared to 65 % with upper

[109] UNICEF. Turkey Annual Report 2019. 2020. Available from: https://www.unicef.org/turkey/en/reports/unicef-turkey-annual-report-2019

[110] Ministry of National Education. 4 September 2020. National Education Statistics Formal Education 2019-2020. Available from: https://sgb.meb.gov.tr/www/icerik_goruntule.php?KNO=396

secondary, 73 % with tertiary education and 84 % of young adults with a master's degree or doctorate.[111]



Source: Ministry of National Education, 2020 and UNESCO, 2019

Figure 5-67 Total Students Enrolled vs. Total Population per School Age by Education Level, 2019

5.4.9.2 Province level

Levels of educational attainment in İstanbul are comparable to those seen at a national level in primary school and tertiary education, however these are lower for secondary school. İstanbul's literacy rate was 97.56 as of 2019. That same year, schooling rate for both primary and middle school was of 98.12 %. It is estimated that 59 % of the population have attended primary and middle school, 22 % have attended high school and 19 % have tertiary education.

5.4.9.3 District and local level

As per Table 5-42, Başakşehir is the district with the highest amount of students and therefore education facilities. Büyükçekmece ranks second in terms of amount of schools, but a lower amount of number of students. Avcılar is a district with a relatively low amount of schools compared to students. Arnavutköy places third in terms of number of students, however fourth in terms of number of pre-schools and secondary schools, second in terms of *anasınıfı*, third in terms of number of primary schools and vocational schools.

Table 5-42 Educational institutions at district level

	Başakşehir	Arnavutköy	Çatalca	Avcılar	Büyükçekmece
Number of pre-schools	73	9	5	37	57
Number of pre-classes within primary schools (*anasınıfı*)	44	41	26	31	33
Number of primary schools	89	71	56	53	82
Number of secondary schools	53	18	12	35	51

[111] OECD. 2019. Country note: education at a glance 2019, Turkey. Available from: https://www.oecd.org/education/education-at-a-glance/EAG2019_CN_TUR.pdf

	Başakşehir	Arnavutköy	Çatalca	Avcılar	Büyükçekmece
Number of students in pre, primary and secondary schools	90,499	53,233	11,824	73,225	50,654
Number of high schools	33	7	4	19	31
Number of vocational schools (high school)	20	11	8	16	20
Universities having campuses in these districts	Murat Hüdavendigar University			İstanbul University, İstanbul Gelişim University	İstanbul University, Fatih University

Source: Mahallem SEGE (mahallemİstanbul.com)

In the neighbourhoods of the AoI, the *muhtars* of Kayabaşı, Şahintepe and Bahçesehir 2 (Başakşehir), Deliklikaya and Ömerli (Arnavutköy), Bahşayiş (Çatalca), Tahtakale (Avcılar) reported the presence of illiterate persons, with the *Muhtar* of Kayabaşı reporting the highest number (5500), and the rest reporting less than a dozen.

As per Table 5-43, not all settlements have educational institutions.

Table 5-43 Educational institutions at settlement level

District	Settlement	Primary school	Secondary school
Başakşehir	Bahçesehir 1	N/A	N/A
	Bahçesehir 2	X	X
	Başak	N/A	N/A
	Şamlar	X	X
	Kayabaşı	X	X
	Güvercintepe	N/A	N/A
	Şahintepe	X	X
Arnavutköy	Hadimköy	N/A	N/A
	Hastane	N/A	N/A
	Deliklikaya	X	X
	Ömerli	X	X
	Sazlıbosna	X	X
	Yeşilbayır	-	-
Çatalca	Bahşayiş	-	-
	Nakkaş	X	X
Avcılar	Firuzköy	N/A	N/A
	Tahtakale	X	X

Source: Settlement Profiling, 2021

In Kayabaşı (Başakşehir district) and Bahşayiş (Çatalca district), the *Muhtars* reported that the main barrier in accessing school is that some families cannot afford it.

Furthermore, the RAP identified the presence of Quran schools in the AoI (see Figure 5-68 below).

Source: RAP, GEM 2022

Figure 5-68 Quran School in Kayabaşı settlement (Başakşehir district), 2021

5.4.10 Community Health, Safety and Security

5.4.10.1 Community Health and Basic Health Indicators

The life expectancy in Turkey has been steadily increasing since 1960. The life expectancy at birth in 2019 was of 77 years, 74 years for men and 80 years for women. The infant mortality rate (per 1,000 live births) has steadily decreased as it went from 33.5 in 1998 to 8.6 in 2018[112].

Maternal mortality rate has also decreased in the last decades and went from 57 to 16 from 1990 to 2015, putting Turkey on par with OECD countries such as South Korea, and above the United States. The mortality rate for under-5 (per 1,000 live births)[113] has followed the same trend, decreasing from 44.6 in 1998 to 10 in 2019.

5.4.10.2 Chronic Disease

Non-communicable diseases (NCDs) accounted for over 87.5 % in 2015 and 90.167 % in 2019 of all mortality in Turkey as risk factor levels are high. The most important risk factors are:

- Tobacco use: in 2017 43.6 % of men were current smokers, 19.7 % of women;
- Harmful alcohol use: men are estimated to consume almost nine times as much pure alcohol per capita as women;
- Unhealthy diet: salt/sodium consumption was of 18 g a day in 2008 and decreased to 9.9 g per day in 2017; and
- High levels of metabolic factors: raised blood pressure, raised total cholesterol, diabetes, and obesity (which as seen in figure is more prevalent in women). All metabolic factors are more predominant with older age in both men and women.

[112] World Bank Data. Mortality rate, infant (per 1,000 live births) – Turkey. Available from: https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=TR

[113] World Bank Data. Mortality rate, under-5 (per 1,000 live births) – Turkey. Available from: https://data.worldbank.org/indicator/SH.DYN.MORT?locations=TR

The most prevalent NCDs are cardiovascular disease (36.6 %), cancer (38.9 %), chronic respiratory disease (7 %) and diabetes (5.7 %). Coronary heart disease mortality rate in Turkish women is amongst the highest in Europe[114].

Significantly, higher percentages of men in most age groups engage in behavioural risk factors, whereas biological risk factors are more prevalent in women.

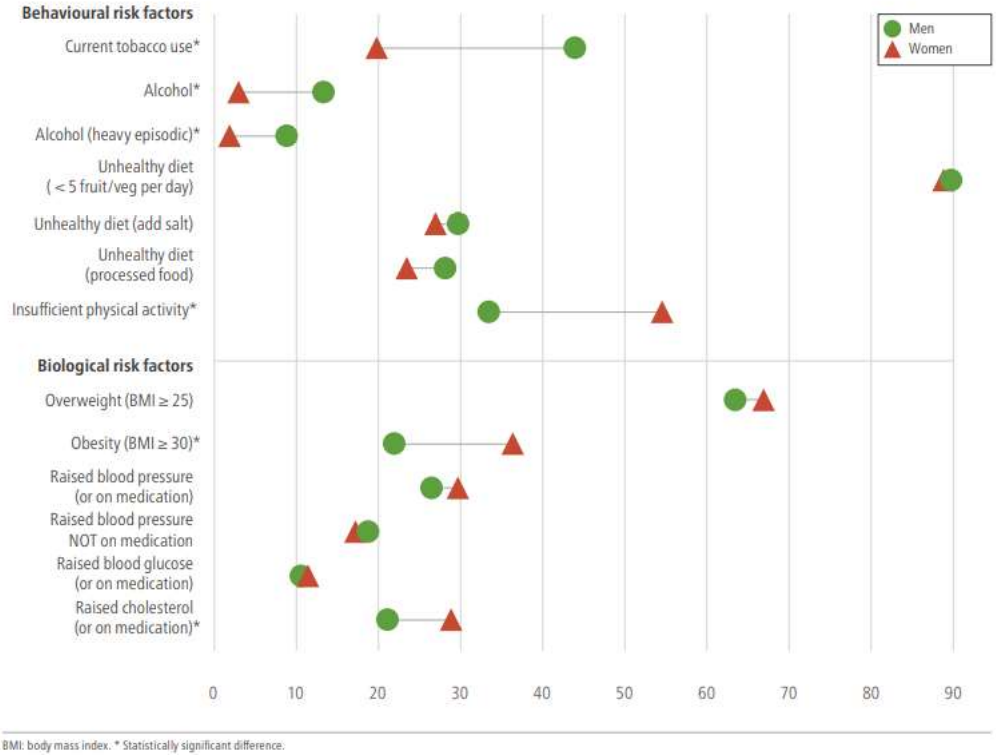


Figure 5-69 Behavioural risk factors depending on gender, 2019

Source: World Health Organization, 2020

In the settlements of the AoI, the most common causes for illness are age (reported as common in eight settlements) and cancer (reported as common in seven neighbourhoods), as seen in Table 5-44.

Furthermore, eleven (11) settlements reported the presence of people with mental or physical disabilities, six settlements reported the presence of paediatric diseases, and one (Tahtakale, Avcılar district) reported the presence of malnutrition and pregnancy related issues. The neighbourhood that reported the most illnesses is Tahtakale (Avcılar district).

[114] World Health Organization. 2018 Prevention and control of non-communicable diseases in Turkey. Available from: https://www.euro.who.int/__data/assets/pdf_file/0009/387162/bizzcase-tur-eng.pdf%3Fua%3D1.#:~:text=Noncommunicable%20diseases%20(NCDs)%20such%20as,and%20development%20challenge%20in%20Turkey.

Table 5-44 Most common illnesses and causes in the AoI

District	Settlement	Infectious Disease	Physical/ mental disability	Malnutrition	Pregnancy related issues	Age related	Paediatric	Cancer
Başakşehir	Bahçesehir 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bahçesehir 2	X	X	-	-	X	-	X
	Başak	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Şamlar	-	X	-	-	-	X	X
	Kayabaşı	-	X	-	-	-	X	X
	Güvercintepe	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Şahintepe	-	X	-	-	-	X	X
Arnavutköy	Hadimköy	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Hastane	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Deliklikaya	-	X	-	-	X	-	-
	Ömerli	-	X	-	-	X	X	X
	Sazlıbosna	-	X	-	-	X	-	X
	Yeşilbayır	-	X					
Çatalca	Bahşayiş	X	-	-	-	X	-	-
	Nakkaş	-	X	-	-	X	-	-
Avcılar	Firuzköy	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Tahtakale	-	X	X	X	X	X	X

Source: Settlement Profiling, 2021

5.4.10.3 Communicable Disease

5.4.10.3.1 COVID-19

The first case of COVID-19 in Turkey was recorded on 11 March 2020, and since then until 17 August 2021 there have been 6,096,816 confirmed cases of COVID-19. The first death recorded occurred on 15 March 2020, and there have been 53,324 deaths reported to WHO. The highest rate of new cases per day recorded was in April 2021, and in May 2021 Turkey had the fifth highest total case numbers in the world.

Its observed case-fatality rate stands at 0.84 %, the 148th highest rate globally, partly due to the fact that the Turkish health system was never overwhelmed as the country has the highest number of intensive care units in the world.

5.4.10.3.2 Brucellosis

Brucellosis has been present in Turkey for over a century, and it currently endemic. It is under-diagnosed and under-reported, with little readily accessible data concerning the epidemiology in Turkey. It is particularly prevalent in rural areas due to traditional farming practices, animal husbandry and consumption of fresh dairy produce.

5.4.10.3.3 Measles

In 2013 Turkey was the centre of a measles outbreak, with 7,145 diagnosed. The number of people diagnosed with measles increased significantly again from 69 cases in 2017 to 510 in 2018. This is linked with a decrease in the vaccination rate (from 98 % of the population in 2016 to 96 % in 2017). As seen in Figure 5-70 many of the cases were found in İstanbul province.

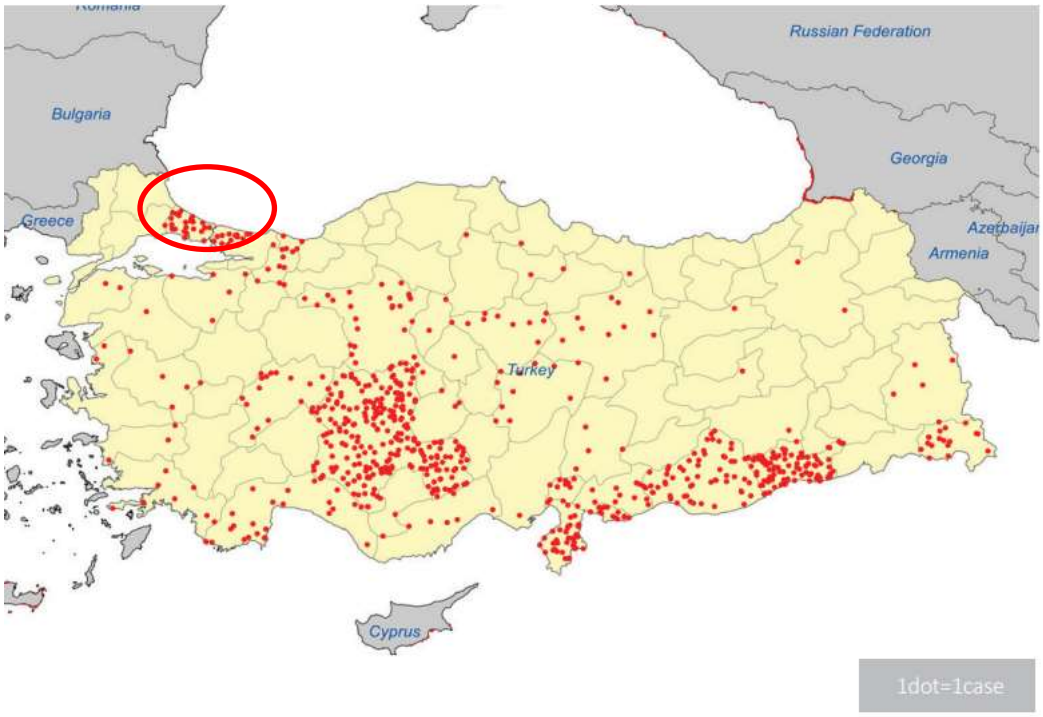


Figure 5-70 Measles cases by first subnational level, 2018

Source: WHO, 2019

5.4.10.3.4 Sexually Transmitted Infections

New HIV infections increased by 465 % between 2006 and 2017, however due to issues regarding official registration and notification there are is no official data about AIDS cases in Turkey. Foreign nationals are reported to make up 16 % of all people infected. Other sexually transmitted infections are on the rise too, such as syphilis and HPV, especially among younger people (ages 20 to 24).

5.4.10.3.5 Illneses in the AoI

The key informant interviews in the AoI reported common diseases in the AoI, in the districts of Arnavutkoy and Basaksehir. These included for both infectious and age related diseases. In Arnavutkoy District, cancer was also mentioned as a common disease in one of the villages.

The rest of districts declared not having any sort of common diseases, with most of them being rare or non-existent.

5.4.10.4 Intentional and Unintentional Injury

5.4.10.4.1 Interpersonal violence and femicide

Femicide or Feminicide has been described as a hate crime against women, as the set of forms of violence that, sometimes, end in homicides and even in suicides[115]. In Turkey, the rates of this type of violence is on the rise. Although the Turkish government does not keep records of violence against women, the Turkish feminist group We Will Stop Femicide (WWSF) reported that 300 women were murdered in Turkey in 2020, mostly at the hands of relatives or partners, whilst 171 were "found dead in suspicious circumstances".[116] Refer to Chapter 5.4.4 for more information on Security and Gender Based Violence.

No information on interpersonal violence was reported by the *Muhtars* as per Field Survey 2021.

5.4.10.5 Health Facilities and Health Services at local level

Turkey has increased health care investments in the recent years. Large-scale city hospitals were built within Public-Private Partnership (PPP) projects. The total hospital number was reported as 236 in İstanbul for 2018 and total bed numbers were reported as 39,328. Two doctors per one thousand people were reported.[117]

In Başakşehir district there is a newly built large city hospital complex, Çam ve Sakura City Hospital. This hospital has 2,682 bed capacity and eight medical branch hospitals, four emergency response services (adult, paediatric ER, traumatic ER and obstetrics ER). Başakşehir State Hospital is another large hospital serving in the district since 2007. Furthermore, there are 23 family health centres and two neighbourhood policlinics[118], as well as five private hospitals and many smaller clinics.

In Arnavutköy district, there is a state hospital with 201 beds, as well as a state hospital specialised in respiratory diseases with 100 beds. There is one private hospital and three (3) private clinics.[119]

Avcılar district has two public hospitals, four private hospitals and private clinics. [120]

In the AoI, the only settlement that has a hospital inside the neighbourhood is Kayabaşı (Başakşehir). The other neighbourhoods are located around 10 km and 20 km from a hospital. In Başakşehir, Şamlar is located 15 km away from a hospital, Bahçesehir 2 is located 17 km away and Şahintepe is located 10 km away. In Arnavutköy, Deliklikaya is located 9 km away from the nearest hospital, where as Ömerli is located 15 km away, Sazlıbosna 10 km away and Yeşilbayır is 20 km away. In the district of Çatalca, Bahşayış is located 10km away from the nearest hospital, whereas Nakkaş is located 12 km away. In Avcılar, Tahtakale is located 15 km away.

A family physician goes regularly to the neighbourhoods of Şamlar and Kayabaşı in Başakşehir district, Deliklikaya and Ömerli in Arnavutköy district, once a week to Nakkaş (Çatalca district) and every fifteen (15) days to Bahşayış (Çatalca district). No family physician visits Sazlıbosna and Yeşilbayır in Arnavutköy district, Tahtakale (Avcılar district) or Bahçeşehir 2 (Başakşehir district) regularly.

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[115] Lagarde, M. (1996) El género: la perspectiva de género. Available from: https://catedraunescodh.unam.mx/catedra/CONACYT/08_EducDHyMediacionEscolar/Contenidos/Biblioteca/Lecturas-Complementarias/Lagarde_Genero.pdf

[116] The Guardian, July 2021. "'History's on our side': Turkish women fighting femicide". Available from: https://www.theguardian.com/global-development/2021/jul/01/historys-on-our-side-turkish-women-fighting-femicide

[117] Biruni Tuik Gov. Gösterge Uygulamasi. 2021. Available from: https://biruni.tuik.gov.tr/ilgosterge/?locale=tr

[118] Turkish Directory of Public and Private Health Institutions. 2021. Başakşehir District Health Institutions. Available from: https://www.trhastane.com/basaksehir-hastaneleri.htm

[119] Turkish Directory of Public and Private Health Institutions. 2021. Arnavutkoy District Health Institutions. Available from: https://www.trhastane.com/arnavutkoy-hastaneleri.htm

[120] Turkish Directory of Public and Private Health Institutions. 2021. Avcilar District Health Institutions. Available from: https://www.hastane.com.tr/İstanbul-avcilar-hastaneleri.html

As seen in the Table 5-45 below, five settlement in the AoI have at least one (1) doctor and one (1) nurse in the neighbourhood (Bahçesehir 2, Kayabaşı, Deliklikaya, Ömerli and Tahtakale), eight (8) neighbourhoods have dispensaries (Bahçesehir 2, Kayabaşı, Şamlar, Deliklikaya, Ömerli, Karaağaç, Nakkaş and Tahtakale).

Only two (2) settlements reported to have midwives in the neighbourhood: Kayabaşı (Başakşehir) and Tahtakale (Avcılar). Midwives play pivotal role in providing maternity care, and they are crucial in saving the lives of pregnant women and preventing morbidity.

Finally, Bahçesehir 2, Şamlar and Şahintepe (Başakşehir district), Deliklikaya and Yeşilbayır (Arnavutköy district, Nakkaş (Çatalca district) and Tahtakale (Avcılar district) report having moderate to severe issues in terms of health services.

Table 5-45 Access to Health facilities and practitioners in the AoI

District	Settlement	Midwife	Health house dispensary	Doctors
Başakşehir	Bahçesehir 1	N/A	N/A	N/A
	Bahçesehir 2	-	X	X
	Başak	N/A	N/A	N/A
	Şamlar	-	X	-
	Kayabaşı	X	X	X
	Güvercintepe	N/A	N/A	N/A
	Şahintepe	X	-	X
Arnavutköy	Hadimköy	N/A	N/A	N/A
	Hastane	N/A	N/A	N/A
	Deliklikaya	-	X	X
	Ömerli	-	X	X
	Sazlıbosna	-	-	-
	Yeşilbayır	-	-	-
Çatalca	Bahşayiş	-	-	-
	Nakkaş	-	X	-
Avcılar	Firuzköy	N/A	N/A	N/A
	Tahtakale	X	X	X

Source: Settlement Profiling, 2021

5.4.10.6 Road safety issues

According to WHO, in 2016 approximately 9,782 people lost their lives in Turkey each year as a result of road traffic crashes, and an estimated 146,730 persons suffered serious injuries due to road accidents. As seen in Figure 5-71, the majority (over 60 %) of all fatal crashes involve cars, 28 % involved pedestrians, 7 % involve two or three wheelers and 3 % involve cyclists.

The agency in charge of coordination, legislation and monitoring and evaluation of road safety strategies, aimed to reduce road fatalities by 50 % between 2011 and 2020. Results on this target haven't been disclosed as of yet.

Furthermore, Turkey is one of the signatories of the UN's global road safety improvement plan of 2010. Around 73 % of all road crash fatalities and injuries happen in the economically productive age group (15 to 64 years of age), and the ratio of male to female fatalities is 3:1[121].

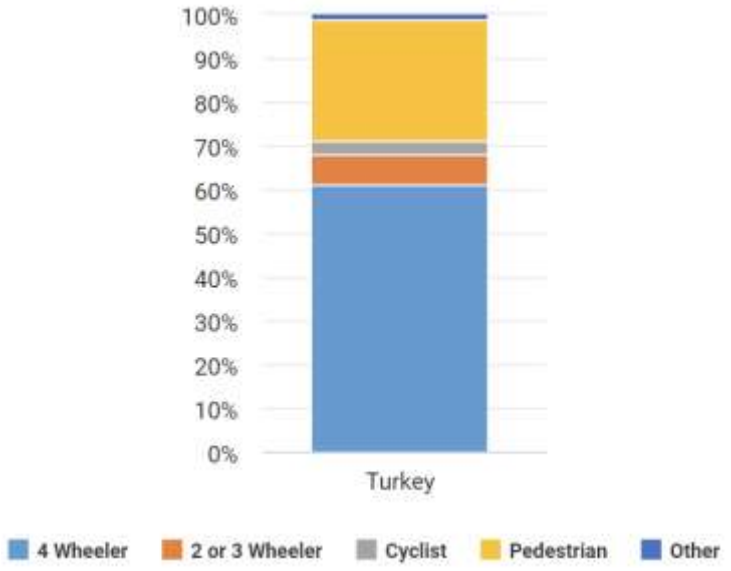


Figure 5-71 Fatalities by user in Turkey, 2016

Source: Global Road Safety Facility, 2016

According to Eurostat, 368 persons died due to a road accident in İstanbul in 2019, a decrease of 33.21 % since 2016 (with 551 deaths). There were 22,889 injuries in İstanbul in 2019.

According to the study on traffic in the AoI of 2021, the share of heavy traffic varies from 8% (first Bosphorus Bridge) to 35%, on the westernmost sections of O-3.

121 Global Road Safety Facility. 2016. Turkey's Road Safety Country Profile. Available from: https://www.roadsafetyfacility.org/country/turkey

5.4.10.7 Gender Based Violence

Domestic violence is a violation of women's human rights. Tolerance as well as the experience of domestic violence form significant barriers to women's empowerment and women's autonomy in all spheres of social life. This has adverse consequences for women's health, health-seeking behaviour, and the health of their children.

In 2009, a national study 'Domestic Violence against Women in Turkey' revealed that 38% of married Turkish women between the ages of 15 and 49 had experienced physical, emotional or sexual violence by a husband or partner at some point in their lives.

The Turkish Demographic and Health Survey (TDHS)[122] does not cover questions of gender-based violence prevalence (whether women have ever experienced GBVH) but includes only questions related to the justifications of violence, and the Turkey Domestic Violence Survey (TDVS) is a stand-alone country survey which does not provided cross-country comparison. The TDHS published in 2018 identified that about 9% of women believed that physical violence was justified at least under one specific circumstance. This is less than in 2013, when 13% of women found Gender Based Violence (GBV) justifiable[123].

Gender-based violence and harassment is rooted in gender inequality and unequal power and are enabled by gender stereotypes. Despite these determinants, Turkey's National Plan for Combating Violence Against Women 2021, which was announced on the day Turkey withdrew from the Istanbul Convention, makes no reference to gender equality and no reference to the Istanbul Convention which provides the roadmap for combating violence. The Ministry of Family and Social Services of the Republic of Turkey has also put in place a Violence Prevention and Monitoring Center (SONIM), which provides support for women throughout the country as well as help centres.

Although no update of the TDVS has been made since Turkey's withdrawal from the Convention, civil society organisations describe a rising prevalence of violence against women, including femicide. According to the Justice Ministry, recent years have seen an average of 400 femicides a year. In 2018, 440 women were murdered, of which about one quarter by their husbands. In 2019, the number was 474, the highest in a decade. Most of the killings were by partners or other family members[124]. According to the *We Will Stop Femicide* (Kadın Cinayetlerini Durduracağız) platform, the most recent figures are inconclusive. In 2020, the courts registered 300 femicides, though another 171 women were killed under suspicious circumstances, some of which were ruled to be suicides.[125] The Federation of Women's Association of Turkey (Türkiye Kadın Dernekleri Federasyonu) is working to secure gender equality and defines the violence suffered by women, girls and LGBTQI individuals as fundamental violation of human rights and discrimination. The organisation provides support services for GBVH survivors through their emergency hotline, legal and psychological support.[126]

The national regulatory framework includes several laws protecting women's rights. Turkey has laws in place that prohibit discrimination in employment by gender (Labour Act, Art. 5, Law on Human Rights and Equality, Arts. 3 and 6), and the penal code addresses sexual harassment in employment (Penal Code, Art. 105(2); Labour Act, Art. 24(II)(a)), just as there are criminal penalties or civil remedies for sexual harassment in employment (Criminal: Penal Code, Art. 105(2), and Civil: Penal Code, Art. 50(1)(b))[127].

[122] The TDHS is conducted by Hacettepe University Institute of Population Studies every five years.

[123] Hacettepe University Institute of Population Studies Ankara. 2018 Turkey Demographic and Health Survey. Available from: http://www.hips.hacettepe.edu.tr/eng/tdhs2018/TDHS_2018_main_report.pdf

[124] Zambrana, M., 2021. Turkey takes a step backwards on violence against women. Equal Times, 1 September 2021

[125] Kadın Cinayetlerini Durduracağız is part of the Borgen Project, We Will Stop Femicide, Turkey

[126] Türkiye Kadın Dernekleri Federasyonu GBVH survivors support

[127] World Bank, 2022. Women, Business and the Law

A summary of national laws related to protection of women's rights is given in the Table 5-46Table 5-46 National Laws protecting women's rights below which shall be considered by Nakkaş Otoyol A.Ş. and EPC Contractor during development of HR policies, GBVH policies as recommended.

Specific provisions will be implemented in the Project's Grievance Mechanism as defined in SEP to manage grievances related to GBVH (e.g. the complainant will be able to communicate the grievance to a person of its preferred gender, for example, if a woman prefers to explain the grievance to another woman, that will be possible). Nakkaş Otoyol A.Ş and EPC Contractor will also assign and train GBVH focal points (including women) to deal with GBVH related incidents and grievances as well as develop response measures and support mechanisms for survivors.

Table 5-46 National Laws protecting women's rights

Regulation	Summary
Law to Protect Family and Prevent Violence against Woman No. 6284 Official Gazette Date/Number: 20.03.2012/28239 Last Amended on 19.08.2017	The purpose of this law is to protect the women, the children, the family members, and the victims of stalking, who have been subject to the violence or at the risk of violence, and to regulate procedures and principles about the measures of preventing the violence against those people.
Turkish Criminal Code No. 5237 Official Gazette Date/Number: 12.10.2004/25611 Last Amended on 14.07.2021	The purpose of the Criminal Code is to protect the individual rights and freedom, public order and security, state of justice, public health and environment, and communal peace, as well as to discourage commitment of offences. This Law defines the basic principles for criminal responsibility and types of crimes, punishments, and security precautions to be taken in this respect. The sixth section of the Criminal Code is on offenses against sexual immunity including article 102 on sexual abuse and article 105 on sexual harassment.

There are several service providers for GBVH as summarized below. Nakkas Otoyol A.Ş and EPC Contractor will ensure that GBVH focal points are aware of the below listed service providers and assist the employees how to contact when needed:

- **Police Stations and Gendarme Stations:** Victims of domestic violence or those in danger of being subjected to violence may file a complaint at their closest police or gendarmerie station. The police or gendarmerie shall take preventive and protective measures in cases where immediate measures are required, and shall refer to the Public Prosecutor's Office in cases where no immediate action is required.
- **Public Prosecutor's Office:** Persons who have been subjected to violence or are in danger of being subjected to violence may also apply to the Public Prosecutor's Office at the courthouse to file a complaint and request necessary measures to be taken for their protection and remedy.
- **Family Court Judge:** Victims of violence or those who are at risk of being subjected to violence may apply to the judge of the Family Court in the province where they are located and request protective measures to be taken in order to keep them save. Where there is no Family Court, an application can be made to the judge of the Civil Court of First Instance. The judge shall decide on the necessary preventive and protective measures. Furthermore, legal proceedings can be initiated.
- **Social Service Counselling Line for Families, Women, Children and Disabled Persons (ALO 183):** ALO 183 is free of charge and can be reached 24/7 from anywhere in Turkey. The ALO 183 hotline, which is operated by the Ministry of Family and Social Policies, provides psychological, legal and economic counselling services to people who have been subject to violence or are in danger of being subjected to violence and who need support. The hotline provides information on services they can use and supporting organizations they can contact for further help, such as local women's organizations, women's shelters etc.

- **Emergency Telephone Lines:** Apart from ALO 183, there are several emergency telephone lines that can be reached 24/7 which include:
  - ALO 155 Police Help,
  - ALO 156 Gendarme Help
  - 112 Emergency
  - 0212 656 96 96 Domestic Violence Emergency Helpline
  - 444 43 06 Gelincik Line for Ankara
- **Provincial Directorates of Family and Social Policies:** The Provincial Directorate of Family and Social Policies, the District Directorate of Family and Social Policies, or Family Counselling Centres and Community Centres are places where victims of violence can seek further support. Services they receive there are free of charge and include the following: Counselling, Guidance, as well as Routing services.
- **Ministry of Interior:** Ministry of Interior developed an official application called Kadin Destek Uygulamasi (KADES - Women's Emergency Support Notification System) which is an emergency response application developed in order to prevent violence against women. Women who have been subjected to violence by their spouses or someone else. Woment who are likely to be exposed to violence can quickly reach the KADES, which was established for this work, by making a report via their smart phones.

  Women who are victims of domestic violence and violence against women can activate the KADES by entering the Turkish Republic ID Number and then using the activation code. By turning on the device location information, the closest police team will be dispatched to the scene where the call for help was made, and intervention will be provided.
- **SONIM:** The Ministry of Family and Social Services of the Republic of Turkey has put in place a Violence Prevention and Monitoring Center (SONIM) which provides support for women throughout the country as well as help centres. SONIM is the place where women who are exposed to violence come to stay away from violence and have access various supports. Violence Prevention and Monitoring Centre hosts the person for a while and these centres are “confidential” centres. The names and locations of such places are "confidential" so that the women do not feel a threat again.
- **Women Shelters:** Women’s shelters, that are also known as guesthouses in Turkey, were established to meet the temporary accommodation needs of women who have been subject to domestic violence or are at risk or becoming a victim of domestic violence. Women’s shelter’s provide temporary accommodation and protection to women and their children, if any, that were or are at risk of domestic violence. This service is provided by several institutions and organizations, such as the General Directorate on the Status of Women of the Ministry of Family and Social Policies, non-governmental organisations (NGO’s), municipalities, district governorships and governorships.

  The duration of stay in shelters is initially six months, but can be extended, if necessary. Girls or boys between the ages of 0 and 12 can stay together with their mothers in a shelter/guesthouse. Boys and girls under the age of 18 years are placed in dormitories under the General Directorate of Child Services of the Ministry of Family and Social Policies after an assessment of their situation. Girls under the age of 18 can stay together with their mothers in a guesthouse. Women over the age of 12 years with male children and women with disabled children are provided with rent and subsistence accommodation if deemed appropriate by the Violence Prevention and Monitoring Centre (ŞÖNİM).
- **Mor Çatı Women’s Shelter Foundation:** Mor Çatı is an NGO that was established in 1990 by feminists in order to combat violence against women. At Mor Çatı, the work against male violence is grounded in feminist principles, aiming for women to be able to build lives unhindered by gender-based discrimination and male violence under free and equal conditions.

Mor Çatı monitors and reports on the implementation of national and international conventions, laws, and regulations as well as making policy recommendations to decision-makers in order to eradicate violence and achieve gender equality. Mor Çatı holds workshops with women's organizations, civil society organizations (NGOs), bar associations and municipalities active in combating violence in order to share our information and experiences in the field.

- **Health centres:** People who have been subject to domestic violence or are at risk of becoming a victim of such violence, can apply to the nearest health institution (such as health centre, family medicine centre, emergency service points of hospitals etc.) for supporting medical services. If violence has been experienced, the necessary treatment is carried out and a report documenting the violence experienced is issued. In urgent cases the 112-emergency help phone should directly be called.
- **Bar Associations:** Those who are not in a position to pay a lawyer's fee to proceed with or initiate a lawsuit against their perpetrators may apply to their local bar association to benefit from free legal aid. Documents required for an application are the following: Identity card, proof of residence and a poverty certificate from the Mukhtar. If there is a Women's Counselling Centre affiliated to the Bar Association, it is possible to apply directly through the centre for free legal aid.
- **Women Solidarity Centres of Municipalities:** Psychological, medical, financial and legal support is provided in women's support units of the respective municipalities. In addition, free accommodation is also provided in women's shelters or guest houses.

5.4.10.8 Security

The 2021 Safe Cities Index gives Istanbul a score of 62.9/100 in their overall security average; ranking it 37th out of the 60 cities in the ranking. This score includes the ranking for personal security, where Istanbul only scores 48.8/100[128].

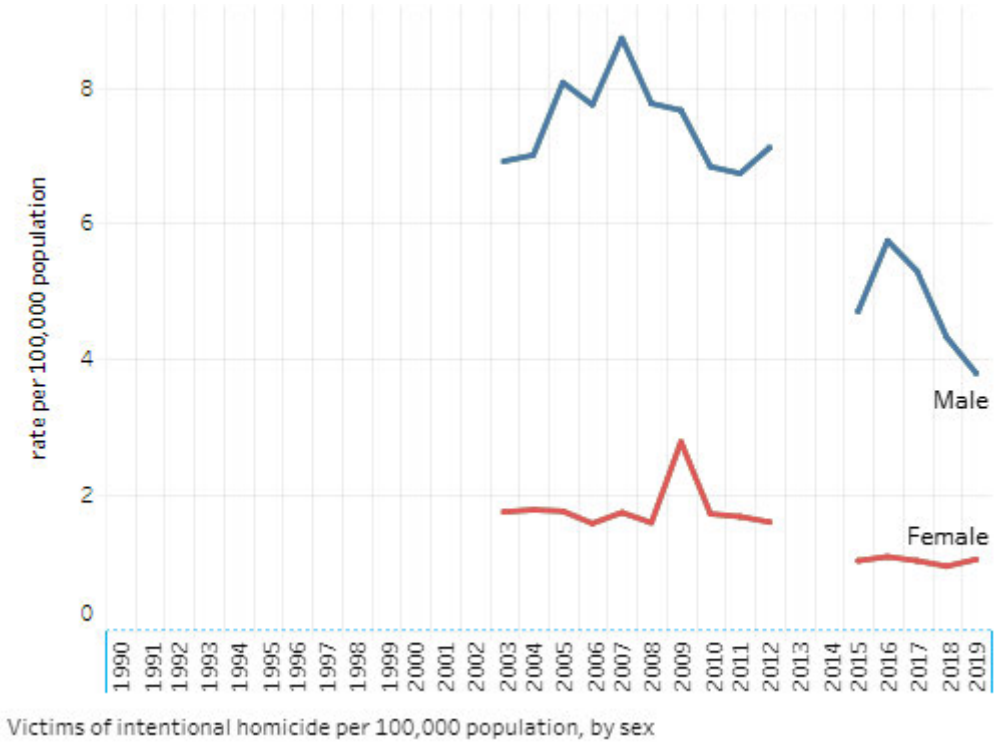
Figure 5-72 shows the data for number of homicide victims by sex in Turkey. As of 2019, the rate per 100,000 people for men was at 3.8 and 1.1 for women. The average (2.6) is below the world average (5.8)[129].

Nakkaş Otoyol A.Ş. identified the following security risks in the Project vicinity upon completion of the risk assessment:

- Vandalism
- Assault
- Damage to Property
- Traffic related assaults

[128] The Economist. 2021. Safe city Index 2021. Available from: https://safecities.economist.com/

[129] UNODC. 2022. Turkey country profile. Available from: https://dataunodc.un.org/content/Country-profile?country=Turkey



Source: UNODC, 2022

Figure 5-72 Number of victims of intentional homicide, by sex, Turkey, 1990 - 2019

5.4.10.9 Water Supply and Sanitation

5.4.10.9.1 Water Supply

Access to water in Turkey is universal, and access to water supply is high as 100 % of the Turkish urban population has access to an improved water source, 96 % of the rural population. Since March 2014, water supply and sewerage administrations, known as SKIs, have provided water supply and sanitation services to the 77 % of Turkey's population living in metropolitan municipalities. Turkey's water uses can be seen in Figure 5-73 below.

As shown in Figure 5-73, agriculture was by far the main consumer of Turkey's water supply in 2016 (89 %) followed by domestic water use (7 %) and industrial water use (4 %).

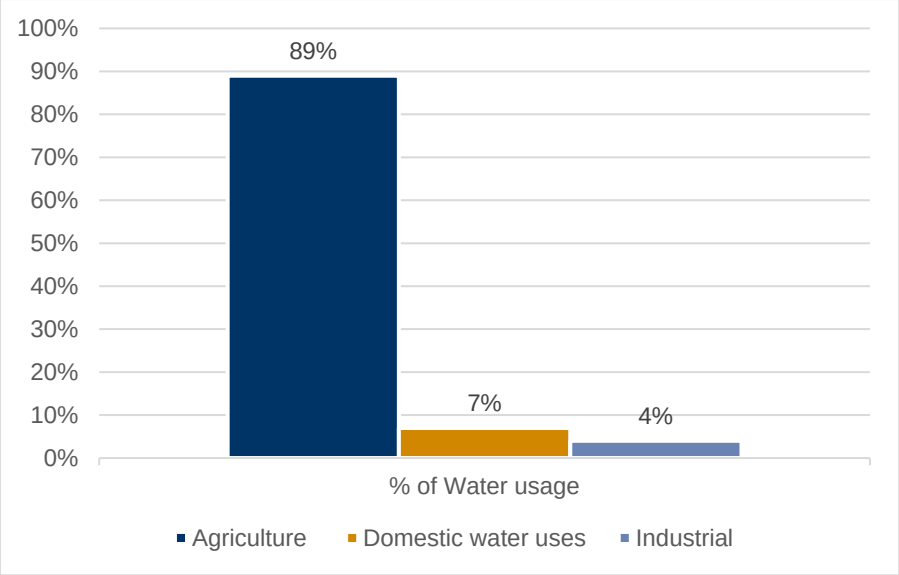


Figure 5-73 Water uses in Turkey, 2016

Source: World Bank, 2016

Nevertheless, the country has 1,350 cubic meters per capita available yearly, compared to Western European countries that can count with 10,000 cubic meters of water supply per capita[130]. This, combined with a projected population growth of 7 % from 2020 – 2025 in İstanbul could cause water shortages in the region.

Furthermore, the water use is much less efficient than that in high-income countries. For example, GDP per ton of water used in Turkey is only about 40 % of that of high-income countries. The inefficient use of water in agriculture causes over-abstraction of water from both surface and groundwater in several river basins. Turkey is one of the countries in the European region with some of the highest level of water security threat.

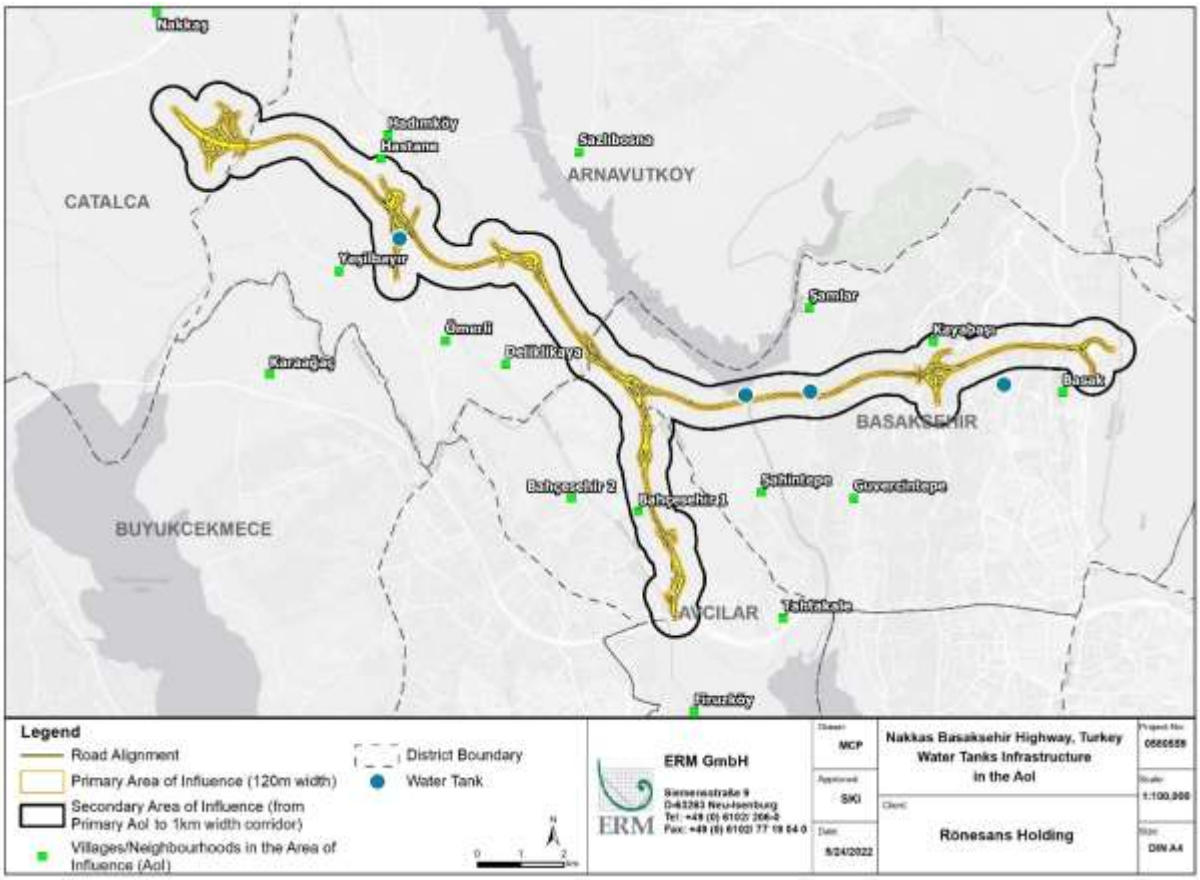
The municipality of İstanbul relies on dams and ponds for water, which are located mainly in the region. İstanbul suffered a drought in winter of 2021, with the municipality urging residents to use water thoughtfully[131], as the reservoirs in the region had reached their lowest water storage levels in 15 years (19.1 %). In May 2021, however, water levels in the dams reached 90 % due to precipitation[132].

According to the *Muhtars*, the settlements in the AoI have never had any chronic issues with water supply, and there have never been extended water cuts or shortages. There are several water tanks located around the neighbourhoods of the AoI, as seen in Figure 5-74 particularly near Kayabaşı, Şamlar and Şahintepe in Başakşehir.

[130] Turkish Ministry of Foreign Affairs. 2018. Turkey's Policy on Water Issues. Available from: https://www.mfa.gov.tr/turkey_s-policy-on-water-issues.en.mfa

[131] The Guardian. Turkey drought: İstanbul could run out of water in 45 days. 2021. Available from: https://www.theguardian.com/world/2021/jan/13/turkey-drought-İstanbul-run-out-water-45-days

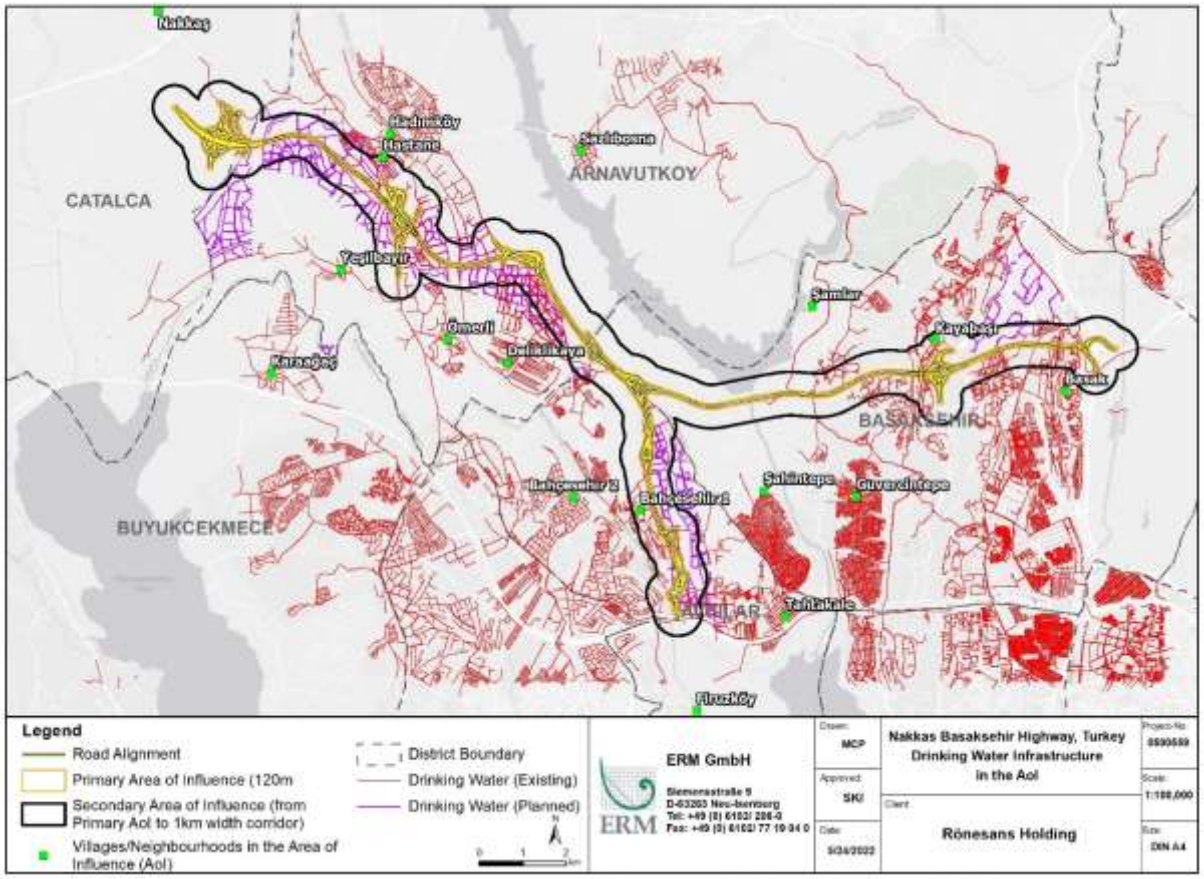
[132] The Hurriyet. 18 May 2021. İstanbul dams record highest water level in a year: Data. Available from: https://www.hurriyetdailynews.com/İstanbul-dams-record-highest-water-level-in-a-year-data-164807



Source: ERM, 2021

Figure 5-74 Water Tanks in the AoI

All settlements have a water supply network in the neighbourhood (Figure 5-75). Furthermore, even though all settlements in the AoI have drinking water infrastructure as seen in some reported the water was not drinkable, more specifically Deliklikaya and Ömerli (Arnavutköy), Bahçeşehir 2 (Başakşehir) and Nakkaş (Çatalca). Moreover, many reported difficulties accessing the water resources.



Source: ERM, 2021

Figure 5-75 Water infrastructure in the AoI

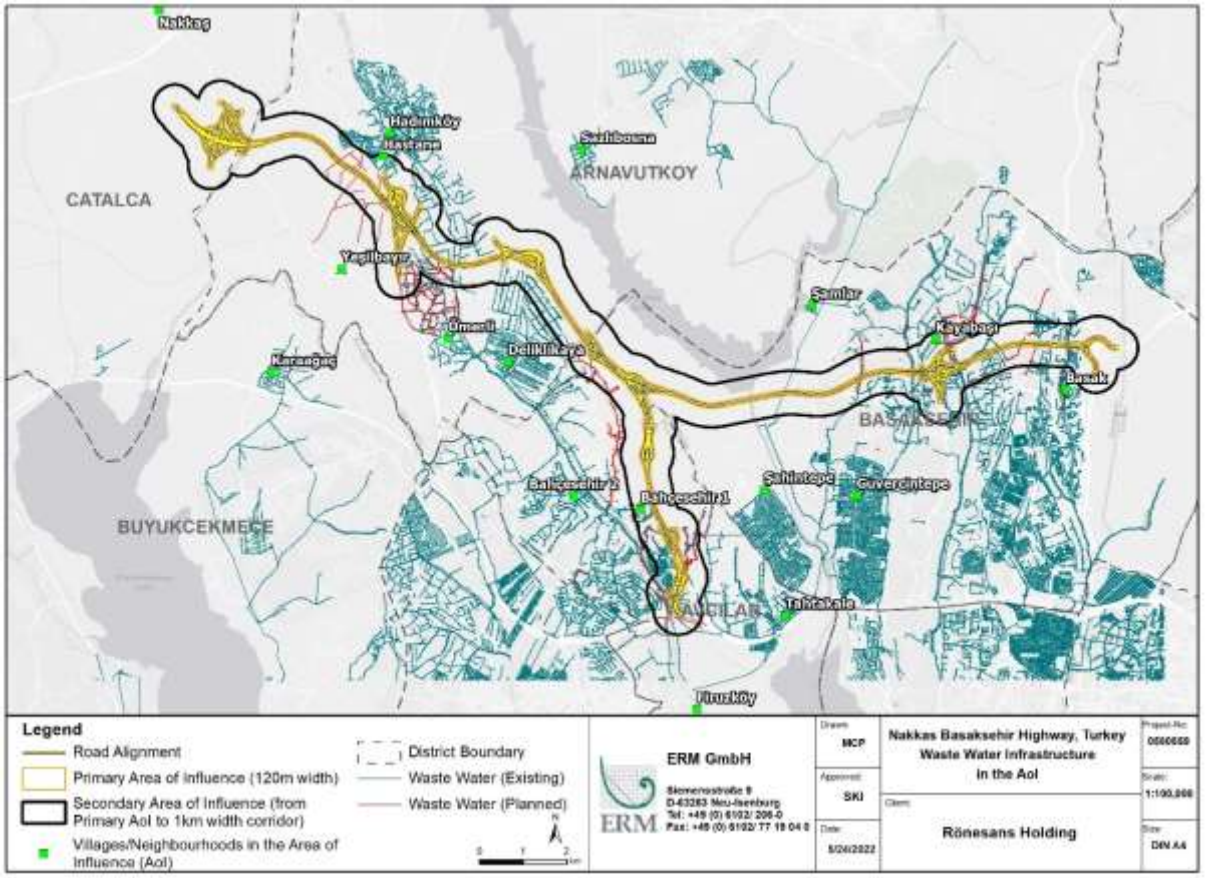
5.4.10.9.2 Sanitation

Regarding sanitation, 97 % of all Turkish population living in urban areas have access to improved sanitations facilities, compared to 75 % in rural areas. Turkey has made significant efforts to increase wastewater collection and treatment in municipalities, and connection rates to wastewater services have increased in the last decade.

İstanbul has seen a huge increase in its share of wastewater treated, going from 9 % in 1993 to 95 % in 2004.[133] The main municipal water and sanitation company, *İstanbul Su ve Kanalizasyon Idaresi* (ISKI), was first established in İstanbul in 1981.

In the AoI, all settlements have a central sewerage system (Figure 5-76).

[133] Altinbilek, D. 2007. Water Management in İstanbul. Available from: https://www.tandfonline.com/doi/abs/10.1080/07900620600709563



Source: ERM, 2021

Figure 5-76 Wastewater management in the AoI

5.4.10.10 Waste Management

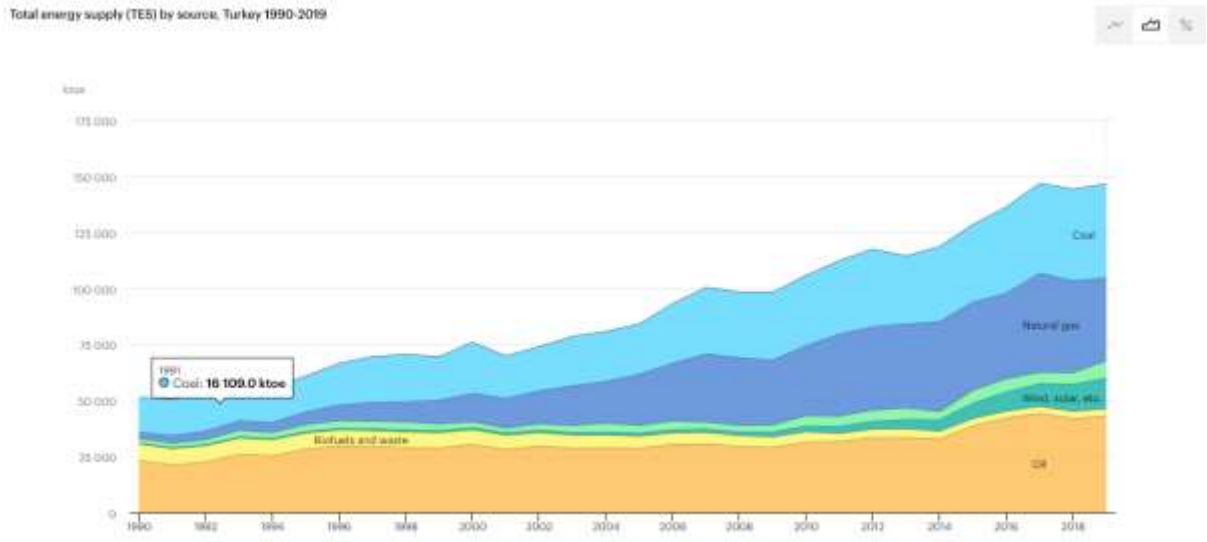
Waste management is a consistently growing area for Turkey. The Ministry of Environment and Urbanization, Climate Change published the National Action Plan for Waste Management 2023, which analyses the current waste management situation for all provinces of Turkey and sets its objectives. According to the waste management plan and the 2016 Action Plan, 61.07 % of municipal waste is disposed of in sanitary landfills and 28.25 % in municipal landfills. About 11 % of municipal waste (including packaging waste) was reported as recycled, composted or otherwise disposed of.

In İstanbul, waste management has improved due to strong governance and institutional involvement, including the creation of the regional solid-waste agency, the İstanbul Environmental Protection and Waste-Processing Corporation (ISTAC)[134].

In the AoI, all households dispose of their waste through recycling except for Şahintepe (Başakşehir), where waste is collected by waste trucks. Deliklikaya (Arnavutköy) and Yeşilbayır (Arnavutköy) reported having moderate issues with uncollected wastes, with Tahtakale (Avcılar), having severe issues. Furthermore, the *Muhtar* of Bahşayış (Çatalca) reported having a surplus of waste generated and dumped nearby the village by third party construction activities.

5.4.10.11 Energy

Turkey's rapid economic and population growth has driven up energy demand, as well as increased the country's import dependency. The government is seeking to boost domestic oil and gas exploration and production, diversify oil and gas supply sources and associated infrastructure, increase renewable energy production and improve energy efficiency. Figure 5-77 below illustrates the increase of the total energy supply by source in Turkey from 1990 to 2019.



Source: International Energy Agency, 2020

Figure 5-77 Total energy supply by source in Turkey, 1990-2019

Since the 2000s, where the main supplier for gas in Turkey was Russia, the country has made efforts to diversify and included Iran and Azerbaijan. The main suppliers for crude oil include Iran, Iraq, Russia and Saudi Arabia[135].

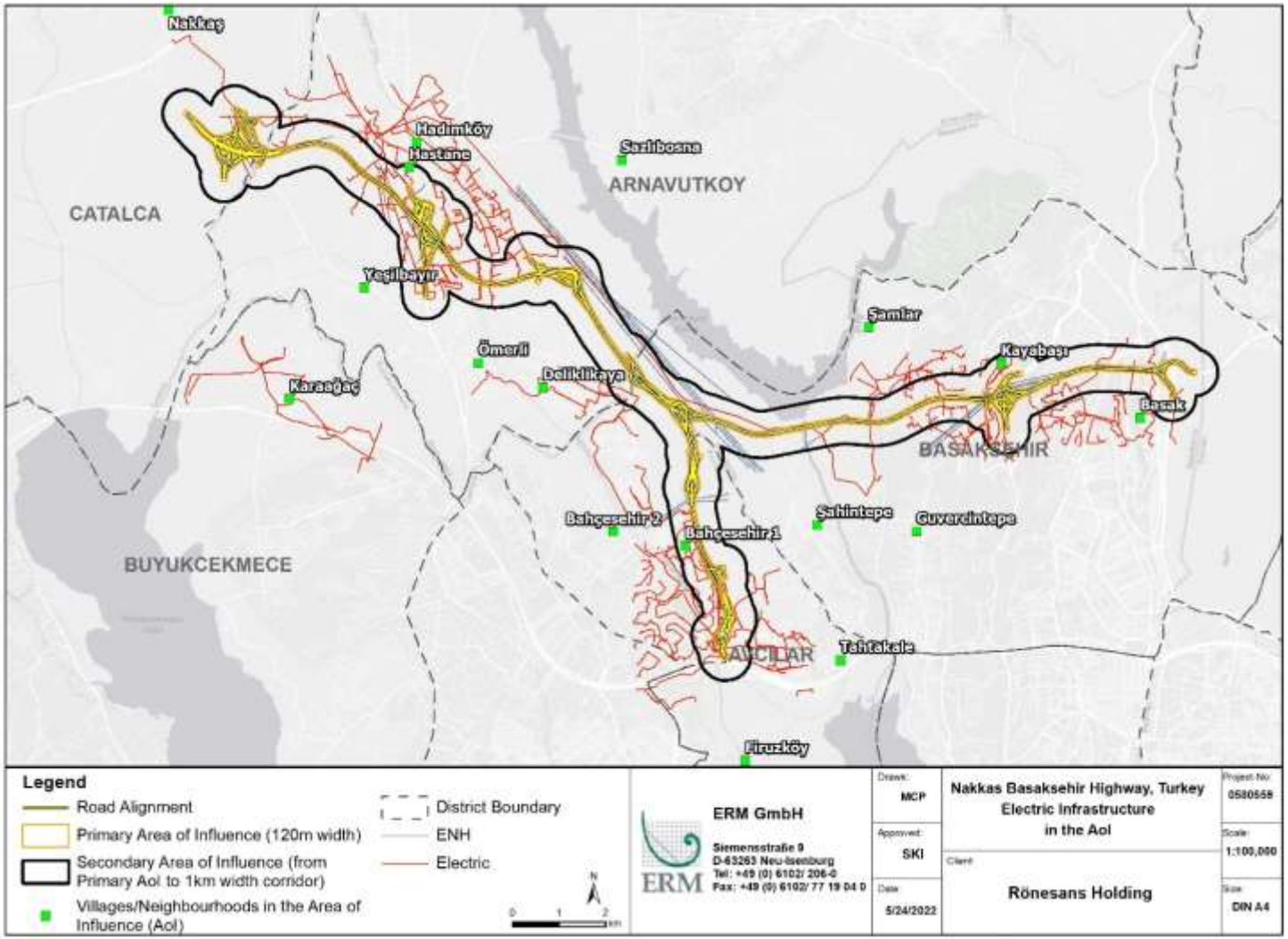
[134] Kanat, G. 2010. Municipal solid-waste management in İstanbul. Available from: https://www.sciencedirect.com/science/article/pii/S0956053X10000826?casa_token=JNUeCFtt-RUAAAAA:uuYM8rZa-4sG-g7C4O2KC7gROSFEQ3xTUAj5AqNMeQKIN2P0bcd3kxsMMWh4pI3MZhq7XX8VNaw

[135] International Energy Agency. 2021. Turkey 2021 Energy Policy Review. Available from: https://iea.blob.core.windows.net/assets/cc499a7b-b72a-466c-88de-d792a9daff44/Turkey_2021_Energy_Policy_Review.pdf

Approximately 300 TWh of electricity is consumed each year in Turkey, 3 kWh per person per day, which is half as much as the global average.

İstanbul was reported to consume 15 % of the total electricity production in Turkey. There are two main distribution companies, namely Bedaş in the European side and AYEDAŞ in the Asian region.

As seen in Figure 5-78, not all settlements in the AoI have electric lines in the neighbourhood, including Sazlıbosna (Arnavutköy), Yeşilbayır (Arnavutköy), Tahtakale (Avcılar) Nakkaş (Çatalca), who reported having moderate issues due to insufficient energy resources. Furthermore, *Muhtars* claimed that the inhabitants of the settlements are discontent about tariffs.



Source: ERM, 2021

Figure 5-78 Electric lines in the AoI

5.4.10.12 Telecommunication

In terms of telecommunications, the urban communities within the municipality, particularly those along the Eastern Main Road, are relatively well served, including radio, internet, cable television and telephone. Most connections in the telecommunication networks in Turkey are done via mobile phone and the internet, whilst the land line phone networks use is decreasing. The peak for landline usage reached 29.45 subscriptions per 100 people in 2001 and had decreased to 13,824 per 100 people[136] in 2019, whereas 96.83 out of 100 people have a mobile cellular subscription that same year.

Furthermore, 73.98 % of the total population was an internet user in 2019. According to the Mobile Connectivity Index[137], Turkey's mobile internet penetration improved from 37 % of the total population to 53 % in 2019, and its score in the Index improved remarkably as it increased from 53 in 2014 to 67 in 2019.

Land line subscriptions have decreased considerably in the last decade İstanbul's mobile cellular subscription exceeds its population, as there were 22,298,624 in 2020.

In the AoI, the settlement that reported the lowest internet usage was Yeşilbayır (Arnavutköy), with 20 %, followed by Tahtakale (Avcılar) with 50 %. All the other neighbourhoods reported an internet usage of over 90 %. All settlements reported over 85 % of the population having a mobile phone.

5.4.10.13 Transportation

Turkey is mostly road-dominated with a roadway network of 65,623 km in 2014. There are three types of intercity roads:

- State roads (Devlet Yolları): they are under the authority of the General Directorate of Motorways, except for urban sections. They are an integrated network of motorways and roads and are the primary road network.
- Controlled-access motorways (*Otoyol):* they are also called *Otoban*, and they are also under the responsibility of the General Directorate of Motorways. The network has a length of 3.523 km and is still in development as the entire network is not connected to each other. It is expected to expand to 4,773 km by 2023, and 9,312 km by 2025.
- Provincial roads (*Il Yolları):* they are motorways linking districts within a province to each other, the provincial centre, the districts in the neighbouring provinces, the state roads, railway stations, seaports and airports.

Turkey's public transport dynamics are reflected in İstanbul, as the majority of passengers travel through road transportation (77 %), illustrated in Table 5-47 below.

Table 5-47 Public transport and passengers in İstanbul (2019)

Type of transport	Daily passenger numbers	% of total
Rail systems	2,822,291	18.6 %
Metro/light rail	1,654,777	10.9 %
Tram	677,222	4.5 %
Cable car/tunnel/funicular tube/nostalgic tram	59,674	0.4 %
Marmaray (rail under the Bosphorus)	430,618	2.8 %

[136] World Bank Data. Fixed telephone subscriptions (per 100 people) Turkey. 2020. Available from: https://data.worldbank.org/indicator/IT.MLT.MAIN.P2?locations=TR

[137] The Mobile Connectivity Index measures the performance of 150 against the four key enablers of mobile internet connectivity. The index is built up through 39 specific indicators feeding into 13 dimensions which are aggregated to give a score for each of the four enablers.

Type of transport	Daily passenger numbers	% of total
Road transport	11,628,191	77.1 %
IETT Bus/Metrobus	2,059,151	13.4 %
Private bus	1,607,036	10.6 %
Autobus A.Ş.	860,801	5.7 %
Minibus	2,911,163	19.2 %
Taxi	1,403,949	9.3 %
Private shuttles	2,867,502	18.9 %
Sea transport	644,852	4.3 %
İstanbul Sea Buses	163,434	1.1 %
City Ferry	231,444	1.5 %
Private ferry lines and ships	249,973	1.7 %
Total	15,149,333	100 %

Source: IETT, 2020

Source: Licensed picture from iStockPhoto, 2018

Figure 5-79 Traffic in İstanbul

In 2020, İstanbul city was among the world's top five cities impacted by traffic congestion[138]. The motorway transport system carries over 95 % of passenger transport in Turkey, and almost 90 % of freight transport. This has led to high levels of congestion, as illustrated in Figure 5-80 below. İstanbul's roads show high congestion levels every day except for Sundays and most Saturdays.

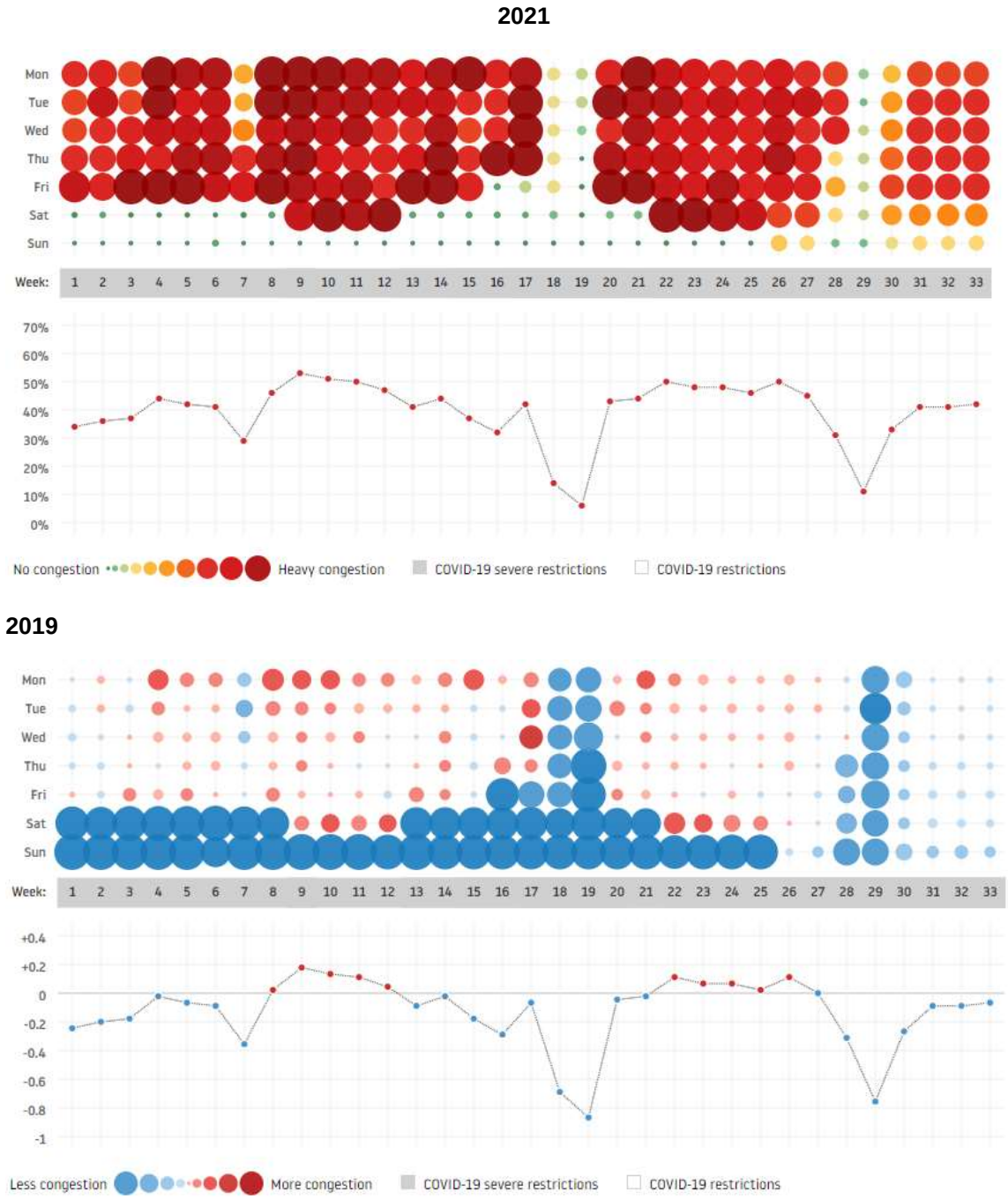
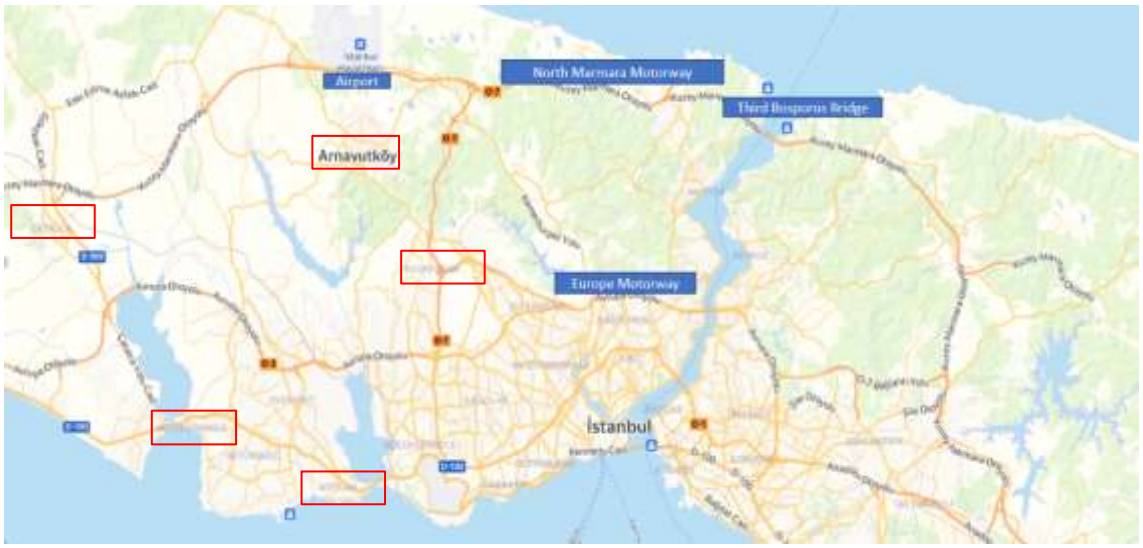


Figure 5-80 Congestion level for each day and week in İstanbul (2021)

Source: Tomtom, 2021

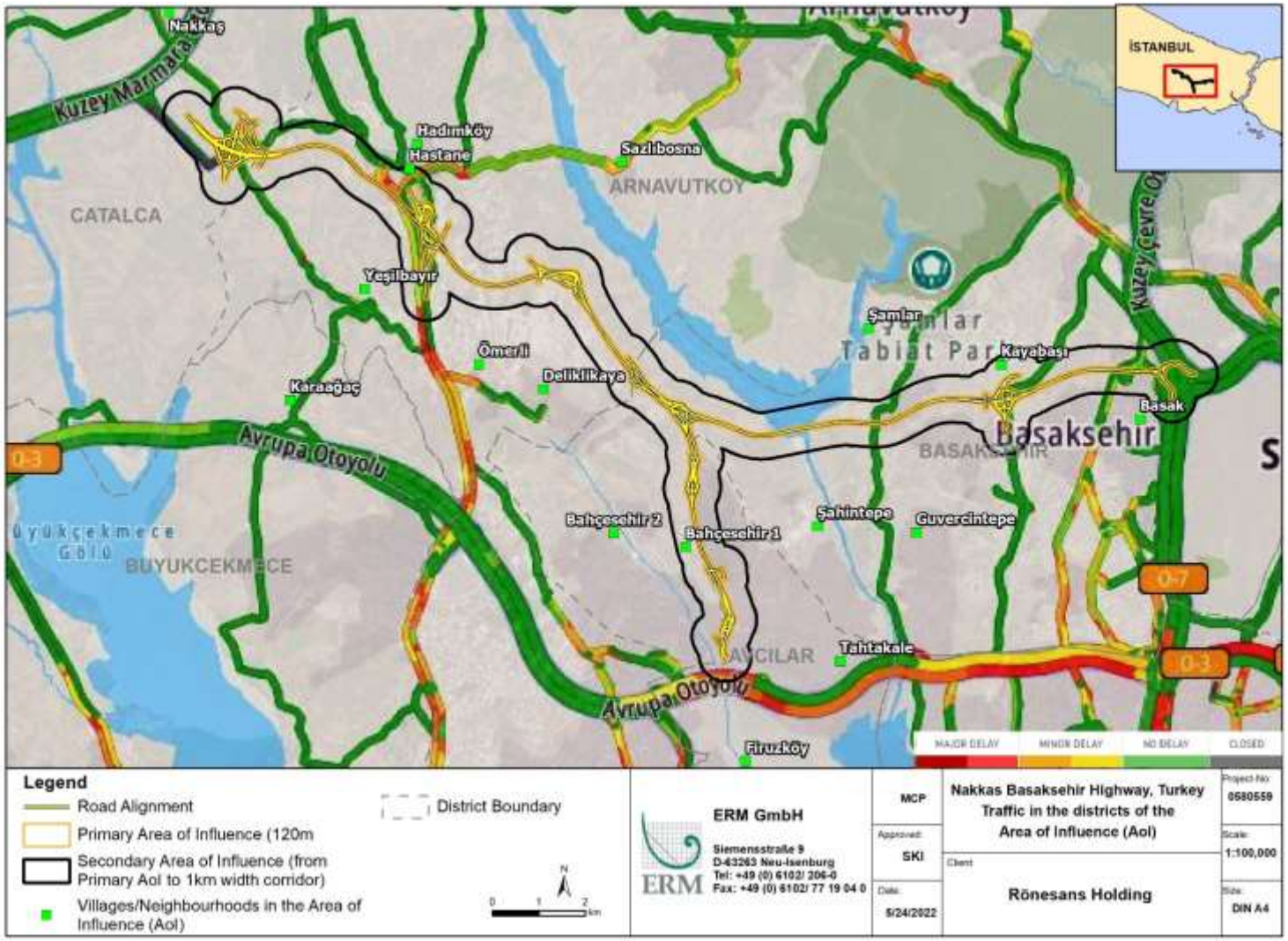
[138] Daily Sabah. İstanbul among world's top 5 cities most impacted by traffic. 2020. Available from: https://www.dailysabah.com/turkey/İstanbul/İstanbul-among-worlds-top-5-cities-most-impacted-by-traffic

There are complex roads at different levels between these and traffic is mostly dense in the area. Başakşehir hosts mass housing areas, which implies dense traffic. The key existing motorways in the AoI are presented in Figure 5-81 . The O-3/E80 and the D-100/E-5 corridors experience high levels of congestion, as they are two of the key local, interurban and intraurban corridors, and connect to central İstanbul and the metropolitan area. Furthermore, the O-7 is an alternative travel corridor that was developed in order to facilitate intraurban and interurban travel. The organised industrial zones, commercial areas, manufacturing intense areas in Başakşehir, Arnavutköy, Büyükçekmece and Avcılar are also traffic intensive areas. Hadımköy (Arnavutköy), as a juncture point of access roads and due to business density, experiences frequent traffic density, as well as Tahtakale (Avcılar) and Firuzköy (Avcılar), reflected in Figure 5-82 below.



Source: Yandex, 2021

Figure 5-81 Roads and motorways in the AoI



Source: Tomtom, 2021. Developed by ERM.

Figure 5-82 Traffic density in the AoI on Thursday 26th August 2021 at 5 p.m.

In the AoI, the roads which link the village to other settlements are of qualified asphalt in Şamlar, Kayabaşı, Bahçeşehir 2 (all located in Başakşehir district), Deliklikaya (Arnavutköy district), and Nakkaş (Çatalca district). The settlements of Ömerli, Sazlıbosna, Yeşilbayır (all located in Arnavutköy district), Bahşayış (Çatalca) and Tahtakale (Avcılar) and Şahintepe (Başakşehir) report having low quality asphalt. Deliklikaya (Arnavutköy) was the only village road that was blocked due to weather conditions. Şamlar (Başakşehir), Deliklikaya and Yeşilbayır (Arnavutköy district), Bahşayış and Nakkaş (Çatalca district), Tahtakale (Avcılar) reported rough roads and transportation difficulties to other villages.

5.4.11 Vulnerability

According to the EBRD, vulnerable groups refer to people who, by virtue of gender identity, ethnicity, age, disability, economic disadvantage or social status may be more adversely affected by project impacts than others and who may be limited in their ability to claim or take advantage of project benefits.

Vulnerable individuals and/or groups may also include people living below the poverty line, the landless, the elderly, women and children headed households, refugees, internally displaced people, ethnic minorities, natural resource dependent communities or other displaced persons who may not be protected by national and/or international law[139].

This chapter identifies these individuals and groups in the study area. The main population groups that have been identified as potentially vulnerable in the context of the Motorway Project in Turkey and the rationale for their identification are presented in Table 5-48 below.

Table 5-48 Overview of Vulnerable Groups

Group	Description	Notes based on Survey Sample (As declared by the surveyed households)
Generic Vulnerability		
Affected by physical displacement	Household members with any of the following specific vulnerabilities	3 households with vulnerable members
Sex and Gender	Due to the nature of domestic relations, women may be reliant on the male members of the family for financial support. As such they are less likely to have access to financial assets. As a result, women-headed households become more vulnerable. 6% of the surveyed households have female heads	None within the households using affected lands.
Ethnic minorities	Some groups, including migrants and refugees, may be marginalised with reduced access to healthcare, education, freedom of speech, credit and other services. In most cases ethnic minority groups have their own language, which is not the language practiced by the dominant ethnic group. Migrants are considered vulnerable as they often lack access to formal jobs, have higher salary gaps, no social security as well as lack of access to land and finance.	None of the affected landowners/users surveyed fall under this category however, migrants are employed informally as herders (throughout the year) by the households engaged in livestock activities or as seasonal agricultural labourers employed temporarily (2-3 months in a

[139] EBRD. 2019. ERBD Performance Requirement 5. Land Acquisition, Involuntary Resettlement and Economic Displacement. Available from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjKk-yD7vPyAhXyEWMBHZ_BVYQFnoECAcQAQ&url=https%3A%2F%2Fwww.ebrd.com%2Fdocuments%2Fenvironment%2Fperformance-requirement-5.pdf&usg=AOvVaw33p4S_ef2Bfluv0gpGS2kY

Group	Description	Notes based on Survey Sample (As declared by the surveyed households)
		year) by the households engaged in agriculture.
Children	In order to access assets/resources children are often reliant on older members of the households or community. When a child is not adequately represented by an adult, from a low income family or an ethnic minority, (s) he may be vulnerable to exploitation within the community or work place.	None
Youth	Youth may be vulnerable in terms of access to assets, education or employment opportunities.	
Elderly/retired	Retired members of the community may have a minimal income and are more likely to have reduced physical or mental capacity to cope with changes to their environment. In addition, in many settlements, the elderly may be reliant on subsistence farming, which would make them specifically vulnerable, as the loss of lands can mean the loss of food. One household within the surveyed population reported an elderly member who is in need of care and social assistance.	7 female 6 male
Economics	Economically displaced households who lose more than 20 percent of their Total Productive Area. People with green card or receiving governmental aid Households with member without any social security Unemployed household member (although looking for job). Employed without social security. Households with total income lower than the applicable minimum wage[140] in Türkiye. ■ Less than 2% of the surveyed households (2 households out of 150) reported household members without a social security. ■ 6% of the surveyed households (9 households out of 150) reported unemployed household member(s).	2 female (unemployed) 1 female (without social security) 3 household (with total income lower than the applicable minimum wage)
Physical/mental health and disability	Those who lack physical mobility or who have mental health issues may be vulnerable to changes and unable to participate in decision making. This also includes people with	4 female 2 male

[140] Net minimum wage applied in Türkiye was 4,253.40 TRY (gross 5,004.00 TRY) fort he period 1 January 2022 – 30 June 2022. It has been updated as 5,500.35 TRY (gross 6,471.00 TRY) for the period 1 July 2022 – 31 December 2022, and further escalated to net 8,506 TRY (gross 10,008.00 TRY) for 2023 (declared by the government in December 2022)

Group	Description	Notes based on Survey Sample (As declared by the surveyed households)
	diseases that make them more vulnerable to changes. ■ 11% of the surveyed households (17 households out of 150) reported household member(s) homebound due to chronic disease ■ 5% of the surveyed households (7 households out of 150) reported household member(s) with physical and/or mental disability	
Literacy	Illiterate members of the community are likely to have a disadvantage with regards to employment and health. 2 households out of 150 reported an illiterate household member.	1 female
Sickness	Chronic disease	13 female 4male 1 children
Dependence on unique natural resources (e.g. water resources, grazing lands, etc.)		Sahintepe and Kayabasi communities use grazing lands for ovine breeding.
Seasonal agricultural workers (Note: formal and informal employees of affected businesses are separately discussed)		There are seasonal agricultural labourers employed temporarily (2-3 months in a year) by the households engaged in agriculture. In Sazlibosna and Tatarcik, a total of 14 seasonal agricultural labourers have been identified.
Others	Household with no Land Ownership – who use affected private or public parcels for agriculture	10 households
	Owners/users of the affected parcels (by Project) which were subject to expropriation by other projects/developments and experiencing significant economic impacts due to cumulative land acquisition impacts	Maximum 119 141 shareholders on 10 parcels (in Nakkas)
	Owners/users of the parcels affected in the past under different projects (not necessarily affected by the Project) and experiencing significant economic impacts due to cumulative land acquisition impacts	11 households
	Household members of land users employed without Social Security	1 female

[141] Part of the shareholders may have ownership in multiple parcels subject to cumulative impacts.

These groups and their vulnerabilities in the specific AoI are further described below.

5.4.11.1 Women Headed Households

Women have fewer options on the labour market than men, which make them more vulnerable to poverty. Within the study area, women seem, however, to be more employed than men as a result of the presence of light-industry (textiles, automotive parts requiring sewing or coating) and agriculture. In addition, the gender wage gap is of 15.6 %[142].

It is estimated that there are 4,000 female-headed households in the AoI. According to the *Muhtars* that participated in the settlement profiling, Kayabaşı is the neighbourhood with the highest number of women-headed households, with around 1,000.

Vulnerable women (single with children, living in poverty, unemployed, exposed to violence) are usually located in rural areas. These women may have more difficulties to access information and engagement relating to the Project's activities, as well as less access to employment and other opportunities that will arise from the Project.

Women might also be considered as more vulnerable to the impacts of the Project as they have less accessibility to jobs and some of them might be lost in the relocation of businesses.

5.4.11.2 Ethnic minorities (including Roma people)

Syrian nationals constitute the largest group of migrants in the İstanbul province, and in 2019 accounted for 58 % of the total migrant population[143]. Following Syrians, the most common nationalities and ethnicities are Turkmen, Afghan, Iraqis, Iranians and Pakistani.

Most migrants, especially Syrians, are low income and live in large households of up to 10 persons; there are also women-headed households. In the Project's AoI, the *Muhtars* reported the presence of Syrian refugees.

Roman communities are considered vulnerable across a range of diverse indicators ranging from access to services (including education and health care), level of education and literacy, participation in decision-making, risk of marginalisation and access to financial resources. Within this group, there are specific individuals such as children and young people who may have an increased vulnerability in terms of risk of child labour, poor working practices and limited access to education. The *Muhtar* of Bahçeşehir 2 (Başakşehir district) reported the presence of Roma people in their neighbourhood.

5.4.11.3 Elderly Population

In İstanbul, elderly population was reported to be 1,079,196 in 2020[144], which represents 6.9 % of the total population. The elderly has specific vulnerabilities relating to income levels and limited ability to change or increase access to additional finances and access to health care, as well as being more susceptible to disease and disability.

The burden of chronic diseases, such as ischemic heart disease and diabetes is highest among elderly residents. Among the elderly there are also some whose pensions are low and they have to live from the land. The density of elderly residents is higher in rural settlements, where may be reliant on

[142] International Labour Organization. 5 October 2020. Gender Wage Gap is 15.6 % in Turkey, according to the joint study by ILO Turkey Office and TURKSTAT. Available from: https://www.ilo.org/ankara/news/WCMS_757055/lang--en/index.htm#:~:text=to%20the%20...-,Gender%20Wage%20Gap%20is%2015.6%25%20in%20Turkey%2C%20according%20to%20the,increases%20and%20educational%20level%20decreases.

[143] IOM UN Migration. Baseline Assessment in İstanbul Province. 2019. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/IST_Baseline_Assessment_Phase5_ENG_29012020.pdf

[144] Anadolu Agency. 30 September 2020. İstanbul's elderly population exceeds 61 provinces. Available from: https://www.aa.com.tr/tr/turkiye/İstanbulun-yasli-nufusu-61-ili-gecti/1990404

subsistence farming and are particularly vulnerable and these settlements are more likely to have limited-service availability and are more prone to isolation. This is because, according to *Muhtars*, the younger population have migrated from rural areas (such as Bahşayış, Ömerli, Sazlıbosna, Yeşilbayır) to urban and more industrial areas (such as Çorlu or Çerkezköy).

Tahtakale (Avcılar district) is the neighbourhood with the lowest percentage of elderly population reported by a *Muhtar* with only 5 %, followed by Kayabaşı (Başakşehir) with an 18 %. In most of the neighbourhoods, the *Muhtars* reported that 20 % of the population is over 65 years old. This population is likely to be especially vulnerable in the AoI since the *Muhtars* reported that small proportion of people in their neighbourhoods receive pensioners pay.

5.4.11.4 Households below poverty line

According to official data, 14.4 % of the population in Turkey lives below the poverty line, and 11 %[145] in the İstanbul province. According to a survey by the İstanbul Statistics Office from 2020, 91.8 % of the households cannot afford to have meat twice in a week, 94.3 % cannot afford to change old furniture, 92.6 % cannot buy new clothes and 89.6 % cannot afford heating, 92.6 % cannot afford an unexpected expense above 1000 TL. Their lack of assets makes them vulnerable to shocks and change. Their vulnerability is reinforced by a lack of social, medical, and educational facilities, and proper housing.

According to a survey released in May 2020[146] by the İstanbul Statistics, the rate of households with more than one member providing income is 9.7 %, 47.3 % of all households don't have regular income and 53.3 % don't have access to social security coverage. The survey also mentions that a majority of households are highly indebted and cannot afford to buy new clothes, new furniture or properly heat their house.

The settlements of Bahşayış (Çatalca) and Tahtakale (Avcılar) reported the existence of homeless people in the neighbourhood. Homeless people are particularly vulnerable as they are subjected to a higher risk of displacement, loss of possessions and violence. Homeless people will have more difficulties to access information and engagement relating to the Project's activities, as well as less access to employment and other opportunities that will arise from the Project.

5.4.11.5 Disability

Disabled people throughout the study area are vulnerable in terms of participation in decision-making and access to employment opportunities. Disabled people may also experience varying levels of social exclusion, community marginalisation, and are more vulnerable to change.

According to official data, there were 2,534,533 with a declared disability people in Turkey in 2020. In the AoI, *Muhtars* reported the presence of disabled people, more specifically in the neighbourhoods of Şamlar, Bahçeşehir 2 and Kayabaşı (Başakşehir district), Deliklikaya, Ömerli, Sazlıbosna and Yeşilbayır (Arnavutköy district), Tahtakale (Avcılar district), and Nakkaş (Çatalca district). The neighbourhoods that reported the highest amount of disabled people was Kayabaşı and Şahintepe (Başakşehir district) with 500 people.

5.4.11.6 Reported vulnerability in the AoI

The information presented in this chapter is a result of the Key Informant Interviews undertaken with the *Muhtars* of the neighbourhoods located in the AoI as presented in Table 5-49. They were asked to report the severity of various issues as "none", "minor", "moderate" or "severe". Additionally, as per the EBRD, unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for affected persons and communities, as well as environmental damage, and adverse

[145] TURKSTAT. 2020. Income and Living Conditions Survey Results, 2019. Available from:
https://data.tuik.gov.tr/Bulten/Index?p=Gelir-ve-Yasam-Kosullari-Arastirmasi-Bolgesel-Sonuclari-2019-33821

[146] İstanbul Statistics Office. 21 May 2020. Urban Poverty Survey in İstanbul, May 2020. Available from:
https://istatistik.İstanbul/bulten.html?bultenAd=İstanbul%27da%20Kent%20Yoksulluğu%20Araştırması,%20Mayıs%202020

socio-economic impacts in areas to which they have been displaced. These issues interact with the vulnerable groups identified in the AoI, as they enhance their pre-established vulnerability.

Some key issues reported[147] as severe by the majority of the districts stand out, such as:

- Rise of prices: One important aspect to be taken into account is that prices are currently increasing at a high rate in some districts of the AoI.[148] This is due to the planned development of mega-projects in İstanbul, which interacts with the Project and passes through three districts of the AoI: Başakşehir, Arnavutköy, and Avcılar, which all reported the rise of prices as a severe issue.
- Decline in agricultural production or income obtained from the trade of agricultural products: The rapid urbanization of Başakşehir district resulted in the reduction of agricultural areas, which affected rural households living from natural resources based livelihoods (especially women who are mostly employed in this sector), as reported per the rural neighbourhoods of the district. The same applies, in a smaller extent, to the settlement of Şahintepe (Başakşehir district), where agricultural infrastructures (five poultry houses) will be expropriated, as well as in Bahçeşehir 1 (Başakşehir District) and in Sazlıbosna (Arnavutköy District) where greenhouses will be affected.
- Food prices: Due to Russia's invasion of Ukraine (two big suppliers of food for Turkey), the annual inflation for food in Turkey has reached 70%, while prices rising by 4.7% in March alone[149].
- Roads and transportation: The settlements of Arnavutköy district, Çatalca district, and Avcılar district all reported severe issues about roads and transportation from within and outside the villages.
- Lack of access to infrastructures and facilities: Insufficient infrastructures access were reported in all settlements of the AoI. It appears the recreation and cultural facilities, health or childcare services is the most common issue in the AoI.
- Unemployment and low income: This is a moderate to severe issue in all the settlement of the AoI. The temporary loss of business infrastructures due to land resettlement (as reported in Chapter 5.4.6.3.4) could potentially enhance this issue.

Further interviews have been conducted during RAP surveys by GEM and the vulnerabilities of the economically and physically displaced households are presented below:

Displacement Category of Interviewed Households	Total Number of Households	No vulnerable members	Single vulnerable member	Multiple vulnerable memebrs
Physically displaced households	5[150]	2	3	0
Economically displaced households	23	5	10	8
Households that do not use the land (owner/shareholder of the land with no active land use)	135	95	33	7

Source: GEM

None of the household heads interviewed reported household members with the following vulnerabilities, thus these categories are not shown in the table for simplicity though these groups were included in the interview questions:

[147] Questionnaries responded by Muhtars (Please see Annex 12)

[148] Hauzbiz, 2021. Başakşehir Distric in İstanbul. Available from: https://www.hausbiz.com/İstanbul/basaksehir/

[149] Mustafa Sonmez.2022. Al monitor. Turkey inflation hits 61% as fallout from Ukraine war continues. Available from: https://www.al-monitor.com/originals/2022/04/turkey-inflation-hits-61-fallout-ukraine-war-continues

[150] Data has been collected through RAP surveys on 5 of 8 houses. 3 houses have been reached but the interviews are yet to be completed.

- Women household heads (widow, divorced or with an economically active adult man in the household)
- People with green card or receiving governmental aid
- Children with special needs
- Migrants
- Seasonal workers
- People belonging to ethnic or minority groups

Vulnerabilities of the households that are the owners/shareholders of the Project-affected parcels but do not actively use the lands (e.g. for agriculture, as residential), number of households with vulnerable members among the economically displaced and physically displaced households and households that do not actively use the land and Employees with vulnerabilities have been surveyed as part of the Business Interviews conducted with affected employers in 2021 and updated in June 2022 are summarised in RAP.

Table 5-49 Main issues reported by *Muhtars* in the neighbourhoods of the AoI, 2021

Issue	Başakşehir district							Arnavutköy district						Çatalca district		Avcılar district	
	Bahçesehir 1	Bahçesehir 2	Başak	Güvercintepe	Şamlar	Kayabaşı	Şahintepe	Deliklikaya	Hadımköy	Hastane	Ömerli	Sazlıbosna	Yeşilbayır	Bahşayiş	Nakkaş	Firuzköy	Tahtakale
Unemployment		Moderate			Moderate	Moderate	Moderate	Minor			Moderate	Moderate	Moderate	-	Moderate		Severe
Low income		Moderate			Moderate	Severe	Moderate	Moderate			Moderate	Moderate	Moderate	-	Moderate		Severe
Decline of agricultural production		Moderate			Moderate	Minor	Severe	Moderate			Minor	Moderate	Moderate	-	Moderate		Minor
Degradation of product		Minor			Moderate	Minor	Severe	Minor			Minor	Minor	Moderate	-	Minor		Minor
Decline of income obtained from the trade of agricultural products		Severe			Severe	Minor	Severe	Minor			Minor	Moderate	Moderate	-	Moderate		Moderate
Rough roads within the village		Moderate			Minor	Minor	Severe	Moderate			Minor	Moderate	Severe	Severe	Severe		Severe
Rough roads and transportation difficulties to other villages		Minor			Moderate	Minor	Severe	Moderate			Minor	Minor	Severe	Severe	Severe		Severe
Difficulties to access the land		Moderate			Moderate	Minor	Severe	Moderate			Minor	Moderate	Moderate	Severe	Severe		Severe
Difficulty to access the water resource		Minor			Severe	Minor	Severe	Minor			Minor	Minor	Moderate	Severe	Minor		Moderate
Agriculture/irrigation		Minor			Severe	Minor	Severe	Minor			Minor	Moderate	Moderate	Severe	Minor		Moderate
Insufficient water resources		Minor			Minor	Minor	Moderate	Minor			Minor	Moderate	Moderate	-	Minor		Moderate
Insufficient sewage system		Moderate			Moderate	Minor	Moderate	Minor			Minor	Moderate	Moderate	Severe	Severe		Severe
Insufficient energy resources		Minor			-	Minor	Moderate	Minor			Minor	Moderate	Moderate	-	Moderate		Moderate
Insufficient accommodation		Minor			-	Minor	Moderate	Minor			Minor	Minor	Moderate	-	Minor		Severe
Insufficient heating		Minor			-	Minor	Moderate	Minor			Minor	Minor	Moderate	-	Minor		Severe
Insufficient educational opportunities		Minor			-	Minor	Moderate	Minor			Severe	Minor	Severe	-	Moderate		Severe
Insufficient health services		Severe			Moderate	Minor	Moderate	Moderate			Minor	Minor	Severe	-	Severe		Severe
Insufficient child care services		Severe			Minor	Minor	Moderate	Moderate			Moderate	Minor	Severe	-	Severe		Severe
Innutrition		Minor			-	Moderate	Moderate	Minor			Minor	Minor	Moderate	-	Moderate		Severe
Uncollected wastes		Minor			Minor	Minor	Moderate	Minor			Minor	Minor	Moderate	-	Minor		Severe
Insufficient communication services		Minor			-	Minor	Moderate	Moderate			Minor	Minor	Severe	-	Minor		Severe
Security and safety		Minor			Severe	Minor	Moderate	Minor			Minor	Minor	Moderate	-	Minor		Severe
Lack of recreation and cultural facilities		Severe			Severe	Moderate	Moderate	Severe			Severe	Moderate	Severe	-	Severe		Severe
Rise of prices		Moderate			Severe	Severe		Minor			Severe	Moderate	Severe	-	Severe		Severe

Source: Field Survey, 2021

5.4.12 Cultural Heritage

This chapter presents the results of the baseline assessment conducted for both tangible and intangible cultural heritage and respective studies based on:

1. Desk-based research;
2. Field visits; and
3. Stakeholder Engagement.

These cultural heritage studies were conducted by ERM's subcontractor REGIO[151], a highly reputable and experienced Turkish archaeology consultant working on many major infrastructure projects in Turkey in line with national and international standards.

This baseline chapter is structured as follows:

- Historical background of the Project region
- Legal Framework, Standards, Roles & Responsibilities
- Moveable and Immovable Tangible Cultural Heritage Baseline Studies along the Motorway Right of Way and access roads
- Intangible Cultural Heritage Baseline Studies at 15 Neighbourhood in the Project AoI.

5.4.12.1 Legal Framework, Standards, Roles & Responsibilities

Works conducted for this ESIA for the survey of potential archaeological remains and the evaluation of the potential impact of construction activities were carried out in accordance with the Cultural and Natural Entities Conservation Law Numbered 2863 (*Law Number: 2863, Date of Approval: 21.7.1983, Publication in the Official Gazette: Date: 23/7/1983 No: 18113*).

The protection and preservation of archaeological and cultural resources in Turkey is addressed primarily by the Law on Preservation of Cultural and Natural Assets (Law No. 2863), dated July 23, 1983. Law 2863 establishes legal definitions for key terms and concepts, defines the movable and immovable cultural and natural assets to be protected, delineates actions to be taken to preserve those assets and assigns the roles and responsibilities associated with decision-making and other related activities.

Key terms and concepts defined within the legislation include:

- Cultural assets – all movable and immovable assets, whether located on the surface, underground or underwater, associated with science, culture, religion and/or the fine arts that are either discovered within a prehistoric or historic area or which have scientific or cultural characteristics belonging to a prehistoric or historic era.
- Natural assets – natural features on the surface, underground or underwater that date from prehistoric or historic eras and whose preservation is essential due to their unique features and beauty.
- Sites – ancient sites and city ruins that reflect the social, economic, architectural and other features of their era, locations of significant historic events and areas containing cultural assets that require preservation within/among their specified natural features; and
- Preservation Areas – buffer areas needed to preserve immovable cultural assets in their physical historical surrounding/context.

[151] REGIO Danışmanlık Eğitim A.Ş

Law 2863 establishes legal protection for the following:

- all natural assets and immovable cultural assets constructed up until the end of the 19th century;
- any immovable cultural asset from after the end of the 19th century, identified by the Ministry of Culture and Tourism as an important asset worthy of preservation;
- all immoveable cultural assets located within Sites;
- buildings/areas that have witnessed significant historical events during the National War and the foundation of the Turkish Republic and dwellings that have been used by Mustafa Kemal ATATÜRK, regardless of time and registration.

All natural and cultural assets that qualify for legal protection under Law 2863 – including known assets and those yet to be discovered – are considered State property. The Regional Protection Councils are charged with the responsibility of ensuring adequate protection of the legally protected natural and cultural assets within their respective regions, which includes the delineation of Preservation Areas and the regulation of activities conducted within those Preservation Areas.

The Protection Councils have the authority to approve or reject proposed physical interventions within Preservation Areas, which include construction, repair works, installations, drilling, partial or complete destruction, excavations, or similar activities. Strict fines and penalties are established for any Party found in violation of Protection Council orders/prohibitions and/or any provisions of Law 2863.

In this regard, the ***İstanbul Regional Council No: 1 for the Conservation of Cultural Property***[152] ("Regional Council No.1") is the sole competent authority within the scope of the Nakkaş-Başakşehir Motorway Project.

İstanbul Archaeological Museums[153] will be responsible for officially supervising any required actions such as official monitoring and/or further activities (trial pits, salvage excavation, re-routing, and remote sensing surveys) in line with the decisions taken by the Regional Council No: 1. They will also prepare the conclusion reports about actions to be taken and submit to Regional Council No: 1 for re-evaluation of the sites.

In addition to the above listed local legal requirements, guideline regulations of the international organizations mentioned below were considered during the studies:

- International Finance Corporation-IFC, Performance Standard 8 – Cultural Heritage;
- European Bank for Reconstruction and Development – EBRD, Environmental and Social Policy, Performance Requirement 8 – Cultural Heritage;
- Department for Transport UK, Design Manual for Roads and Bridges, LA 106 Cultural Heritage Assessment, January 2021; and
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties. ICOMOS, Paris 2011.

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5.4.12.2 Overview of International Guidelines and Standards

International heritage guidelines potentially applicable to the Project including the International Finance Corporation (IFC) Performance Standard 8 (PS 8) promulgated in 2012, recognise the importance of cultural heritage for present and future generations, and draw upon general principles established by the UNESCO's Convention Concerning the Protection of World Cultural and Natural Heritage and its Convention for the Safeguarding of Intangible Heritage.

General objectives relevant to the present Project are:

- to support the conservation of cultural heritage in internationally financed projects;
- to protect cultural heritage from adverse impacts of project activities; and
- to promote awareness of and appreciation of cultural heritage where possible.

Cultural heritage, as defined by the above guideline, includes: archaeological sites, historic buildings (isolated and in districts), graveyards and places invested with traditional meaning of a historical, cultural or religious nature.

Locations and structures associated with traditional belief will be considered as protected cultural heritage pursuant to the EBRD as described below.

Intangible Cultural Heritage (ICH), as defined under EBRD Performance Requirement (PR) 8, will also be considered as protected heritage by the Project. ICH refers to customs, traditions and beliefs that make a people or a region distinctive and socially cohesive. ICH resides in living communities and has a significance that is based in the contemporary world. Sites with ICH value can include the traditional forms of cultural heritage such as historic monuments, archaeological sites, and historic landscapes. However, ICH can also include special natural features including flora, fauna and particular ecological zones. For this reason, a competent treatment of ICH requires the methods and expertise of social, environmental and cultural heritage specialists. The importance of ICH cannot be understated. ICH is often central to the ethnic and cultural identity of a people; local unwritten languages are a prime example of this. ICH can be purely intangible (e.g., language, stories, songs, etc…), but it often includes movable physical aspects, such as objects used by a living culture, as well as immovable features, such as man-made structures or the natural landscapes. A local story that is told and retold by a people for generations may, for example, refer to a specific town or a feature on the landscape. In this case, an immovable tangible feature may be a sustaining aspect of the ICH. Physical damage to the physical feature could therefore diminish or threaten the identity or sense of place of the subject group.

Tangible cultural heritage such as churches, shrines, and archaeological sites may have both a conventional cultural heritage component and an ICH component. A mosque or graveyard, for example, may have value for its art historical interest, but it may also have a long tradition of local use and significance (ICH value). The local traditional population using the Mosque (the ICH users) are typically less capable of protecting their interest in the mosque than, for example, the art historians studying the mosque. Also, legal protection for typical tangible and immovable cultural heritage (historic buildings and archaeological sites) is more established than for ICH whose legal recognition is a relatively recent phenomenon. In sum, ICH will be highlighted for protection along with other cultural heritage.

As noted above, IFC PS 8 and EBRD PR8 requirements emphasize that cultural heritage impacts be identified and managed through an ESIA process that involves a robust and wide-ranging public consultation. This implies an emphasis on traditional and non-technical local uses of and requirements for cultural heritage, as appropriate, in addition to those of the academic and legal realms. This, more than any other aspect of the international cultural heritage requirements, is distinct and different than most national cultural heritage law, including Turkish heritage law.

5.4.12.3 Historical Background of the Project Region

The Nakkaş-Başakşehir Motorway Project is located in the Thrace region, which historically extends between Macedonia and the Bosporus. Thrace is composed of large plains and arable lands. Apart from these flatlands, the main heights are Mons Asticus (Istranca Mountains) in the north, Hieron Oros (meaning Holy Mountain, modern name is Ganos Mountain) in the south and Koru Mountains (the ancient name is not known) in the southwest.

While the highlands are covered with intense forest vegetation, interior parts and plains near the coastline are covered with steppes. These plains are very inhabitable because of their suitability to agricultural production. Lumber, is one of the important trade goods.

While the eastern part of the region displays Black Sea climatic conditions of heavy rainfall, a very large part near the Marmara Sea features a climate called Marmara transition climate, which resembles the climate of the Mediterranean. In the interior parts between these two climatic belts, which is isolated from the sea, continental climatic conditions are observed. The rivers of the region, flowing in the north-south direction are Tonzos (Tunca), Ardeskos (Arda), and Hebros (Meriç). Agrianes (Ergene) flows in the east-west direction. In addition to these, there are minor rivers. These are: Arzos (Çorlu Stream), Tearos (Kaynarca), Apsinthos (Derbent Creek), Melas (Kavak Stream), Athyra (Çekmece Creek), Kydaris (Alibey Creek), and Barbyses (Kağıthane Creek). Apart from these rivers, the lakes located in the region are Delkos (Terkos) and Stentaris (Gala).

Agricultural production has played a crucial role in the economy of the region. Ancient historians Herodotus and Xenophon mention that barley, wheat, and hemp were cultivated in the region. The Thrace region, which was very advanced in viniculture, was also famous for wine production. In terms of livestock, sheep and horse breeding is important in the region. It is known that fishery is an important means of living in the coastal districts. Ancient historian Strabo states that Keras (Haliç) was rich in terms of tuna fish and Atlantic bonito.

Important settlements were established in the Palaeolithic[154], Neolithic[155] and Chalcolithic[156] periods in the Thrace region. The ancient settlements in Eskice Ridge near Büyükçekmece Lake and Kefken and Gümüş Dere near Kilyos confirm this information.

Yarimburgaz Cave is most important prehistoric settlements in the region. Yarımburgaz Cave is located in the east of the Sazlıdere Valley within the boundaries of Altınşehir quarter of Başakşehir District and approximately 3 km west of the Nakkaş-Başakşehir Motorway Project route. Yarımburgaz Cave has a complex structure in terms of archaeological as well as geological formation. Yarımburgaz Cave is composed of two different caves "lower cave" and "upper cave". The caves connected with a short transverse corridor connects, sloping down. The lower cave is still an active karstic cave, with growing speleothems and pools of standing water in its dark, inner recesses. There are Lower Paleolithic levels in the cave. The upper cave was strongly modified in Byzantine times when a church was carved into its walls, and a monastery constructed outside the cave mouth. These modifications removed prehistoric deposits to an undetermined extent, but some Chalcolithic and Upper Paleolithic deposits remain.

Findings belonging to the further phases of the Palaeolithic Period were encountered in Ağaçlı Village located near the Black Sea coastline in the north of Kemerburgaz. These sites are Mesolithic (Epi-Palaeolithic) Period settlements discovered on the fossilized dunes stretching alongside the Black Sea coast. It is revealed that there were a multitude of habitations around the Black Sea, which was a fresh water lake in this period, when the present climatic conditions start to become dominant in the region.

[154] The Paleolithic or Palaeolithic is a prehistoric period of human history distinguished by the development of the most primitive stone tools discovered and covers roughly 95 % of human technological prehistory. It extends from the earliest known use of stone tools, probably by Homo habilis initially, 2.6 million years ago, to the end of the Pleistocene around 10,000 BC.

[155] Traditionally considered the last part of the Stone Age, the Neolithic followed the terminal Holocene Epipaleolithic period and commenced with the beginning of farming, which gave raise to the "Neolithic Revolution".

[156] The Chalcolithic period or Copper Age was a period in the development of human technology, preceding the Bronze Age, before it was discovered that adding tin to copper formed the harder bronze.

The richest findings dated to this period are collections of “small” tools found in the dunes of Ağaçlı. This collection, which is named “Ağaçlı Culture”, constitutes the richest finding set belonging to this period in Turkey. It is known that the number of settlements in Thrace increased after this period.

Some of the known prehistoric settlements are Hoca Çeşme Mound, Toptepe, Aşağı Pınar, Kanlıgeçit, and Çardakaltı. During the 7th and 6th millennia, the Balkan Peninsula and Carpathian region were inhabited by the Neolithic farmers coming from the Near East. During this period, Marmara was an important junction point. Menteşe, Ilıpınar, Fikirtepe and Pendik were among the most important archaeological settlements in Marmara dated to this period of the “agricultural revolution” in human history. Scientific literature suggests that a new wave of immigrants from the Central Anatolia and Aegean regions arrived at the region at the end of the Neolithic Period; the local cultures developed and continued their existence, but eventually left their place to the newcomers in the beginning of the Chalcolithic Period. It was revealed through the several past field surveys and excavations conducted in the region that all the settlements in Thrace were demolished by fire at the end of the Chalcolithic Period. Gladina Locality within the provincial boundaries of Büyükçekmece District, Kanallı Bridge (Kınalı Bridge) near Silivri District and Selimpaşa Mound located within the municipal boundaries of Selimpaşa Municipality, Silivri are among the important Early Bronze Age settlements in Thrace. In addition to that, traces of the Early Bronze Age were encountered in the necropolis area above İncegiz Caves, which are located in a deep valley in the north of Çatalca District and in Kartepe (Karatepe) Caves, which are located in mountainous and forested terrain in the northeast of Dağyenice Village.

The 2nd Millennium BCE (the Middle and Late Bronze Ages) is the period during which empires such as Hittites and Mycenaean flourished in Anatolia and Aegean region. On the other hand, although it was believed until recently that all of Thrace was inhabited only by nomadic communities, the discovery of ceramics and figurines belonging to the Hittite Period in the excavations conducted in Bathonea (Küçükçekmece, İstanbul) revealed the existence of Hittite civilization in Thrace.

In around 1200s BCE, Thrace was inhabited by Thracian tribes coming from the north. It is known that by the 8th century BCE, the Thracian settlements continued their existence as Hellenized colonies. In the 4th century BCE, an independent Thracian state was established in the region. In order to eliminate an unrest that took place in the region, Alexander the Great launched a military campaign in 333 BCE. After Alexander’s death, the region became autonomous. In the 1st century BCE, Thrace fell under the Roman influence and eventually became a Roman Province in 45 BCE. In the Roman Period, “Via Egnatia,” the main road connecting the centre of the Empire, Rome with Anatolia passed through this region. In 333 CE, the Eastern Roman Empire was formed when Roman emperor Constantine I renamed Byzantium to Constantinople (modern day İstanbul) and declared it the Capital of the empire

Thrace was within the boundaries of the Eastern Roman Empire (Byzantine Empire).

In the Byzantine Period, great defensive systems were constructed in the region. Silivri, with its ancient name Selymbria or Selybria, was known as the citadel protecting the İstanbul road throughout the Byzantine Period. In addition to Silivri Citadel, the defensive system named Anastasian Wall was commissioned by the Byzantine Emperor Anastisus I (491-518) in order to protect Constantinople from the invasions coming from Thrace. It is known that the Anastasian Wall, which was 56 km long, started in the Black Sea coast, passed through Fenerköy and Kurfalı villages and ended in the Marmara Sea.

Although it is known that important monuments from the Byzantine Period were located in Silivri, Selim Paşa and close vicinity, most of them were demolished because of the rapid urbanization.

The region remained under the control of the Byzantine Empire until the 14th century and then it was taken over by the Ottoman Empire after the conquest of İstanbul in 1453. Apart from the ancient ruins, there are trenches and Historical Military Bunkers constructed for defence purposes in the Balkan Wars (1912 – 1913) and the World War II (1939 – 1945) in the region. The “Çatalca Entrenchment Line” which was constructed in 1877 was controlling an area of totally 50km between Terkos in the north and Büyükçekmece Lake in the south, in 35-40 km west of İstanbul. The outposts and fortifications forming the entrenchment line were constructed intermittently in a 6.5 km long corridor. There were 10 redoubts in total through the defence line. The redoubts were equipped with machine guns and light artilleries.

The redoubts were constructed on the top of hills. Below the redoubts, armouries were constructed. Underground telephone and telegram lines provided communication between the redoubts and with the hinterland.

Another important defence line in the region was “Çakmak Line”. It was constructed as an entrenchment line as a precaution against possible German invasions during the World War II by the government of the period from the Black Sea to Marmara, parallel to the Anastasian Wall and Çatalca Entrenchment Line. It was named “Çakmak Line” after Marshall Fevzi Çakmak, the Chief of General Staff of the period. Çakmak Line was composed of two lines of bunkers, trenches, and outposts starting from Durusu Lake and ending in Büyükçekmece Lake.

The purpose of constructing bunkers and bastions and the memories belonging to the periods there were built are still known by the residents as their fathers/grandfathers told them and these memories are conveyed to the next generations in various occasions. Some of the bunkers, trenches and outposts are located within the impact area of the Nakkaş-Başakşehir Motorway Project as discussed in further sections.

As per general settlement policies of the Ottoman Period, many Turkish families from Central Anatolian Region (Karaman Turks) and Crimea (Tatar and Noghai) were settled in the region in order to Turkify the Balkan region. These people who lived in the Balkan lands for almost three centuries had to go through a forced migration to Eastern Thrace with Ottoman-Russian War which is known as the War of 93[157] (1877 – 1878) and the following Balkan Wars. Karaağaç, Bahşayiş, Sazlıbosna etc. located in the study area are settlements that were formed as the result of these migrations.

In the Ottoman Period, families from Anatolia who were engaged in farming were brought to İstanbul and its vicinity in order to work on the foundation lands. The Nakkaş Neighbourhood located in the study area is the settlement established by 18 families who were brought with this purpose from Nevşehir (Muşkara) to the lands endowed by Fatih Sultan Mehmet to his miniature artist (Nakkaş). Şamlar Neighbourhood was established by 9 households brought to the location from Damascus (Şam) in order to work in the Hunting Lodge of Abdülhamid. On the other hand, there is some information found in the literature suggesting that 7 households from Anatolia were brought and placed in Şamlar Village during Selim the 3rd period in order to work at Azatlı Powder Mill.

A population exchange was experienced in 1924 as per the protocol made as a result of Lausanne Treaty signed by the Republic of Turkey. There are settlements in the study area that include families who came and settled there with the population exchange. While Aya Yorgi/Kayabaşı Neighbourhood is the only settlement to have experienced a complete change in demographical structure due to population exchange, emigrants are known to have settled in other settlements as well (Table 5-50).

Crimean Tatar Emigrants, Bulgarian and Greek Turk Emigrants, Gacals (Natives), the Roma, Pomaks, Albanians and families who migrated from Anatolia in more recent periods still live in the region. This extensive cultural range of the region is also reflected on the traditions of local communities (Table 5-50).

[157] Named as 93’ since the date was 1293 in Islamic calendar during the war period

Table 5-50 Settlements included in the study and people's origin information as conveyed by the participants

No	Origin	Karaağaç	Bahşayiş	Nakkaş	Yeşilbayır	Hadımköy	Ömerli	Sazlıbosna	Dursunköy	Delikkaya	Şamlar	Hoşdere	Kayabaşı	İkitelli	Firuzköy	Ispartakule[158]
1	**Bulgarian Turks**	x		x	x	x	x		x	x	x	x		x		
2	**Crimea Tatar Emigrants**		x					x			x	x		x		
3	**Albanian**			x								x				
4	**Gacals (Natives)**			x	x		x		x		x					
5	**Population Exchange Emigrants**			x						x	x	x	x	x	x	
6	**Anatolian Emigrants**[159]	x			x	x	x				x		x	x	x	x
7	**The Romany**		x			x			x							
8	**Pomak**					x										

During the field survey it was determined that some of the traditions related to the transition periods of life are still alive in the Project area and its vicinity. Transition periods of life starting with birth and ending with death are reflected in the local customs in the region. Cultural qualities of the region are as notable as its natural structure and history. Multicultural aspect of the region is reflected to many areas of life such as traditions, dances, foods and transition periods of life as the customs of Rum, Christian, Turkish and Muslim people have intertwined with each other in time.

Agriculture, animal husbandry, historical structures, and safeguarding and conserving natural environment are prevailing elements among the residents of the region. Along with the transition periods of life, national and religious festivals also have great significance for local people.

[158] Ispartakule has not shown any settlement property in the past and in the current situation, it is a modern settlement which was planned recently.

[159] People who came from various regions of Anatolia and settled in the region in the recent period.

5.4.12.4 Baseline Studies

The objective of baseline studies was:

- To assess the potential for cultural entities and their characteristics in predetermined locations before the start of the motorway construction and to develop plans and design strategies for the prevention of construction damage in those areas located on the motorway route,
- To provide data on the identified areas to be included in this ESIA for the purposes of proper planning of the Project to avoid any delays during construction activities,
- As the result of the field work, to determine the locations where a change in the Project route might be required and to propose alternative routes,
- To develop strategies in accordance with the legal procedures and to propose changes in the routing in the areas of high archaeological value (if any), and to propose further actions to be taken where re-routing is not possible,
- To collect and record archaeological data over the construction impact area using scientific methods,
- To archive all data gathered in archaeological studies and to prepare their identification and registration tags to be reported to the Ministry of Culture and Tourism by Nakkaş Otoyol A.Ş., and
- To contribute to the tangible and intangible cultural heritage and archaeological inventory of Turkey with possible new archaeological findings.

5.4.12.4.1 Desktop Studies

In this phase of the study, the ESIA archaeological team reviewed related publications regarding the regions covering the Project route and its impact area. The documents used during desktop studies included:

- Academic publications;
- Historic maps;
- Reports on the previous Cultural Heritage Studies and Results of Field Surveys; and
- Inventory records of Regional Council No: 1 for the Conservation of Cultural Property.
- The Project route is located in a geography in the narrow cross-roads in Thrace between Europe and Asia has been subject to all periods of modern human development. The exact locations, numbers, and conditions of archaeological and immovable heritage of the region are not clearly known at present because of intense migration, rapid and unplanned urbanization, industrial facilities covering large territories and the limited number of studies on the cultural inventory of the region. The subject study area covered a corridor width of 1 km each side of the Motorway centreline and the access roads as shown in Figure 5-83 and Figure 5-84 below.

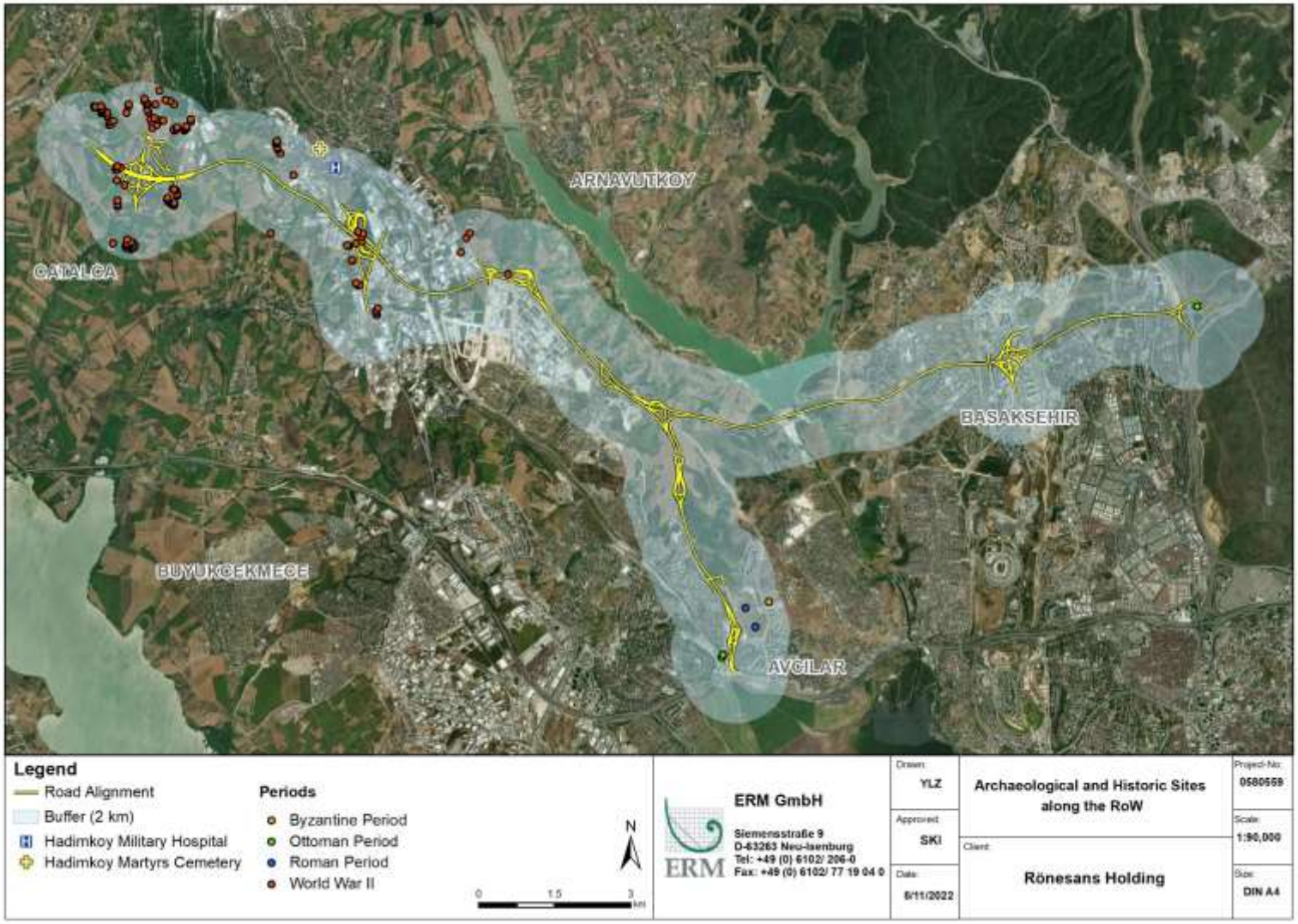


Figure 5-83 Nakkaş-Başakşehir Motorway Project, Archaeological and Historic Sites along the RoW

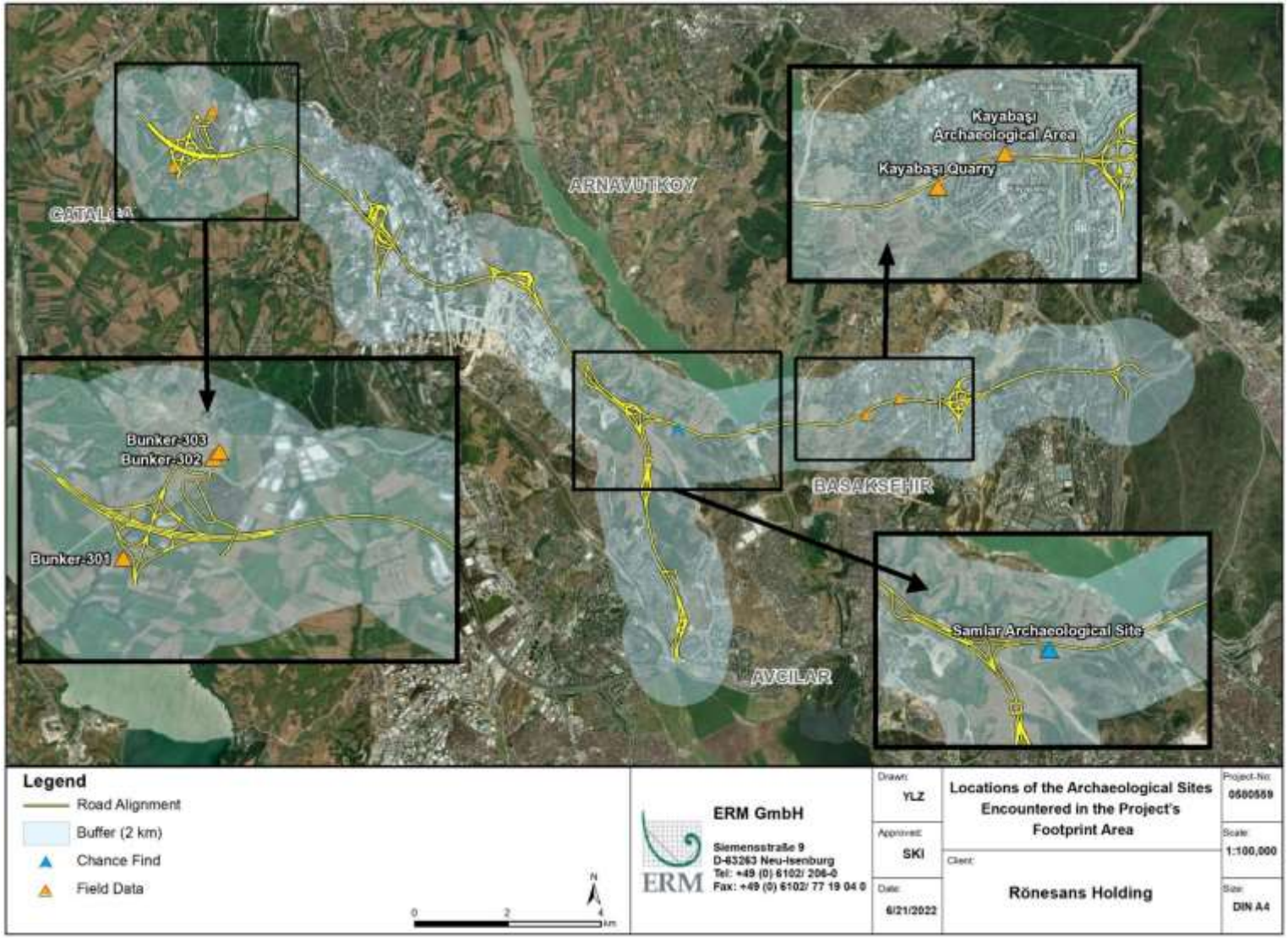


Figure 5-84 Locations of the Archeological Sites Encountered in the Project's Footprint Area

5.4.12.4.2 Field Studies

The ESIA archaeology team conducted the walkover surveys in February 2021 to determine the potential for archaeological and immovable cultural assets within the Motorway route. Field work was carried out in a 1 km wide corridor along the Project alignment and access roads.

The walkover survey method was applied to archaeologically high potential locations and registered sites within the Project's Right of Way (RoW), Project components or its surroundings. Additionally, drone footages were taken for archaeological or cultural heritage potential locations during the fieldwork.

Approximately 60 % of the Motorway route passes through agricultural areas. Although settlements and industrial areas surround the rest of the Project corridor, there were no civil works along the construction corridor in this section.

Findings of the Field Studies along the RoW

Based on the field studies, in total there are 12 sites that are located on the Project RoW (see Figure 5-85) whose locations have been mapped in Figure 5-83 and Figure 5-84 and details listed in Table 5-51 and summarized below:

- 2 Historical Areas – Kayabaşı Archaeological Area (See Photos 1-4) are located within the RoW;
- 10 Historical Military Bunkers (See Photos 5-14) are located within the RoW; and

Photo 1: Kayabaşı Archaeological Area

(Km 54+920 – 55+144)

Photo 2: Pot Sherds from the surface of Kayabaşı Archaeological Site (Km 54+920 – 55+144)

Photo 3: Kayabaşı Historical Quarry

(Km 54+158 – 54+306)

Photo 4: Kayabaşı Historical Quarry

(Km 54+158 – 54+306)

Photo 5: Historical Military Bunker – 293
(Trans-European Motorway Connection Road – KM 9+498)

Photo 6: Historical Military Bunker – 294
(Trans-European Motorway Connection Road – KM 9+519)

Photo 7: Historical Military Bunker – 295
(Trans-European Motorway Connection Road – KM 9+000)

Photo 8: Historical Military Bunker – 296
(Trans-European Motorway Connection Road – KM 4+400)

Photo 9: Historical Military Bunker – 297/298
(Trans-European Motorway Connection Road – KM 3+900)

Photo 10: Historical Military Bunker – 299
(Trans-European Motorway Connection Road – KM 4+100)

Photo 11: Historical Military Bunker – 300

(Trans-European Motorway Connection Road – KM 4+100)

Photo 12: Historical Military Bunker – 301

(Trans-European Motorway Connection Road – KM 2+200)

Photo 13: Historical Military Bunker – 302/303

(Trans-European Motorway Connection Road – KM 0+800/0+730)

Photo 14: Historical Military Bunker – 304

(Trans-European Motorway Connection Road – KM 4+300)

Figure 5-85 Photos taken During CH Field Studies along the RoW

Table 5-51 Tangible Cultural Heritage Sites Identified During Field Studies

No	Site Name	Registration Status	Chainage	Within the RoW
1	Kayabaşı Archaeological Site	Not registered	Km 54+920 – Km 55+144	√
2	Kayabaşı Historical Quarry Site	Not registered	Km 54+158 – Km 54+306	√
3	Historical Military Bunker 102	Registered	Km 36+276	√
4	Historical Military Ditch 1	Registered	Km 36+543	√
5	Historical Military Bunker 150	Registered	TEM Connection Section West (Km 4+420)	√
6	Historical Military Bunker 127	Registered	TEM Connection Section West (Km 4+000)	√
7	Historical Military Bunker 18	Registered	Km 41+740	√
8	Historical Military Bunker 19	Registered	Km 41+740	√
9	Historical Military Bunker 20	Registered	Km 41+740	√
10	Historical Military Bunker 21	Registered	Km 41+740	√
11	Historical Military Bunker 22	Registered	Km 41+740	√
12	Historical Military Bunker 23	Registered	Km 41+740	√

5.4.12.5 Chance Find – Samlar Archeological Site

During construction works a Chance Find has been encountered on 11.07.2021 in the area between 49+800 and 49+900 Km of the road in Şamlar district. Project Chance Finds Procedure has been applied, work has been stopped and legal authorities have been informed immediately.

In line with the decision of the Cultural Heritage Preservation Regional Board No. I, it was decided to carry out an archaeological excavation in the mentioned area. Şamlar Rescue excavations started on 08.12.2021 and finished already, as a result of the controls made by the field experts of the Istanbul Archaeology Museums and the survey engineer with the inclusion of EPC Contractor's archaeological consultant (see Figure 5-86 and Figure 5-87). During the excavations, 180 (5x5m) plan square trenches were excavated (4750 m²). As a result of these excavations, 30 rooms of different sizes, stone floors within the space, 4 pithos (storage vessels), 1 kiln structure and the remains of a hand mill workshop, 4 stone tombs were unearthed. In addition, based on the surface of the bronze coin found in the excavation, it was seen that the settlement continued until the 9th century AD. It is thought that the settlement is dated to the Late Roman-Early Byzantine period. In addition, 360 inventory findings and 8 box findings which is not qualified for record as inventory have been identified in the atelier where the small finds were classified. Restoration, photography and documentation of the findings have been completed. After the expert's inspection in coordination with the Istanbul Archaeology Museums Directorate, the findings will be delivered to the museum with an official letter.

The ruins of the wall are protected by security of Nakkaş Otoyol A.Ş. for 22 hours at the Şamlar Excavation Site.

Figure 5-86 Archaeological excavation in Samlar

Figure 5-87 Pictures from the excavation site

5.4.12.6 Intangible Cultural Heritage

This chapter presents the current situation with regard to intangible cultural heritage (ICH) elements, located within the Project study area (as defined below).

Objectives of the ICH study included the following:

- Identify ICH elements in the settlements located in the vicinity of the Project;
- Determining current status and geographical distribution of intangible cultural heritage elements that may be affected by Project construction and operation activities;
- Identifying negative impact that may occur on intangible cultural heritage elements due to Project activities,;
- Identifying the negative impacts that may occur on intangible cultural heritage elements due to the Project activities.

The study area involved the neighbourhoods and settlements listed in Table 5-52:

Table 5-52 Settlements included in the ICH

No	Province	Sub-province	Neighborhood	Distance to the Motorway Centerline (km)
1	İstanbul	Büyükçekmece	Karaağaç	0.7
2	İstanbul	Çatalca	Bahşayiş	2.5
3	İstanbul	Çatalca	Nakkaş	2.6
4	İstanbul	Arnavutköy	Yeşilbayır	1.2
5	İstanbul	Arnavutköy	Hadımköy	0.9
6	İstanbul	Arnavutköy	Ömerli	1.7
7	İstanbul	Arnavutköy	Sazlıbosna	2.5
8	İstanbul	Arnavutköy	Dursunköy	5.9
9	İstanbul	Arnavutköy	Delikkaya	1.6
10	İstanbul	Başakşehir	Şamlar	1.9
11	İstanbul	Başakşehir	Hoşdere	2.9
12	İstanbul	Başakşehir	Kayabaşı	0.6
13	İstanbul	Başakşehir	İkitelli	3.3
14	İstanbul	Avcılar	Firuzköy	4.3
15	İstanbul	Avcılar	Ispartakule/Tahtakale	2.9

Baseline collection data involved desktop studies and field works, as described further below.

Works for assessment of intangible cultural heritage were based on the “Convention for the Safeguarding of the Intangible Cultural Heritage” by UNESCO, which was officially accepted by the Republic of Turkey with the “Law No. 5448 Regarding the Approval of the Convention of Safeguarding of Intangible Cultural Heritage on January 19th, 2006”. The intangible cultural heritage legally safeguarded by the relevant law is defined as follows:

“Cultural products and production processes such as oral narratives and oral traditions created in oral culture environment by local people and included in folklore studies, performance arts, social practices, rituals and festivals, practices related to folklore, the universe and nature, handcraft traditions”.

In addition to the above defined laws and regulations, the below given guides and guidelines published by international organizations were also taken into account during the study process:

- International Finance Corporation-IFC, Performance Standard 8 – Cultural Heritage;
- European Bank for Reconstruction and Development – EBRD, Environmental and Social Policy, Performance Requirement 8 – Cultural Heritage;
- Guidance on Heritage Impact Assessments for Cultural World Heritage, ICOMOS, 2011.

5.4.12.6.1 Desktop Study

Publications and research reports, including previously conducted ICH studies in the Project area and its vicinity, were reviewed to determine the current status of the ICH.

Background investigations indicated that the region has been preferred by people as a settlement location since the early periods of history due to its arable fields and natural richness such as water resources. The region witnessed various settlements in numerous periods from Paleolithic Age until the end of the 20th century as well as occasional migration movements. This has greatly contributed in tangible and intangible cultural heritage values of the region.

5.4.12.6.2 Field Work

Field works were conducted in June 2021 in the Project area and in the neighbourhoods in its vicinity.

A total of 52 persons were interviewed as detailed in Interviewees during the field works conducted within scope of the study (Figure 5-88 Map of the Project Area and neighbourhoods in its vicinity).

Table 5-53 Distribution of Interviewees

Sub-province	Neighborhood	Number of Women	Number of Men
Büyükçekmece	Karaağaç	2	3
Çatalca	Bahşayiş	1	3
Çatalca	Nakkaş	1	4
Arnavutköy	Yeşilbayır	0	2
Arnavutköy	Hadımköy	1	1
Arnavutköy	Ömerli	1	5
Arnavutköy	Sazlıbosna	0	3
Arnavutköy	Dursunköy	0	2
Arnavutköy	Delikkaya	1	1
Başakşehir	Şamlar	0	3
Başakşehir	Hoşdere	0	1
Başakşehir	Kayabaşı	2	9
Başakşehir	İkitelli	1	2
Avcılar	Firuzköy	1	1
Avcılar	Ispartakule/Tahtakale	0	1
Total		11	41

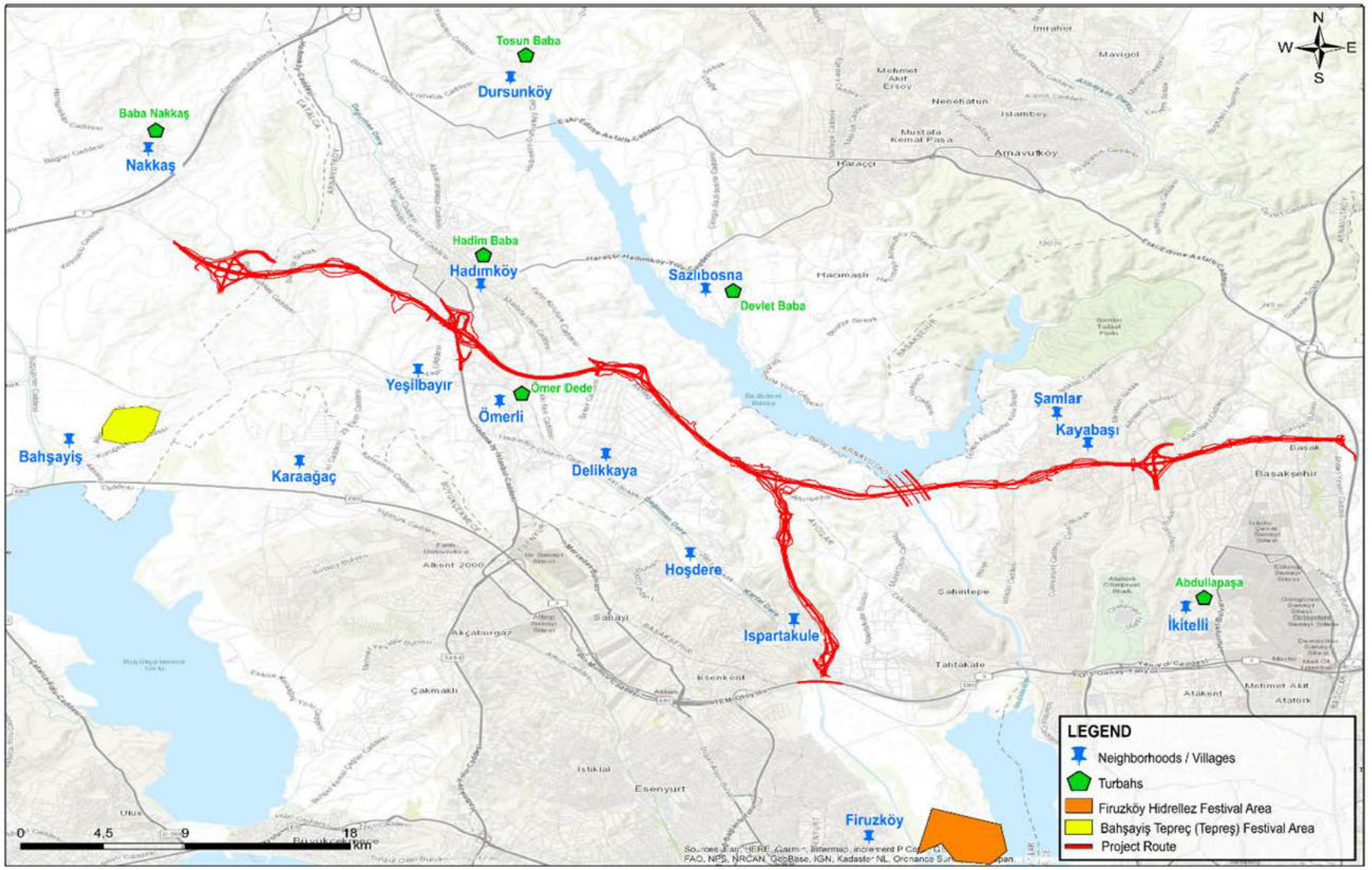


Figure 5-88 Map of the Project Area and neighbourhoods in its vicinity

Photo 1: Hoşdere Neighborhood

Photo 2: Nakkaş Neighborhood

Photo 3: Kayabaşı Neighborhood

Photo 4: Hadımköy Neighborhood

Photo 5: Sazlıbosna Neighborhood

Photo 6: Dursunköy Neighborhood

Figure 5-89 Photos from ICH Field Surveys

Field works for intangible cultural heritage were conducted using qualitative face-to-face surveys in 15 settlements within the vicinity of the Project route. Interviews aimed to allow participants convey their own cultural structures and behavioural traits and experiences that make up those structures. Since the majority of the study area is urbanised, priority was given to people who have accurate and reliable information about the history of the region in the interviews as a strategy, i.e. people who have been residing in the area at least for three generations and who are over the age of 55 and from different professions. Also, people who have commanding knowledge about the region's history, customs and traditions as well as its geography were also interviewed.

5.4.12.6.3 Overall Assessment of Intangible Cultural Heritage

Results of field work indicated that all the people living in the Project route know Turkish. However, people of Sazlıbosna also speak the Tatar language among each other. All settlements in the Project area consist of Sunnite Muslims, except the people of Firuzköy who are followers of Bektashi religion.

In the scope of oral traditions conveyed from generation to generation, the residents within the study area are aware of their ancestors who migrated to the area, including heroic stories of the Balkan Wars.

There is a martyrs' cemetery in Hadımköy (Figure 5-90) and a military hospital built by Sultan Abdulhamid the 2nd (Figure 5-91).

Figure 5-90 Hadımköy Martyrs Cemetery

Figure 5-91 Hadımköy Military Hospital

Local associations and foundations are important cultural points that enable transmission of intangible cultural heritage from generation to generation. In Kayabaşı Neighborhood there is Kayabaşı Thessaloniki Association; in Firuzköy Neighborhood there is Firuzköy Thracia Foundation; in Hoşdere Neighborhood there is Hoşdere Solidarity and Culture Association; in Şamlar Neighborhood there is Şamlar Village Culture and Solidarity Association. These organizations were observed to provide solidarity among locals as well as continuance of oral traditions and folk dances among them. Tepreç (Tepreş) Festivities[160] are organized in the first week of May at the Bahşayiş settlement (Figure 5-92). Additionally, Agriculture/Harvest Holiday is also celebrated at Şamlar Neighbourhood every year

[160] Tepreç Festivities; in the past, Crimean Tatar Turks used to celebrate the first Friday following Hıdırellez as Tepreş Day. If Hıdırellez coincided with a Friday, this used to be taken as a good omen. This day was called Kıdırlez Friday. The word Tepreş derives from the verb "depreşmek" which means "coming to life" or "livening up".

between June 15th and 20th. At Kayabaşı Neighbourhood, the day of Ashura is organized with the participation of approximately 5000 people in the month of Muharram ul Haram.

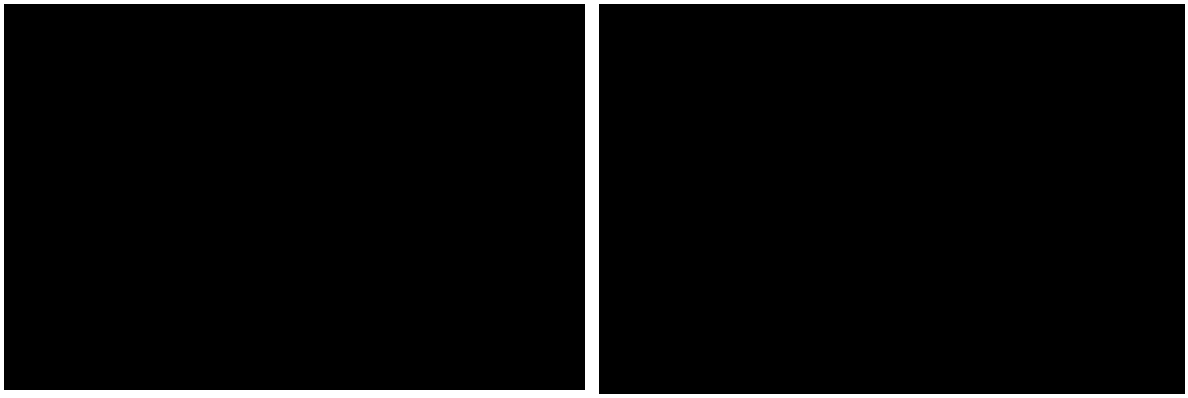


Figure 5-92 View from Tepreç Festivities Organized in 2019 in Bahşayiş

Residents of Sazlıbosna and Şamlar, which are other Crimean-Tatar neighbourhoods within the study area, participate in the festivities as well as all Crimean-Tatar associations in Turkey (Turbahs[161] and cemeteries also have a significant place in traditional folk beliefs. Tosunbaba Turbah in Dursunköy Neighborhood (); Baba Nakkaş Turbah in Nakkaş Neighborhood (); Hadımbaba Turbah in Hadımköy Neighborhood, Devlet Baba Turbah in Sazlıbosna Neighborhood; and cemetery located in İkitelli Neighborhood may be listed as examples of these. There are Ottoman Period Mosque examples in the settlements located within the study field. The Non-Muslim Cemetery called Maşatlık in Kayabaşı is still preserved today.

The cultural beliefs related to production and consumption of the local people for survival purposes based on the knowledge obtained from their ancestors depends on animal husbandry and agriculture. Current agricultural products cultivated in the region are wheat, barley, sunflower and canola. Water buffalo stock farming, poultry farming, ovine and bovine breeding still continue, although to a lesser degree compared to the past years.

Wool works and point lace works were observed to continue in the region in scope of traditional handcrafts. This traditional handcraft does not seek economic profit, as it is conducted mainly at home. Small scale production is conducted for daily use and living space decorations.

There are mosques in the Project vicinity as defined in Chapter 6.3.4.2, however no other religious structures (churches, synagogues, etc.) were identified.

[161] Turbah is a structure shaped like a room in which graves of state officers or religious scholars are found. These are historical mausolea in which mostly respectable persons are buried.

6. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

6.1 Physical Environment

6.1.1 Climate Change Risk

6.1.1.1 Impact Assessment

Baseline and projection data for several climate hazards have been identified in the baseline compilation are provided again in Table 6-1. The baseline data is used to assess the potential presence and severity of a climate hazard type, while the projections data is used to assess the projected changes of a climate hazard type in the future. In this chapter, the climate data and trends are assessed in relation to the Project's exposure to provide a review of risks posed to the Project.

Climate change hazards material in the Project region are potential wildfire, landslide, and flash flooding as well as water scarcity. Extreme heat, river flooding, coastal flooding have only a low hazard level. Based on the climate change projections the hazard level may in the future significantly increase or decrease, moderately increase or decrease or only change minimal depending on the RCP.

Table 6-1 Climate Hazard based on Baseline and Projections Values

Climate Hazards	Baseline Conditions for İstanbul	Projections for Turkey					
		Year	2030		2060		
	Hazard level	Parameter	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5	Rating
Extreme Heat	Medium	Change in Air temperature in °C	1.1 °C	1.2 °C	2.0 °C	2.9 °C	Moderate Increase
Wildfire	High	Land fraction annually exposed to Wildfires in %	0.1 %	0.2 %	0.3 %	0.4 %	Minimal Change
Flooding	Low	Change in Maximum Daily Rainfall in mm	-0.82 mm	0.43 mm	0.18 mm	0.99 mm	Minimal Change
Coastal Flooding	Very Low	-	-	-	-	-	-
Landslides /Flash Flooding	Medium	Change in Maximum 5-day Rainfall	1.35 mm	1.25 mm	1.67 mm	2.42 mm	Moderate Increase
Water Scarcity	Medium	Projected Change In Water Stress[162]	1.4x increase	2x increase	2x increase	2x increase	Significant Increase

In the following Table 6-2 the physical scenario data used for the assessment is listed including (i) hazards causing material impacts under baseline conditions, (ii) the trend in the hazard out to the future based on the projections scenario data used (iii) as well as the description of the potential impacts that might stem from the shortlisted climate-hazards. Possible Impacts have been based on the Project specific exposure to the climate hazards.

[162] WIR Water Risk Atlas, available at: https://www.wri.org/applications/aqueduct/water-risk-atlas
The Atlas provides global water stress data in seven categories from 2.8x greater increase to 2.8x or greater increase.

Table 6-2 Climate Hazards and Possible Impacts

Climate Hazards	Baseline Conditions for İstanbul	Projections for Turkey	Possible Impacts
	Hazard level	Rating	
Extreme Heat	Medium	Moderate Increase	The climate data results show that present and future extreme heat conditions are not likely to have an impact on the Project. 1. During Construction; increased heat stress on workers (e.g. risk of heat-stroke), requiring more frequent breaks for cool-down and taking fluids etc. 2. During Operations: potential physical-structural impacts to sensitive materials, eg cracking, buckling or melting of road surface asphalt
Wildfire	High	Minimal Change	3. Disruption of construction and operation of the highway due to life threating risks of wildfires. 4. Possible health issues or risk to life from smoke inhalation (for construction workers and later for operations employees and motorists). 5. Fire damage to construction equipment and later operational assets (e.g. Toll-booths).
Flooding	Low	Minimal Change	Sections of the proposed motorway are in close proximity of water courses. However, climate data results show that present and future flooding conditions are not likely to have an impact on the Project.
Coastal Flooding	Very Low	-	Climate data results show that coastal flooding is not likely present in the Project area.
Landslides /Flash Flooding	Medium	Moderate Increase	6. Physical risk to construction sites, through flash flooding and landslides. 7. Physical risk to buildings and other operational road infrastructure, through flash flooding and landslides.
Water Scarcity	Medium	Significant Increase	8. Decrease in the availability of surface water used for construction and during operation.

On basis of the climate change projections, potential impacts on the Project may occur due to e.g. variations in precipitation pattern, increase in temperature and increase in frequency and intensity of heavy rainfall events. Following Table 6-3 describes the potential impacts for each of those risks and provides the outcome of the impact assessment.

The significance of the potential impact is based on the magnitude of the impact, its frequency and likelihood. Climate hazards of low and very low likelihood are not included in Table 6-2. Physical damage to assets in case of wildfires and flash flooding and landslides are potential impacts with moderate significance. The risk of decreased water availability for the construction and operation of the Project poses a potential impact with moderate significance. All other identified negative impacts are of minor significance.

Table 6-3 Impact Assessment Climate-related Physical Risks

Potential Impact	Pre-mitigation						
	Magnitude Factors				Vulnerability Factors		Resulting Risk Significance
	Type	Durat.	Extent	Scale	Frequency.	Likelihood.	
1. Fire damage to assets due to wildfires.	Direct	Short-term	On-site	Significant. altered	(1-5)	Possible	Moderate
	Medium				Medium		
2. Possible health issues or risk to life from smoke inhalation during wildfires.	Direct	Short-term	Local	Unaltered	(1-5)	Possible	Minor
	Small				Medium		
3. Physical risk to construction site, through flash flooding and landslides.	Direct	Short-term	Local	Notably altered	(5-10)	Possible	Minor
	Medium				Low		
4. Physical risk to buildings and other road infrastructure, through flash flooding and landslides.	Direct	Short-term	Local	Significant altered	(1-5)	Possible	Moderate[163]
	Medium				Medium		
5. Decrease in the availability of surface water used for construction and during operation.	Direct	Long-term	Local	Somewhat altered	(1-5)	Possible	Moderate
	Medium				Medium		

[163] A separate Flood Risk Assessment (Annex 16) has been conducted by ERM related with flash flooding risks, where further details and actions are defined.

6.1.1.2 Mitigation Measures

Climate change hazards material in the Project region are potential wildfire, landslide and flash flooding as well as water scarcity. Specific mitigation measures, in order to reduce the impact of climate change on the Project, are mainly included with the implementation of general good practice. The measures may be adapted in relation to specific construction and operational activities. Good practice measures include the following.

Table 6-4 Mitigation Measures for Climate-related Physical Risks

	Resources/Area	Mitigation Measures	Responsibility	Timelines/ Frequency of Monitoring
1	**Climate Change**			
	Design	■ Usage of Stone Mastic Asphalt which has the following advantages in comparison with conventional asphalt types such as noise absorption, less hydroplaning, good low temperature performance, slow aging and durability to premature cracking of asphalt, stability against permanent deformation (rutting) and high wear resistance.	EPC Contractor/ Nakkaş Otoyol A.Ş.	Operation
	Design	■ Consideration of Flood Risk Assessment study of ERM during design.	EPC Contractor/ Nakkaş Otoyol A.Ş.	Construction Operation
	Design	■ Consideration of the adaptation measures listed in BTY Climate Resilience study during design.	EPC Contractor/ Nakkaş Otoyol A.Ş.	Construction Operation
	Occupational H&S	■ Emergency Preparedness and Response Plan will be in place with a set of specific pre-established procedures for coordination, alert, mobilisation and response to the occurrence or imminence of a particular event, such as natural hazards as for wildfires, flooding and landslides, etc ■ EPR team will be formed, trained, and equipped with adequate tools and equipment to respond the emergency cases. ■ International best practice regarding OHSE risks and mitigation will be implemented as listed below: ■ Cool water will be provided for employees to drink. Enough water have to be drunk frequently to prevent dehydration. ■ The EPC contractor will ensure that appropriate clothing will be provided and worn. During periods of elevated temperature, employees should wear light-coloured, lightweight, loose-fitting cotton clothing that allows ventilation of air to the body. ■ Employees will be encouraged to take breaks and hydrate any time they feel necessary.	EPC Contractor/ Nakkaş Otoyol A.Ş.	Construction Operation

	Resources/Area	Mitigation Measures	Responsibility	Timelines/ Frequency of Monitoring
		■ The job-tasks will be paced to allow more frequent breaks for fluid intake and sufficient recovery time. ■ A space in a shaded area or an air-conditioned building will be provided for taking breaks. ■ Work changes will be considered to lower the risk of heat stress. ■ Shaded areas during remote outdoor work (e.g., constructing temporary shelters using tarps) will be provided.		
	Resources	■ Water permits will be obtained for using boreholes and/or river or lakes as source.	EPC Contractor/ Nakkaş Otoyol A.Ş.	Construction
	Community H&S	■ Possibility of increase in flash flooding and landslides occurrence will be considered in the detailed design of the motorway by the Technical Planner. ■ The drainage/runoff systems, culverts, bridges, potential flooding areas such will be designed to handle the peak flows and floods. ■ Enhancement of road segment resistance will be considered, e.g. on embankments, creating deeper road foundations on slopes, enhancing drainage structures. ■ Roadside fire fuels e.g. certain vegetation will be reduced to a minimum. ■ River bridges/viaducts, culverts, derivation channels and proper drainage system will be designed according to Hydraulic Hydrological Calculation Report and meteorological data of The Directorate General of Meteorology. ■ Road drainage and stormwater design will be done according to KGM (General Directorate of Motorways) drainage criteria code considering 10,100- and 500-years precipitation recurrence intensity and critical precipitation duration map prepared by State Hydraulic Works (DSI).	Nakkaş Otoyol A.Ş.	Detailed Design

6.1.1.3 Residual Impacts

Table 6-5 shows the anticipated residual impacts referring to those potential impacts predicted to remain after the application of mitigation measures outlined in Table 6-4. All potential impacts can be mitigated so that only impacts with minor risk significance remain.

Table 6-5 Residual Impact of Climate-related Physical Risks

Potential Impact	Post-mitigation						
	Magnitude Factors				Vulnerability Factors		Resulting Risk Significance
	Type	Durat.	Extent	Scale	Frequency.	Likelihood.	
1. Fire damage to assets due to wildfires.	Direct	Short-term	On-site	Notably altered	(1-5)	Possible	Minor
	Small				Medium		
2. Possible health issues or risk to life from smoke inhalation during wildfires.	Direct	Short-term	Local	Unaltered	(1-5)	Possible	Minor
	Small				Medium		
3. Physical risk to construction site, through flash flooding and landslides.	Direct	Short-term	Local	Notably altered	(5-10)	Possible	Minor
	Medium				Low		
4. Physical risk to buildings and other road infrastructure, through flash flooding and landslides.	Direct	Short-term	Local	Notably altered	(1-5)	Possible	Minor
	Small				Medium		
5. Decrease in the availability of surface water used for construction and during operation.	Direct	Medium-term	Local	Unaltered	(1-5)	Possible	Minor
	Small				Medium		

6.1.2 Air Quality

6.1.2.1 Impact Assessment

The key activities considered in the AQIA are set out below, along with the pollutants of interest for each activity:

- Construction – the construction of the Project will generate traffic on the existing road network and will also generate dust and particulate matter (as PM_{10} and $PM_{2.5}$) around construction activities.
- Operation – the operation of the Project will generate traffic on the new motorway as well as nearby roads, leading to emissions of nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$.

The AQIA considers these activities, emissions and impacts in the context of the existing baseline, and on this basis identifies the potential for significant impacts.

The Project is located in the western part of İstanbul. The surrounding area is a mix of urban and rural, with commercial activities and other roadways. The existing air quality is expected to be close to, or in excess of air quality standards in some areas of the Project based on air monitoring along the proposed route. Baseline data is discussed in Chapter 1.5 and a separate report included as Annex 6.

6.1.2.2 Air Quality Standards (AQS)

As part of this AQIA, projected results from traffic modelling and dust assessment are compared against relevant air quality standards (AQS). These standards refer to human health impacts of air quality as well as dust deposition/soiling as a nuisance to humans and as an impact to vegetation.

The AQS relevant to this assessment are based on the European Union (EU) AQS and are set out in Table 6-6.

Air Quality Assessment and Management Regulation (HKDYY) in Turkey entered into force in 2008[164]. Turkey has opted to align with the more stringent European Union (EU) AQS and will adopt these values by latest 2024. As the Project will come into operation by 2024, we assume that the Turkish and EU AQS will be the same.

[164] İstanbul Metropolitan Municipality, Air Quality Assessment And Management Regulation
https://havakalitesi.ibb.gov.tr/Icerik/mevzuat/turkiye-standartlari

Table 6-6 Air Quality Standards

Pollutant	Averaging Period	Statistic	Value (µg/m3)
NO_2	Annual mean	N/A	40
NO_2	1 hour mean	Not to be exceeded more than 18 times per year	200
PM_{10}	Annual mean	N/A	40
PM_{10}	24 hours mean	Not to be exceeded more than 35 times per year	50
$PM_{2.5}$	Annual mean	N/A	25

In addition to the above AQS, dust deposition is assessed as an indication of the potential for nuisance to arise due to soiling. The IFC and WHO do not set out guidelines, as dust deposition is a perception and nuisance issue, rather than an issue that directly affects health. Nevertheless, there are several standards and guidelines for dust deposition published by various other bodies, and these are set out in Table 6-7. The TA-Luft (Germany) guideline is a generally reasonable European threshold in which nuisance will occur and will be considered in this assessment.

Table 6-7 Dust Deposition Guidelines

Potential for complaint	Deposition rate ($g/m^2/day$)	Data source
Possible Nuisance	0.600[165] (30-day average)	South Africa National Standards for residential areas
Possible Nuisance	**0.350 (monthly mean)**	**TA-Luft (Germany)**
Serious nuisance	0.200	UK recommended nuisance dust deposition rate
Very Likely Nuisance	0.650	TA-Luft (Germany)
First Loss of Amenity	0.133 (monthly mean)	West Australia Nuisance Standard
Unacceptable reduction in air quality	0.333	West Australia Nuisance Standard

Dust emissions can also adversely impact on vegetation close to the construction works. These impacts vary on a species-by-species basis but are typically in the same order of magnitude as nuisance impacts at human receptors[166]. On this basis, the guidelines for the avoidance of nuisance at human receptors can be used to also avoid adverse impacts on vegetation. There are some exceptions, for example agriculture producing soft fruits or leafy vegetables that may be more susceptible to damage and these will need to be considered on a case-by-case basis, if present.

[165] For residential areas can be exceeded 3 times in a year and not in consecutive months.

[166] Farmer, A.M. (1994). The Effects of Dust on Vegetation – A Review.

6.1.2.3 Determining Significance

6.1.2.4 Introduction

The significance of impacts to air quality is determined by:

- Sensitivity of Receptors (to the pollutants) x Magnitude of Impacts

The determination of the significance of impact is used for all impacts except dust, which is assessed with a different methodology, as described later. The significance criteria for this assessment are outlined in ESIA Chapter 4 “ESIA Methodology”.

6.1.2.5 Receptor Sensitivity

Factors defining the sensitivity of a receptor are presented in Table 6-8.

Table 6-8 Factors Defining the Sensitivity of a Receptor

Sensitivity	Human (Health)	Human (Dust soiling)	Ecological
High	Locations where members of the public are exposed over a time period relevant to the air quality objectives [(a)] Examples include residential dwellings, hospitals, schools and residential care homes	Regular exposure High level of amenity expected Appearance, aesthetics or value of the property would be affected by dust soiling Examples include residential dwellings, museums, medium and long-term car parks and car showrooms	Nationally or internationally designated site with dust sensitive features [(b)] Locations with vascular plant species [(c)]
Medium	Locations where workers are exposed over a time period relevant to the air quality objectives [(a)] Examples include office and shop workers [(d)]	Short term exposure Moderate level of amenity expected Possible diminished appearance or aesthetics of property due to dust soiling Examples include parks and places of work	Nationally designated site with dust sensitive features [(b)] Nationally designed sites with a particularly important plant species where dust sensitivity is unknown
Low	Transient human exposure Examples include public footpaths, playing fields, parks and shopping streets	Transient exposure Enjoyment of amenity not expected Appearance and aesthetics of property unaffected Examples include playing fields, farmland [(e)], footpaths, short-term car parks and roads	Locally designated site with dust sensitive features [(b)]

[(a)] In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.
[(b)] Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).
[(c)] Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.
[(d)] Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation.
[(e)] Except commercially sensitive horticulture

For the case of this Project, all receptors are defined as ‘High’.

6.1.2.6 Magnitude

Table 6-9 shows the magnitude criteria which are based upon IFC Guidance [167]. Key to the criteria is the IFC 'rule' in the Guidance that no project should take up more than 25 % of any air quality standard to allow future sustainable development in the same airshed. In this case, the 25 % rule is applied at locations where there are sensitive receptors. The IFC also states that where the airshed is degraded (i.e., air quality standard is already exceeded) then further measures should be considered to minimise impacts to air quality as far as practicable. The magnitude criteria have been established based on these guidelines to fit into the EIA framework whilst maintaining the spirit of the IFC guidance. These significance criteria have been established in principle since the IFC guidelines were published. These criteria have been applied to numerous projects, including to road schemes where there is no specific project requirements for defining significance and projects and being undertaken within the IFC framework.

Table 6-9 Magnitude Criteria

Impact as % of AQS	Magnitude
Undegraded Airsheds where Predicted Environmental Concentrations (PEC)* < Air Quality Standards/Guidelines	
<10 %	Negligible
10 – 25 %	Small
25 – 75 %	Medium
>75 %	Large
Degraded Airsheds where PEC* > Air Quality Standards/Guidelines	
<5 %	Negligible
5 – 10 %	Small
10 – 25 %	Medium
>25 %	Large

*PEC is Project Impact plus the existing baseline

6.1.2.7 Assessment Methodology

6.1.2.8 Construction Traffic

Figure 6-1 sets out a screening methodology identifying the numbers of HGVs and LGVs needed to trigger minor, moderate and major impacts. This method is based upon a worst-case screening, as it is based on receptors being immediately adjacent to the roadside, and older, more polluting vehicles. The method is derived from that set out in the UK Motorways Agency Design Manual for Roads and Bridges. The methodology is based upon the numbers of vehicles needed to trigger an impact based upon an increase in roadside NO_2 and PM_{10}, noting that NO_2 is the more sensitive parameter for road traffic. This methodology is designed to provide basic screening criteria for temporary increases in traffic associated with construction avoiding detailed modelling which has a high degree of uncertainty for construction phase due to the highly variable nature of construction traffic flows. Impacts depend on two factors: volume of traffic; and distance between the road and receptor. This is captured in the two tables on the lower right in the graphic.

[167] IFC (2007) General EHS Guidelines for Air Emissions and Ambient Air Quality

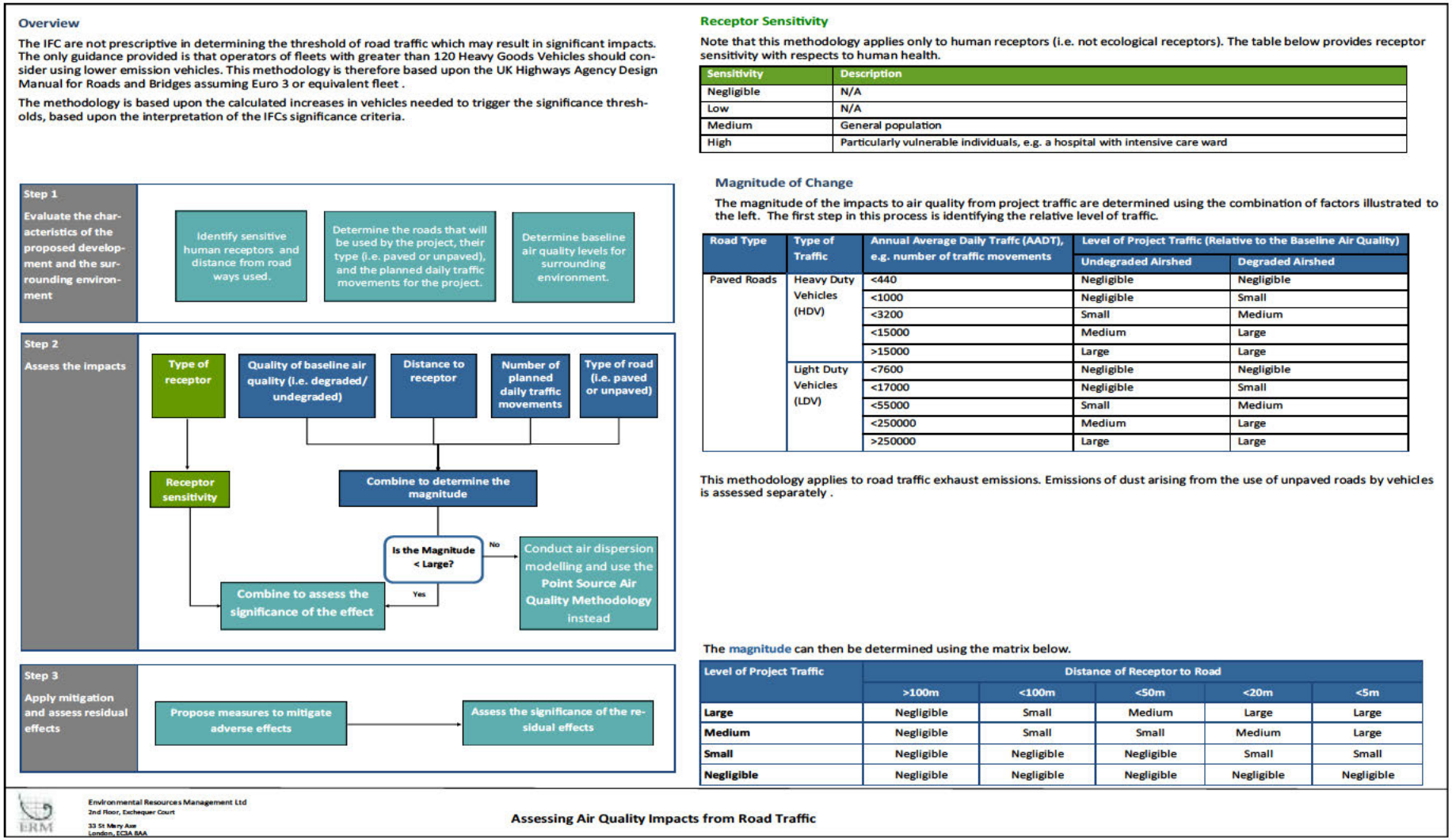


Figure 6-1 Air Quality Assessment Infographic for Construction Road Traffic

6.1.2.9 Construction Dust

The construction of the Project will result in emissions of dust and PM_{10}. However, best practice mitigation will be put in place to manage these impacts to the point that these are negligible, or at worst minor in limited circumstances. The methodology set out in Figure 6-2 and used in this assessment outlines the appropriate and applicable mitigation needed to achieve negligible impacts. This is then supported through the execution of the Construction Environmental and Social Management Plan (CESMP Annex 17) to ensure that mitigation is applied, and impacts are monitored and addressed throughout the construction program.

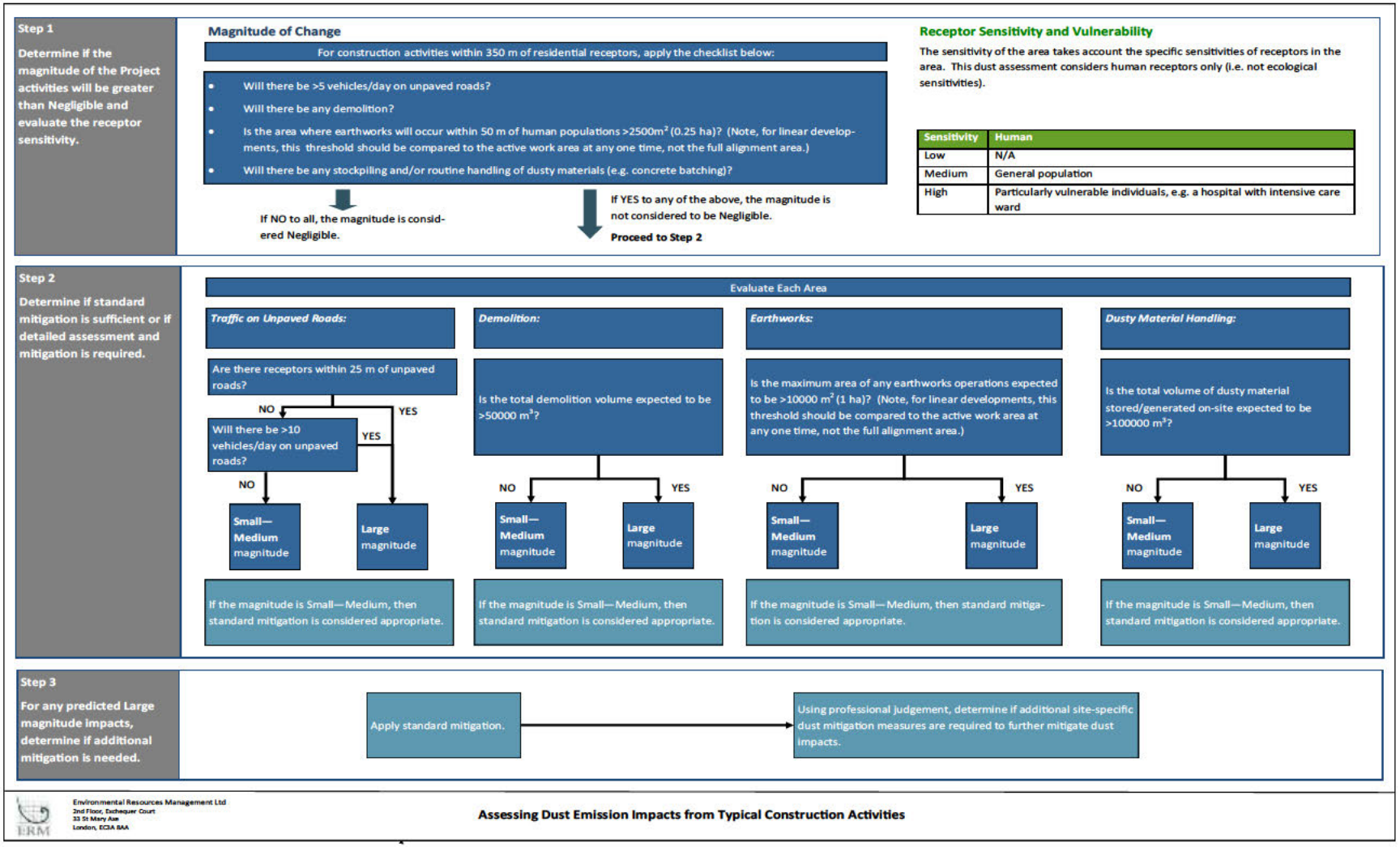


Figure 6-2 Air Quality Assessment for Dust – Infographic

6.1.2.10 Operational Traffic

6.1.2.10.1 Introduction

Modelling of traffic emissions has been undertaken utilising the ADMS-Road's dispersion model[168]. ADMS uses information on the traffic flows, traffic speeds, road characteristics, surrounding area and local meteorology to predict the impacts of road traffic emissions on air quality. The scenario considered is for operational traffic in 2040, as this reflects peak traffic flow.

The IFC does not advocate the use of a specific model for road traffic. However, ADMS is one of the small numbers of dispersion models that is specifically designed for use in assessing road traffic impacts.

6.1.2.10.2 Road Model Methodology

The key elements of the methodology used for carrying out the air dispersion modelling are set out in Table 6-10. The assumed road-widths are presented in Table 6-11.

Table 6-10 Road Traffic Modelling Inputs

Parameter	Approach	Notes
Dispersion model	CERC ADMS-Roads v5.0	CERC ADMS 5 is an internationally recognised model for point source modelling[169].
Roads Modelled	711 Nakkaş – Yeşilbayır 712 Yeşilbayır – Hadımköy 713 Hadımköy – Delikkaya 714 Delikkaya – Bahçeşehir 716 Bahçeşehir – Olimpiyat 717 Olimpiyat – K13 Başakşehir 721 Yeşilbayır – Yeşilbayır 1 722 Yeşilbayır – Bahşayiş 723 Bahşayiş – Karaağaç 731 Bahçeşehir – Tatarcık 732 Tatarcık – Antikkent 733 Antikkent – Ispartakule	The geometry of each road has been included in the model to provide spatially accurate concentrations at sensitive receptors close to the proposed route
Years modelled	2040	
Model domain	Area between Nakkaş and Başakşehir	The Project has a total length of 36 km: 24 km (main motorway) as well as 12 km of connecting roads
Receptors	'Smart' gridding around roads of interest	A receptor grid has been defined around the roads of interest to allow contour plots to be generated that follow the road alignment
Surface characteristics	Surface Roughness: 0.5 Albedo: 0.23 Monin – Obhukov Length: 30 Priestly – Tailor Parameter: 1	
Meteorological data	İstanbul Ataturk Airport 2016 – 2020	Hour-sequential data

[168] CERC, ADMS-Roads model, https://www.cerc.co.uk/environmental-software/ADMS-Roads-model.html

[169] IFC (2007), Environmental, Health and Safety Guidelines, Air Emissions and Ambient Air Quality https://www.ifc.org/wps/wcm/connect/4e01e089-ad1a-4986-b955-e19e1f305ff0/1-1%2BAir%2BEmissions%2Band%2BAmbient%2BAir%2BQuality.pdf?MOD=AJPERES&CVID=ls0KF2J

Parameter	Approach	Notes
Street Canyons	none	The roads are not confined by street canyons
Emissions data	Road traffic emissions were calculated based upon Turkey fleet composition data (see Chapter 1.4.3.3.)	

Table 6-11 Model Inputs – Road Widths

Road Name	Road Model ID	Road Width (m)
711 Nakkaş – Yeşilbayır	711	30
712 Yeşilbayır – Hadımköy	712	40
713 Hadımköy – Delikkaya	713	38
714 Delikkaya – Bahçeşehir	714	38
716 Bahçeşehir – Olimpiyat	716	30
717 Olimpiyat – K13 Başakşehir	717	40
721 Yeşilbayır – Yeşilbayır 1	721	34
722 Yeşilbayır 1 – Bahşayiş	722	24
723 Bahşayiş – Karaağaç	723	42
731 Bahçeşehir – Tatarcık	731	36
732 Tatarcık – Antikkent	732	29
733 Antikkent – Ispartakule	733	30

6.1.2.10.3 Emissions Calculations

The vehicle emissions for input into ADMS-Roads have been calculated from the AADT data for each road section (see Table 6-12). AADT data has been split into 70 % Light Goods Vehicles (LGV) vehicles and 30 % Heavy Goods Vehicles (HGV) with ratio based on a separate traffic report[170]. LGVs encompass smaller road vehicles such as cars and motorcycles, while HGVs are defined as vehicles with two – six axles and a wheelbase of 3.2 m or greater. The LGV fleet was further split into petrol and diesel vehicles (ratio of 40:60) using previously calculated traffic ratios (no current data for Turkish traffic fleet was available, so the ratio from 2013 used)[171]. For HGVs there was no fleet composition data available, so calculations were based on the average engine power (250 kW) for the most common HGV model in 2016 (Mercedes Daimler Axon)[172].

All vehicles on the motorway were assumed to have Euro VI engines, and emissions factors for each road section were calculated using EU NO_x emissions standards[173,174]. These were added together to obtain an ADMS-Road's emissions factor for each road section.

As the emissions data is stated in total NO_x, conversion of NO_x to NO_2 is required. No such factors are provided by the IFC and these are not cited by regulatory bodies (unlike industrial NO_x to NO_2 factors

[170] Steer 2021, Northern Marmara Motorway Project Nakkaş – Başakşehir Section. Traffic and Revenues Study

[171] https://appsso.eurostat.ec.europa.eu/nui/mainPage.do

[172] https://theicct.org/sites/default/files/publications/ICCT_Turkish-fleet-baseline_20160318.pdf

[173] https://dieselnet.com/standards/eu/ld.php

[174] https://dieselnet.com/standards/eu/hd.php

which are published). Therefore, data from a monitoring site close to a major highway (M25 in England) was used to derive a conversion factor of 8% [175].

Table 6-12 Road Traffic Data (for 2040)

Road Name	AADT	%HGV	Speed (kph)	Emissions Factors for ADMS-Roads (g NO_x/km)
711 Nakkaş – Yeşilbayır	103,404	29 %	120	4.33
712 Yeşilbayır – Hadımköy	125,805	32 %	120	5.11
713 Hadımköy – Delikkaya	162,096	32 %	120	8.15
714 Delikkaya – Bahçeşehir	172,850	31 %	120	8.31
716 Bahçeşehir – Olimpiyat	232,953	25 %	120	12.5
717 Olimpiyat – K13 Başakşehir	195,478	28 %	120	12.0
721 Yeşilbayır – Yeşilbayır 1	53,913	39 %	100	3.72
722 Yeşilbayır 1 – Bahşayiş	44,514	45 %	100	3.72
723 Bahşayiş – Karaağaç	44,682	45 %	100	3.73
731 Bahçeşehir – Tatarcık	77,763	14 %	100	5.05
732 Tatarcık – Antikkent	64,578	13 %	100	4.33
733 Antikkent – Ispartakule	57,919	15 %	100	3.87

6.1.2.10.4 Future Traffic

The assessment of road traffic impacts is based upon currently best available data relating to the vehicle fleet in Turkey. When preparing the emissions inventory, data on the future fleet composition was not identified. Furthermore, the uptake of alternative fuels, such as electric vehicles and hydrogen vehicles, has not been taken into consideration, as no data on likely uptake was identified. Therefore, for modelling purposes, the future fleet in 2040 is assumed to reflect the current fleet.

Realistically, however, by the year 2040 the emissions from the vehicle fleet will have likely substantially changed. Emissions of oxides of nitrogen are expected to be much lower, as combustion technology is replaced by electric and hydrogen vehicles, and at very least ultra-low emission hybrid vehicles. A feasibility study by Mott Macdonald has indicated that electric vehicles will be 3.6 % of the total vehicle fleet in a high growth scenario by 2025 and up to 20.7 % by 2040[176]. This situation, with regard to air quality, may be further improved by the uptake of low and zero emission vehicles in light of Turkish climate change commitments, which will have the effect of decarbonising the transport fleet to an unknown extent by 2040. These changes in vehicle technology will reduce the road traffic emissions and will also result in lower baseline levels of NO_2 and particulate matter, given that the baseline is heavily influenced by road traffic. In practice, by 2040 the impacts will therefore be somewhat lower than predicted, albeit the exact reduction is unknown.

In summary, the model for 2040 is based on the current fleet composition which is a conservative assumption as by 2040 the fleet will likely have a much more significant portion of zero-emission vehicles. As such real emissions in 2040 will likely be significantly lower than what the model shows (however by exactly how much cannot be currently quantified).

[175] Nox conversion assumed 0.08 from M25 Staines roadside calculation (Table 6.8) https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/nd-chapter6.pdf

[176] Mott Macdonald 2021. PPP Road Nakkaş-Başakşehir – Feasibility Study Review and VfM Analysis.

6.1.2.11 Construction Traffic

The number of HGV movements is anticipated to be, at peak, between 10 and 40 vehicles per hour. Assuming a 12-hour working day, this equates to 240 to 960 vehicle journeys per day (with two journeys per each vehicle movement). On the basis of the screening thresholds set out in Figure 6-1 the magnitude of the impacts of these traffic movements are anticipated to be *negligible* for NO_2, PM_{10} and $PM_{2.5}$.

6.1.2.12 Construction Dust

Based upon the risk assessment set out inFigure 6-2, the risk of significant dust impacts from the four key types of activities have been reviewed to identify if there are activities that are at medium or high risk of causing dust impacts, and therefore require additional mitigation. In summary:

- Unpaved roads – large magnitude of risk
- Demolition – small magnitude of risk
- Earthworks – large magnitude of risk
- Dusty material handling – large magnitude of risk

The construction works will be undertaken with a degree of embedded mitigation suitable for managing emissions from this Project and ensuring a low risk of causing dust impacts. With these mitigation measures correctly implemented and supported by site boundary monitoring, the risk of dust nuisance is *negligible* or, at worst *minor* during limited periods, for example during particularly hot, dry and windy weather.

The Project is deemed not to have a negative impact relating to dust nuisance and PM_{10}. as per the TA Luft (Germany) guideline is met at nearby sensitive receptors,

6.1.2.13 Operational Traffic

The results of the dispersion modelling are illustrated in Figure 6-3 to Figure 6-6 to show the NO_2 concentrations arising from the road traffic.

The key findings are:

- NO_2 annual mean:
  - The Project impacts are predicted to be greater than 25 % of the AQS at some locations in close proximity to the road alignment
  - The Project impacts are predicted to be less than 100 % of the AQS at all receptor locations
  - Where the baseline is greater than 75% of the AQS there is therefore a risk of the AQS being exceeded. This is particularly the case near Basaksehir at the eastern end of the Project where the highest impacts co-incide with the highest baseline. As such, there is a risk that at some sensitive receptors close to the road alignment the AQS may be approached and exceeded.
- NO_2 1 hour mean:
  - The Project impacts are predicted to be less than 25 % of the AQS at all receptor locations
  - When combined with the baseline, the 1 hour NO_2 AQS is not predicted to be exceeded at any sensitive receptor locations
- PM_{10} annual mean:
  - The Project impacts are predicted to be greater than 10 % of the AQS at some locations in close proximity to the road alignment as the PM_{10} baseline is also in excess of the AQS at some locations there is the risk of Medium impacts arising.
  - The Project impacts are predicted to be less than 25 % of the AQS at all receptor locations

- As noted, the PM_{10} baseline is anticipated to be degraded as the AQS is likely to be exceeded throughout the Project study area. The impacts of the Project are not predicted to exceed 25 % of the AQS, however, they are predicted to exceed the lower threshold of 10 % at some locations

- $PM_{2.5}$ annual mean:
  - The Project impacts are predicted to be greater than 25 % of the AQS at some locations in close proximity to the road alignment
  - The Project impacts are predicted to be less than 100 % of the AQS at all receptor locations
  - The greatest impacts arise toward the eastern end of the Project, which coincides with two locations where the baseline was close to AQSs. As such, there is a risk that at some sensitive receptors close to the road alignment the AQS may be approached and exceeded.
- PM_{10} 24 hour mean:
  - The Project impacts are predicted to be greater than 10 % of the AQS at some locations in close proximity to the road alignment
  - The Project impacts are predicted to be less than 25 % of the AQS at all receptor locations
  - As noted, the PM_{10} baseline is anticipated to be degraded as the AQS is likely to be exceeded throughout the Project study area. The impacts of the Project are not predicted to exceed 25 % of the AQS, however, they are predicted to exceed the lower threshold of 10 % at some locations.

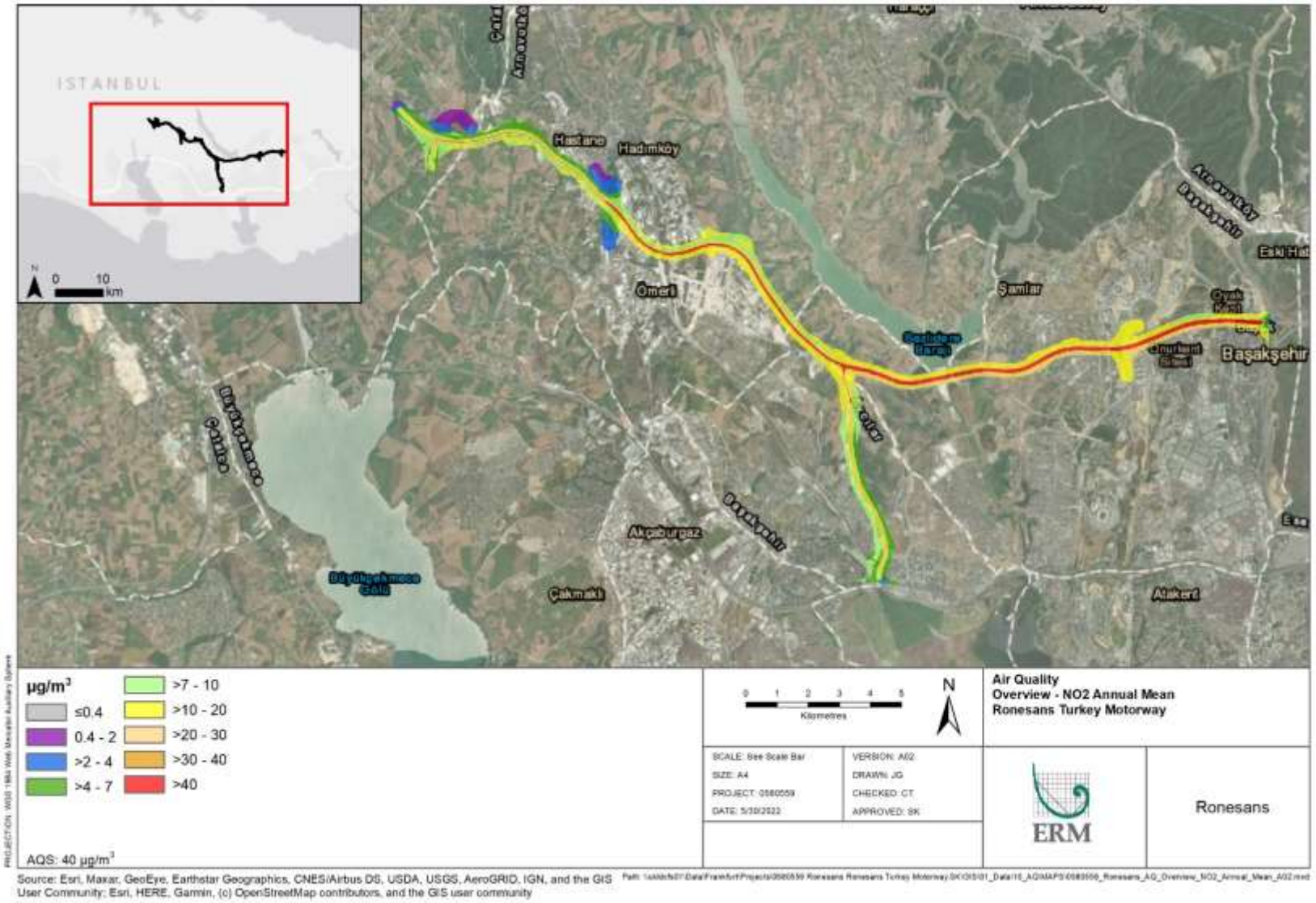


Figure 6-3 NO_2 Annual Mean Contour Plot

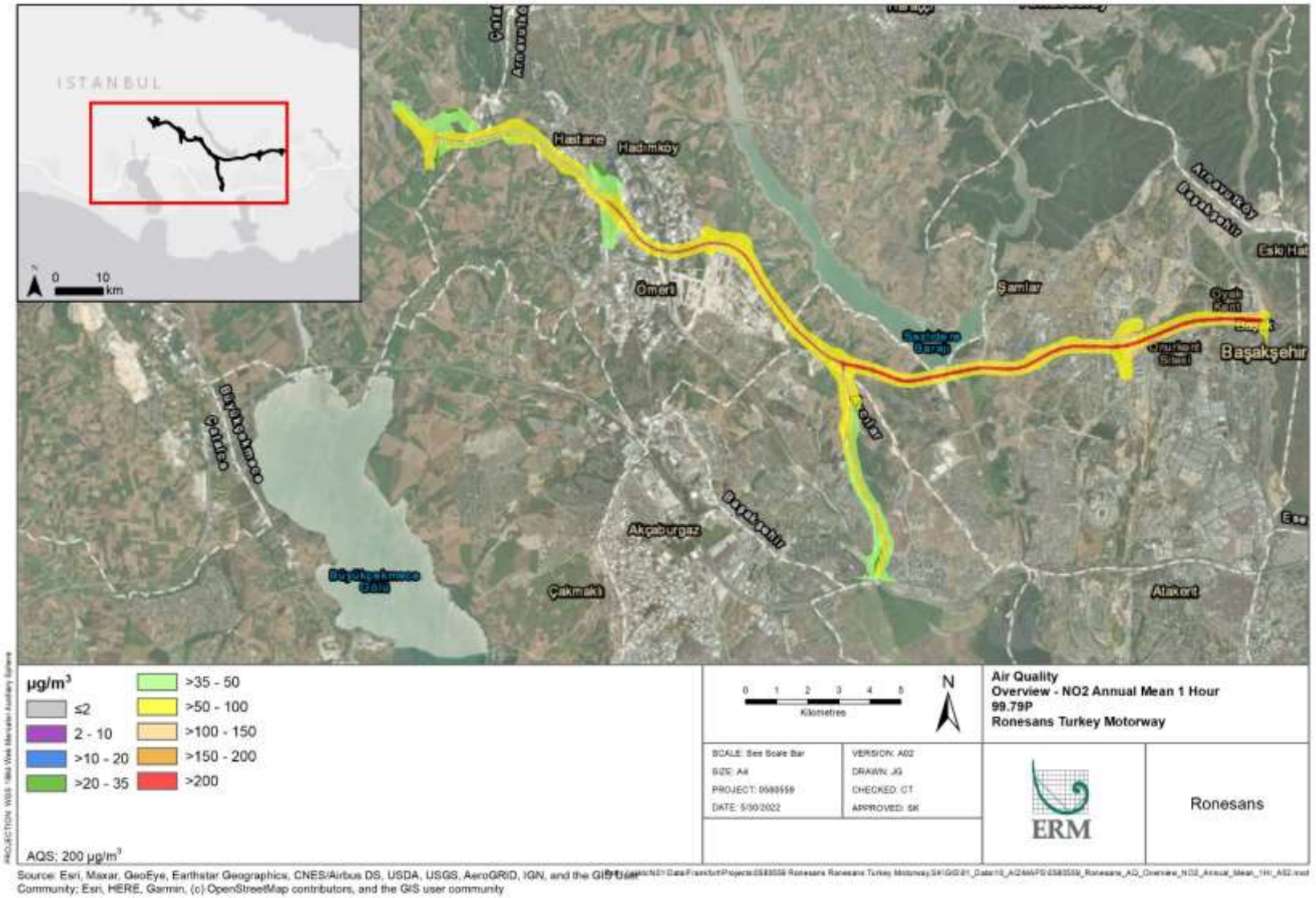


Figure 6-4 NO_2 1 hour Contour Plot

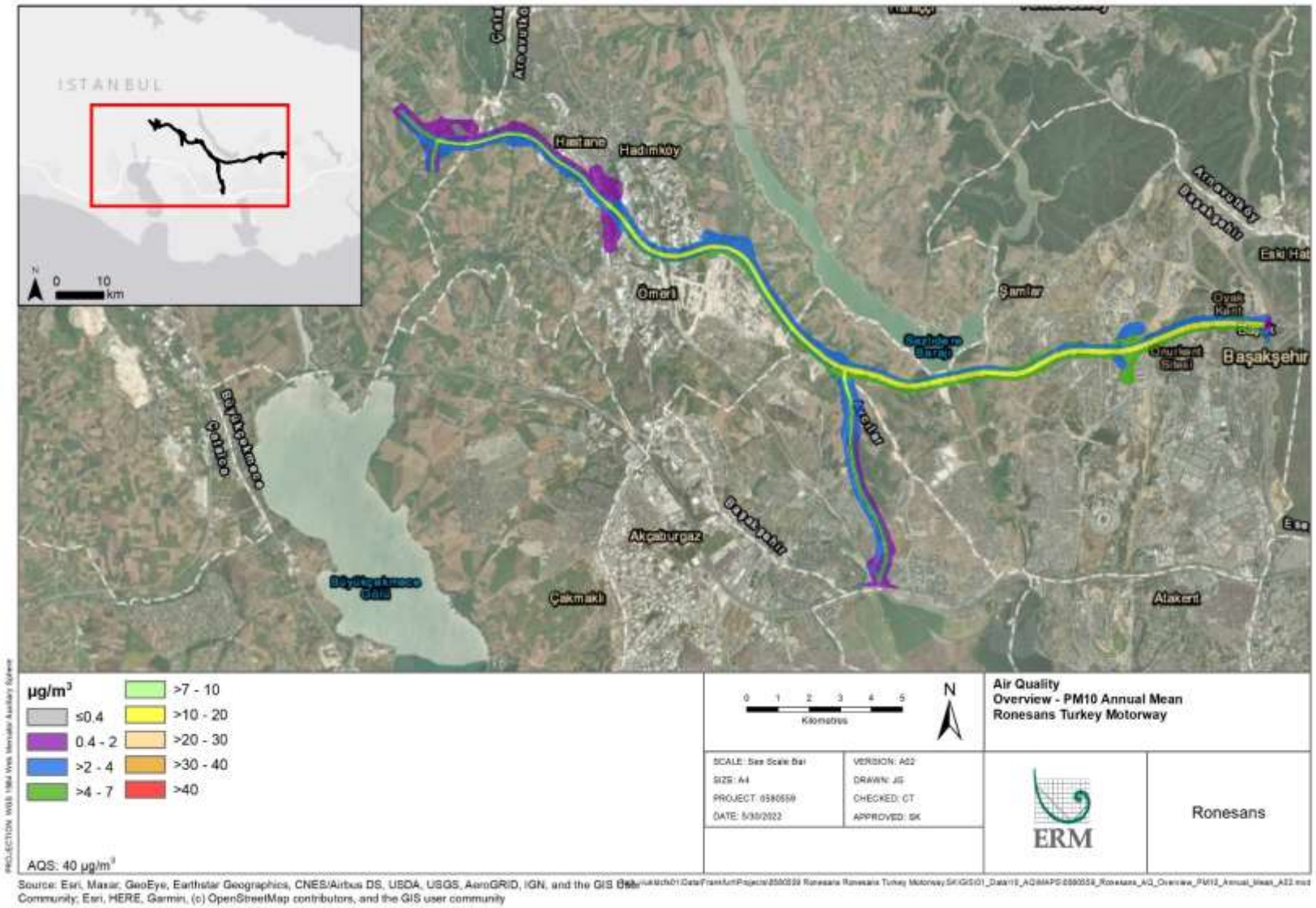


Figure 6-5 PM_{10} Annual Mean Contour Plot

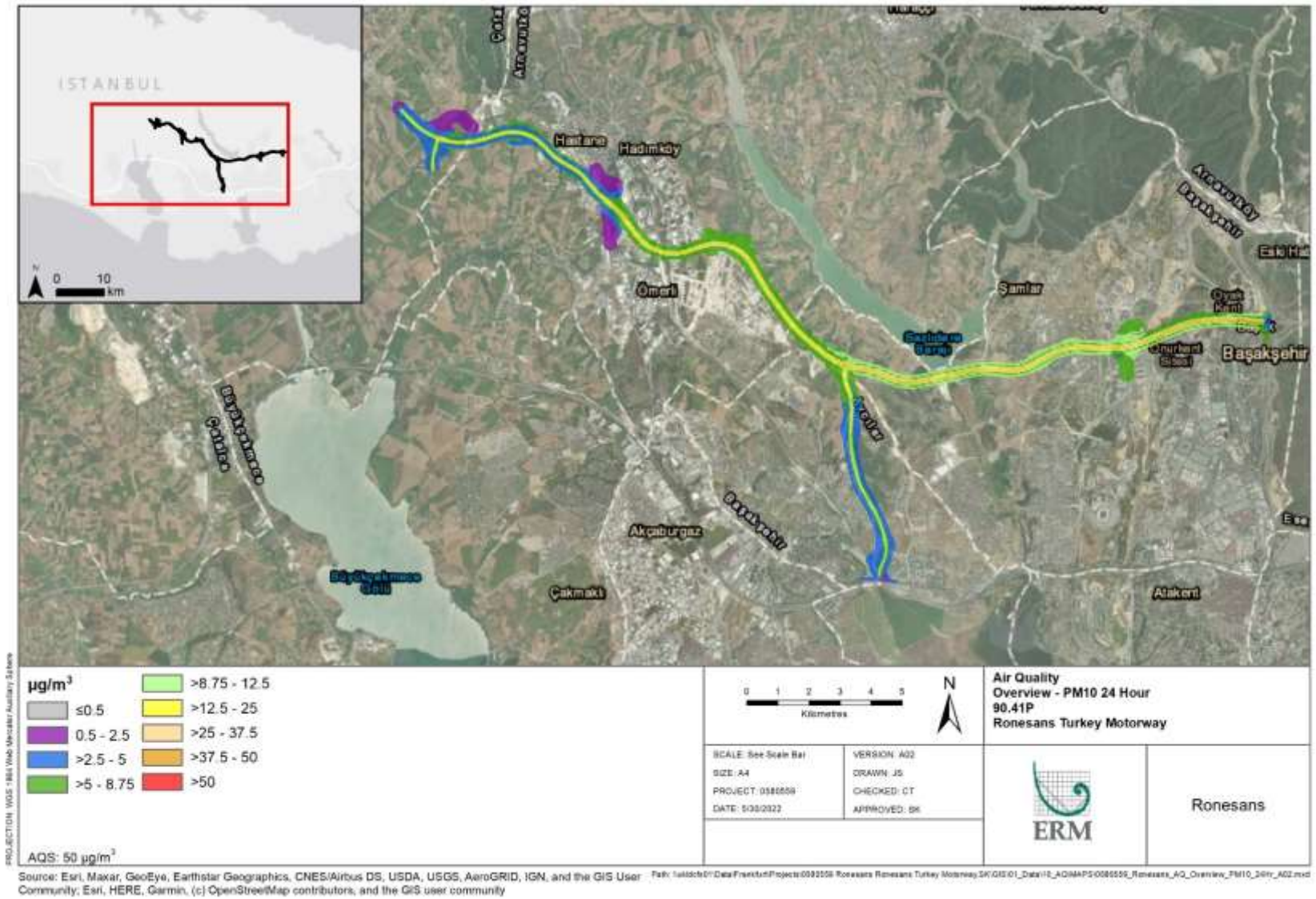


Figure 6-6 PM_{10} 24 Hour Contour Plot

6.1.2.14 Mitigation

6.1.2.14.1 Construction Dust

Following the risk assessment which outlines parts of the Project as having a large magnitude of risk, the following mitigation measures for construction dust are recommended in accordance with Institute of Air Quality Management (IAQM) guidance for high risk sites[177] and IFC best practice[178]. Unmitigated, the Project would result in major impacts, but in practice no scheme would be undertaken with no mitigation.

Air Quality and Emission Control Plan has been developed and implemented as a basic-embedded measure. Part of the implementation of the Air Quality and Emission Control Plan is to highlight the moderate to high-risk sites across the Project construction area. On these sites where additional mitigation measures are required the mitigation set out below is deemed sufficient to render residual impacts *as negligible*.

6.1.2.15 Communications

- Develop and implement the Project Stakeholder Engagement Plan (SEP) and Grievance Mechanism (GM) for the project. This would include community engagement before work commences on site and a mechanism to record and respond to complaints.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

6.1.2.16 Site Management

- Record all dust and air quality complaints in the GM, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.

6.1.2.17 Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the inspection log available to the local authority when requested.
- Carry out regular site inspections to monitor compliance with the Air Quality and Emission Control Plan and record inspection results.
- Increase the frequency of site inspections by the person(s) accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority.

[177] IAQM 2014. Guidance on the assessment of dust from demolition and construction. Version 1.1. https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

[178] IFC 2007. General EHS Guideline: Construction and Decommissioning https://www.ifc.org/wps/wcm/connect/7d708218-2a9e-4fcc-879d-9d5051746e7d/4%2BConstruction%2Band%2BDecommissioning.pdf?MOD=AJPERES&CVID=ls62NKq

6.1.2.18 Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Necessary measures around dusty activities or the site boundary that are at least as high as any stockpiles on site during road excavations.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
- Avoid site runoff of water or mud.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site necessary mitigation measures will be taken.

6.1.2.19 Operating vehicle/machinery

- Impose reduced speed limits on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

6.1.2.20 Waste Management

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).

6.1.2.21 Measures Specific to Demolition

- Ensure effective watering method is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives as defined in Blasting Management Plan.
- Bag and remove any biological debris or damp down such material before demolition.

6.1.2.22 Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

- Only remove the cover in small areas during work and not all at once.

6.1.2.23 Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials, ensure bags are sealed after use and stored appropriately to prevent dust.

6.1.2.24 Measures specific to track out

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system with pool/water jet (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

6.1.2.24.1 Construction Traffic

The following mitigation is advised for construction traffic:

- Nakkaş Otoyol A.Ş. has a requirement in their sub-contractor agreements specifying the EURO Standards that HGV vehicles need to meet to comply with the applicable emissions standards.
- Nakkaş Otoyol A.Ş. has a requirement that certain pieces of equipment such as cranes used for the Project are no more than 3 years old which is also applicable for the HGVs as well. Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Use grid electricity or battery powered equipment where practicable to minimize the use of diesel- or petrol-powered generators.
- Regardless of the size or type of vehicle, fleet owners/operators should implement the manufacturer-recommended engine maintenance programs.

6.1.2.24.2 Operational Traffic

It is expected that the uptake of electric and/or hybrid vehicles over time will reduce the impacts of road traffic and reduce the baseline air pollution by 2040 when peak traffic is expected. In terms of mitigation that can be applied from the start of the Project in 2024, the following can be considered:

- If required, purchase sensitive receptor properties, particularly close to roadside where impacts are predicted to be major.

A mitigation method that can be implemented from design stage is to undertake detailed analysis of exact route and junction design to maximise distance between road and receptor noting that changes in the order of 5 – 10 m can have a significant impact for receptors close to the roadside.

Potential operation phase impacts on sensitive receptors located outside the expropriation boundary will be monitored internally by Nakkaş Otoyol A.Ş. and externally by the Lenders through their independent consultants. PAPs shall be granted the right to request acquisition within three (3) years upon commissioning of the Motorway should any significant environmental and/or social impacts be identified through E&S monitoring that cannot be mitigated.

During the operation phase, Nakkaş Otoyol A.Ş. will implement the SEP including the grievance mechanism and continue engaging with the PAPs, including users of fragmented and orphan parcels, on an ongoing basis. Any feedback and/or request received from PAPs related to land fragmentation, engineering structures, etc. will be investigated by Nakkaş Otoyol A.Ş. design and construction teams and assessed by an Independent Land/Valuation Specialist (to avoid any conflict specially in cases where there is disagreement with the landowners on the decision of Nakkaş Otoyol A.Ş. /KGM) in terms of necessity, and technical and financial feasibility. Where necessary and feasible, Nakkaş Otoyol A.Ş., subject to approval by KGM, may include additional structures in the design throughout the operation phase.

6.1.2.25 Summary Tables

Table 6-13 and Table 6-14 summarise the impacts from Construction Traffic on Air Quality and Construction Dust, respectively, and Table 6-15 shows Operational Traffic Impacts on Air Quality. The tables indicate the extent, duration, scale, frequency, and likelihood of impact of the Project on receptors before and after mitigation is applied (including embedded measures).

Table 6-13 Construction Traffic Impacts on Air Quality

Project Phase: *Construction Traffic*				
Type of Impact: Direct Negligible to Small Impact				
Rating of Impacts:				
	Pre-mitigation (assumes embedded mitigation measures)		**Post-mitigation (Residual) – (no additional mitigation methods are needed)**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	within 350 m of construction activity	*Local*	within 350 m of construction activity
Duration	*Medium-term*	Construction expected to last 30 months.	*Medium-term*	Construction expected to last 30 months.
Scale	*Minor*	Construction expected to last 30 months, however the Project is completed section by section therefore only expect scale to be minor at any one time.	*Minor*	Construction expected to last 30 months, however the Project is completed section by section therefore only expect scale to be minor at any one time.
Frequency	*Regular*	Impacts expected throughout the duration of construction.	*Regular*	Impacts expected throughout the duration of construction.
Likelihood	*Likely*	During construction phase	*Likely.*	During construction phase

Magnitude:	
Pre-mitigation	**Post-mitigation (Residual)**
No Mitigation, Negligible Magnitude for NO_2, Small Magnitude for PM_{10}	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:	
High Sensitivity	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Minor Impact	Minor Impact

Table 6-14 Construction Dust Impacts

Project Phase: *Construction Dust*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	within 350 m of construction activity	*Local*	within 350 m of construction activity
Duration	*Medium-term*	Construction expected to last 30 months.	*Medium-term*	Construction expected to last 30 months.
Scale	*Major (without embedded mitigation)*	Not applicable – project will not be undertaken without mitigation. Pre-mitigation doesn't apply as required mitigation will be implemented and actively managed through the CESMP.	*Negligible to Minor*	Construction expected to last 30 months and section by section however with embedded mitigation only expect scale to be minor at any one time.
Frequency	*Regular*	Impacts expected throughout the duration of construction.	*Regular*	Impacts expected throughout the duration of construction.
Likelihood	*Likely*	During construction phase	*Likely.*	During construction phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Not applicable			Negligible to Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major (without embedded mitigation)			Negligible to Minor Impact	

Table 6-15 Operational Traffic Impacts

Project Phase: *Operational Traffic*				
Type of Impact: Direct Negative Impact (NO_2 and PM_{10} emissions)				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Large project, covers many areas of sensitive receptors	*Regional*	Large project, covers many areas of sensitive receptors
Duration	*Long-term*	During operational phase	*Long-term*	During operational phase
Scale	*Major*	During operational phase	*Moderate/Major*	During operational phase (Expected that baseline and emissions from road traffic in 2040 will be substantially lower than the opening year but mitigation measures have been outlined above in any case)
Frequency	*Regular*	Impacts expected throughout the duration of operation.	*Regular*	Impacts expected throughout the duration of operation.
Likelihood	*Likely*	During operational phase	*Likely*.	During operational phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			Medium/Large Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate/Major Impact	

6.1.2.26 Conclusions

This AQIA assessed the potential impacts of construction (due to traffic and dust emissions) and operational impacts of motorway vehicle emissions on air quality for the Project. A list of mitigation methods which will work to minimise emissions is outlined in this Chapter. Monitoring will be completed at key sensitive receptors and a GM will be put in place to capture feedback.

Construction Traffic: There are negligible to minor impacts from NO_2 and PM_{10}/$PM_{2.5}$ emissions identified for construction traffic.

Construction Dust: Impacts are negligible, or at worst minor, as mitigation will be applied throughout the duration of the construction program. The exact mitigation that will be needed will be identified based on the specific activities being undertaken at any given location, and the proximity of receptors. This will be managed through the Construction Environmental and Social Management Plan (CESMP) and Air Quality and Emission Control Plan that has been developed in support of the project and supported by site boundary monitoring.

Operational Traffic: Impacts are moderate to major when traffic data from 2040 is assessed for NO_2 and PM_{10}/$PM_{2.5}$. Some mitigation measures from Project start are possible as outlined above, which can be applied to help smooth out the traffic flow and thus reduce emissions. However, these measures cannot be guaranteed to meet air quality standards at sensitive receptors. There are limitations in the assessment due to the absence of a thorough understanding of the vehicle fleet composition in 2040.

Vehicle fleet composition and associated emissions in Turkey will change substantially in the next two decades. Electric vehicles will become more prevalent, hydrogen technology may emerge, and climate change goals will also drive vehicle fleet composition change. These predicted trends will by 2040 substantially reduce emissions of NO_x and PM_{10}/$PM_{2.5}$ from vehicles. The uptake of low and zero emissions vehicles will also substantially improve the baseline NO_2, as traffic emissions dominate the baseline conditions in the wider region. Therefore, in summary, although the impacts from operational traffic are moderate to major, due to outlined changes in fleet composition by 2040 the impacts of the project will likely be less extensive and reduce the risk of AQSs being exceeded.

6.1.3 Greenhouse Gas Emissions

6.1.3.1 Impact Assessment

The greenhouse gas (GHG) emissions assessment estimates the emissions contributing to climate change from the Project during its construction and operation phases. The objectives for this assessment are:

- To undertake a GHG inventory of the construction and operational carbon footprint of the Project.
- To contextualise annual emissions against international thresholds.
- To determine whether expected GHG emissions are deemed to be 'significant'.

6.1.3.2 Relevant Applicable Standards

The following Applicable Standards are relevant for this assessment:

- IFC Performance Standards, 2012;
- EBRD Performance Requirements, 2019; and
- Equator Principles 4, 2020;

IFC Performance Standards

Regarding resource efficiency, including the use of energy and other GHG-relevant activities, the IFC's Performance Standard 3: Resource Efficiency and Pollution Prevention [179] states the following:

> *The client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring*:
>
> *For projects that are expected to or currently produce more than 25,000 tonnes of CO2-equivalent annually, the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice.*

EBRD

The EBRD Performance Requirement 3 on Resource Efficiency and Pollution Prevention and Control [180] states the following:

[179] International Finance Corporation, Performance Standard 3, 2012

[180] European Bank for Reconstruction and Development: Performance Requirement 3, Resource Efficiency and Pollution Prevention and Control, 2019

For projects that either (1) have, or are expected to have, gross emissions in excess of 100,000 tonnes CO2-equivalent annually, or (2) are expected to result in a net change in emissions, positive or negative, of more than 25,000 tonnes of CO2-equivalent annually post-investment, the client will quantify these emissions in accordance with EBRD Protocol for Assessment of Greenhouse Gas Emissions. The scope of GHG assessment shall include all direct emissions from the facilities, activities and operations that are part of the project, as well as indirect emissions associated with the production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually and reported to EBRD.

The EBRD's Protocol for Assessment of GHG Emissions[181] sets out its methodology for how consultants should assess the GHG emissions from projects.

Equator Principles

The Equator Principles 4 (EP4)[182] states the following:

The EPFI will require the client to report publicly on an annual basis on GHG emission levels (combined Scope 1 and Scope 2 Emissions) and GHG efficiency ratio, as appropriate, during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually. Clients will be encouraged to report publicly on Projects emitting over 25,000 tonnes.

For all Projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than 100,000 tonnes of CO2 equivalent annually, consideration must be given to relevant Climate Transition Risks (as defined by the TCFD) and an alternatives analysis completed which evaluates lower Greenhouse Gas (GHG) intensive alternatives.

In summary, the Applicable Standards require consideration of the GHG emissions (combined Scope 1 and Scope 2 emissions) associated with the Project during its initial design/construction and later operational stages.

If the GHG emissions of the Project exceed 25,000 or 100,000 tonnes of CO2 equivalent annually, then additional reporting and climate-studies will be triggered. The approach to estimating the GHG emissions is presented in the following chapter.

6.1.3.3 Approach

This chapter describes the methodology of GHG emissions assessment. The following Figure 6-7 shows the four main steps of the assessment, as further elaborated in the text below.

Figure 6-7 Methodology Overview

[181] European Bank for Reconstruction and Development Bank, Protocol for Assessment of Greenhouse Gas Emissions, 2010
[182] Equator Principles, Principle 4: Environmental and Social Management System, 2020

6.1.3.3.1 Calculation Methodology

The GHG emissions have been calculated using the following guidance references:

- World Resources Institute/World Business Council for Sustainable Development, The Greenhouse Gas Protocol: Corporate Accounting & Reporting Standard (2004)[183];
- World Resources Institute/World Business Council for Sustainable Development, The Greenhouse Gas Protocol: The GHG Protocol for Project Accounting (2005)[184];
- International Organization for Standardization (ISO), ISO 14064 (2018);
- Intergovernmental Panel on Climate Change (IPCC) 2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories (2019)[185]; and
- EBRD Protocol for Assessment of Greenhouse Gas Emissions (2017)[186].

GHG emissions are calculated via the application of documented emission conversion factors. These factors are calculated ratios relating GHG emissions to a proxy measure of activity at an emissions source. For this assessment mainly the guidance UK Government GHG Conversion Factors for Company Reporting [187] is used.

Additional guidance includes the TCFD – Task Force on Climate-related Financial Disclosure.

6.1.3.3.2 Organisational Boundaries

The organisational boundaries of the GHG assessment were set for this assessment using the so-called "control principle" per the methodology of ISO 14064. This means all emissions by entities and activities controlled by the organisation (e.g., Nakkaş Otoyol A.Ş.) must be included; for this Project this refers mainly to all of the construction and operational activities within the scope of the ESIA and over which Nakkaş Otoyol A.Ş. has direct control. Not included within this boundary e.g., would be the operations of third-party quarries.

6.1.3.3.3 Operational Boundaries

In accordance with the GHG protocol, direct and indirect emissions are categorised into two broad scopes:

- Scope 1: Direct GHG emissions;
- Scope 2: Indirect GHG emissions from the use of purchased electricity, heat or steam.

The estimates made for emissions from construction stage activities assume a construction period of 30 months, or 2.5 years. Hence, where estimates are made for the overall construction stage, the total quantities are divided by 2.5 to determine an average annual emission amount.

The construction phase and the operation of the Project will result in direct Scope 1 GHG emissions primarily associated with

- Combustion of fossil fuels due to the transportation of materials to site, transportation of excavated materials and the use of construction equipment on site, as well as
- Combustion of fossil fuels due to operating and maintenance of the road.

[183] Available online at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

[184] Available at: https://ghgprotocol.org/standards/project-protocol

[185] Available at: https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html

[186] Available at: https://www.ebrd.com/documents/admin/ebrd-protocol-for-assessment-of-greenhouse-gas-emissions.pdf

[187] 2020 emission factors available online at: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Indirect GHG emissions in Scope 2 include emissions from the use of electricity from the grid that is generated elsewhere (i.e. not generated at the Project site). Grid electricity will be used to

- Supply the workers' camp during construction, and
- Supply road lighting, toll booths and buildings necessary for operation.

In line with Applicable Standards, the operational boundaries of this study include all emissions released during Scope 1 and 2.

The GHG/carbon footprint of a project can usually only be accurately determined on the basis of actual data on relevant activities, such as X litres of diesel or Y KWh of electricity consumed in a given month during construction. Given that this Project has not yet commenced, and no such actual data are available (yet), at this stage the GHG assessment must necessarily be based on a number of relevant assumptions about the future activities and related emissions.

6.1.3.3.4 Impact Assessment Methodology

Impact assessments are normally conducted by determining how the proposed activity will affect the baseline environment. In the case of GHG emissions. However, the potential impact of GHG emissions occurs on a global basis and the specific source of GHG emissions cannot be linked directly to the future potential impact at a specific location. In the absence of such causal links, this chapter presents an alternative risk-based methodology per international good practice.

In general, the methodology for assessing GHG impacts is based on the evaluation of impact *Magnitude* and the *Likelihood*, which yields a resulting impact *Significance*. The *Likelihood* factor, as explained further below, replaces the usual factor of '*Vulnerability*'.

Magnitude

Impact magnitude is a function of the potential intensity of the impact, moderated by the extent and duration of that impact. When considering GHGs, the extent and duration of the potential impact will always be the same. The extent is international as it is the total stock of world GHG emissions trapped in the atmosphere (leading to global warming).

The duration of the impact is regarded as permanent as the persistence of CO_2 emissions in the atmosphere ranges between 100 and 300 years[188] and thus continues well beyond the life of the Project.

Table 6-16 shows a *Magnitude* scale for project wide GHG emissions that is in line with reporting thresholds adopted by a number of international lender organisations and the Applicable Standards.

Table 6-16 Magnitude Scale for Project GHG Emissions

Project-Wide GHG Emissions/annum	Magnitude Rating
>1,000,000 t CO_2 e	Very Large
100,000 – 1,000,000 t CO_2 e	Large
25,000 – 100,000 t CO_2 e	Medium
5,000 – 25,000 t CO_2 e	Small
<5,000 t CO_2 e	Negligible

6.1.3.3.5 Likelihood

Likelihood is described as 'Unlikely', 'Seldom/Occasional' or 'Likely' according to the definitions outlined in Table 6-17.

[188] Carbon Dioxide Information Analysis Centre (CDIAC)

Table 6-17 Likelihood Definitions

Likelihood	Definition
Unlikely	Reasonable to expect that the consequence will not occur at this facility during its lifetime.
Occasional	Exceptional circumstances/conditions may allow the consequence to occur within the facility lifetime.
Likely	Consequence can reasonably be expected to occur within the life of the facility.

In the case of this Project, the *Likelihood* of carbon emissions occurring during construction and operational phases is 100 %, and therefore classified as 'Likely' per the above table.

Determination of Significance

The combination of the *Magnitude* of a potential impact and the *Likelihood* yields the degree of the *Significance* of a potential GHG impact. This is illustrated in Table 6-18.

As stated above, the *Likelihood* of GHG emissions from the Project activities is given as Likely, and therefore only the **Likely** column in Table 6-18 is relevant for this assessment.

Table 6-18 Impact Significance Rating Matrix

		LIKELIHOOD		
		Unlikely	**Occasional**	**Likely**
MAGNITUDE	**Very Large**	**MAJOR**	**MAJOR**	**MAJOR**
	Large	**MODERATE**	**MAJOR**	**MAJOR**
	Medium	**MINOR**	**MODERATE**	**MAJOR**
	Small	**NEGLIGIBLE**	**MINOR**	**MINOR**
	Negligible	**NEGLIGIBLE**	**NEGLIGIBLE**	**NEGLIGIBLE**

6.1.3.4 GHG Inventory

6.1.3.4.1 Construction Phase

Scope 1

The main source of direct GHG emissions during construction will be from fuel combustion. The fuel combustion is mainly related to construction vehicles and machinery onsite and company-owned transportation vehicles for transporting raw material to and off site. In addition, fuel is used for power generators in cases where grid electricity is not available.

Nakkaş Otoyol A.Ş. expects to consume about 55,000,000 litres of diesel over the entire construction period, which will be approx. 30 months, or 2.5 years. The following Table 6-19 shows the estimated GHG emissions (expressed as tons of CO_2 equivalent – t CO_2 e) in total and annually as based on the anticipated fuel consumption (calculation results rounded appropriately to reflect the uncertainty in the estimates).

Table 6-19 Emissions from Fuel Combustion During Construction (Scope 1)

	Consumption (in total)	Conversion Factor[189]	Emissions (in total)	Emissions (on average annual)
	[litres]	[kg CO_2 e per litre]	[t CO_2 e]	[t CO_2 e]
Diesel	55,000,000	2.68	150,000	60,000

Over the entire construction time in total approx. 150,000 t CO_2 e caused by on-site fuel combustion will be released. Which means on average during construction 60,000 t CO_2 e will be released per year[190].

Scope 2

The main source of power at the construction camps will be from the public electricity grid. The total amount of anticipated electricity consumption is 41,000 MWh, which causes in total around 18,000 t CO_2 e emissions over the 30-month construction period. This results in approx. 7,000 t CO_2 e per year during construction. The calculation is shown in Table 6-20 below.

Table 6-20 Emissions from Grid Electricity Use During Construction (Scope 2)

	Consumption (in total)	Conversion Factor[191]	Emissions (in total)	Emissions (on average annual)
	[kWh]	[kg CO_2 e per kWh]	[t CO_2 e]	[t CO_2 e]
Electricity	41,000,000	0.44	18,000	7,000

Together, the total GHG emissions for Scopes 1 and2 are estimated at about 168,000 t CO_2e tons during the construction stage.

6.1.3.4.2 Operation Phase

Scope 1

The Scope1 emissions during the operation phase are from the fuel combustion as a result of maintenance work. Road maintenance and repair works require many different types of activities(ranging from smaller measures at regular intervals to more important measures that are spread out over a longer period of time) in order to maintain the roads under the best possible conditions for as long as possible. Currently, there are no detailed information available on maintenance projections that can serve as a basis for GHG emissions calculations. However, a lifespan of the motorway of 25 years is assumed, which means theoretically around 4 % of the road needs to be maintained annually on average. Assuming that GHG emissions are roughly proportional, annual emissions due to maintenance activities would be about 4 % of the total emissions caused by the entire construction.

As shown in Table 6-21, total emissions for fuel consumption during the construction phase are roughly 150,000 t CO_2 e per year. If, based on this value, an annual maintenance of 4 % is calculated, this results in approx. 6,000 t CO_2 e emissions per year.

189 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

190 This is a theoretical assumption. It is more likely that the road will be maintenance every 5 years.

191 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Table 6-21 Emissions from Fuel Combustion During Operation (Scope 1)

	Emissions from Fuel Combustion During Construction	Annual maintenance	Emissions per year
	[t CO_2 e]	[%]	[t CO_2 e]
Fuel	150,000	4	6,000

Scope 2

During the operational phase of the highway, electricity will be used mainly for road lighting and for supplying electricity to the intersections, and buildings necessary for operation. Lighting will be provided by different types of lighting technology, including energy-efficient LED lamps. This lighting equipment will require approximately 5,500,000 kWh of electricity annually, which would be equivalent to about 2,400 t of CO_2 e per year. The calculation is shown in Table 6-22.

Table 6-22 Emissions from Grid Electricity Use During Operation (Scope 2)

	Consumption	Conversion Factor[192]	Emission per year
	[kWh]	[kg CO_2 per kWh]	[t CO_2 e]
Electricity	5,500,000	0.44	2,400

6.1.3.5 Summary GHG Inventory

This section provides a summary of the various calculations in the above subsections. The results for annual Scope 1 and 2 emissions are presented below in Table 6-23.

Table 6-23 Summary of Annual Emissions for Scope 1 and 2

Project Phase	Emissions per year [t CO_2 e]
Construction	
Scope 1	60,000
Scope 2	7,000
Subtotal Scopes 1 & 2	**70,000 (rounded)**
Operation	
Scope 1	6,000
Scope 2	2,400
Subtotal Scopes 1 & 2	**9,000 (rounded)**

The estimated Scope 1 and 2 emissions during construction are about 70,000 t CO_2 e per year over a period of 30 months. During operations, the annual Scope 1 and 2 emissions are in the range of only about 9000 t CO_2 e. Thus, with reference to the GHG emission thresholds for Scope 1 and 2 emissions, the annual emissions during construction will exceed the 25,000 t of CO_2 e threshold for reporting, while the further threshold of 100,000 t CO_2 e/year is not exceeded. Neither threshold is exceeded during operations. According to the Applicable Standards, Nakkas Otoyol A.S must therefore prepare annual reports quantifying direct and indirect emissions during construction but is not responsible to carry out

[192] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

further assessments related to GHG emissions and climate change. At this point it appears that no GHG reporting is required during operations.

6.1.3.6 Impact Assessment

In the following Table 6-24 the results of the GHG inventory are assessed according to their *Magnitude*, *Likelihood* and *Significance*. The impact assessment shows that the *Significance* of the Project-related direct emissions from fuel combustion for maintenance work and operation (Scope 1) and indirect emissions from electricity consumption during construction (Scope 2), are considered of Minor Significance. The Scope 1 direct emissions during construction are considered of Major Significance.

Table 6-24 Impact Assessment Using GHG Inventory Data

		GHG emissions annually	Magnitude	Likelihood	Resulting Significance
Construction	Fuel consumption (Scope 1)	60,000 t CO_2 e	Medium	Likely	Major
	Electricity use (Scope 2)	7,000 t CO_2 e	Small	Likely	Minor
Operation	Fuel consumption (maintenance/ operation)	6,000 t CO_2 e	Small	Likely	Minor
	Electricity use (Scope 2)	2,400 t CO_2 e	Negligible	Likely	Negligible

6.1.3.7 Mitigation Measures

During the 2.5 years of construction, the main source of emissions is fuel combustion of vehicles and other construction equipment. Nakkas Otoyol A.S will encourage fuel efficiency of its contractors during construction as far as reasonably feasible. This can be achieved, for example, by optimizing the transport routes on the construction site. Furthermore, it should be ensured that no machines are running when they are not needed. In general, given that fuel is expensive and reduces the profit margins of the contractors, there is a natural economic incentive for contractors to operate their vehicles and other equipment in a fuel-efficient manner. These mitigation measures are split between the two impacts as presented below in detail inTable 6-25.

During operation the Project causes Minor impact due to GHG emissions from fuel combustion and Negligible impact due to electricity use. Mitigation measures are only necessary for Minor impact, in order to reduce the negative effects. These are best practice examples to achieve energy and resource efficiency (see Table 6-26). These and other mitigation measures of GHG emissions during the Project construction and operation phase can be achieved through a series of international best practices that are included in the ESMMP.

Future low carbon transition might require the reduction of the use of fossil fuels in roadway maintenance vehicles; measures on the path to low carbon transition can be found in Table 6-27.

Table 6-25 GHG Mitigation Measures during Construction

Number	Impact Description	Impact Assessment	Mitigation Measures	Residual Impacts
1.	Fuel consumption (construc-tion)	Major	■ Optimize transport logistics (locations/routes) to ensure efficient carriage of raw materials. ■ Reducing vehicle idling times through focus on scheduling of construction operations. ■ Ensure regular maintenance of vehicles per manufacturer specifications. ■ Provide efficient driving guidelines to transportation vehicle drivers to promote fuel efficiency. ■ Engines will not be left running unnecessarily. ■ Refuelling shall be done from authorised fuel stations. ■ Optimization of the timing for works implementation (Traffic management) to minimize traffic delays due to rehabilitation, widening or maintenance work zones on existing road sections.	Major
2.	Electricity use (construc-tion)	Minor	■ Specify the use of the most energy efficient site accommodation in tender or contract documentation. ■ Create and agree energy efficiency specifications for new and retrofitted site accommodation. And promote energy efficient use among workers. ■ Consider if feasible, sourcing renewable energy.	Negligible

Table 6-26 GHG Mitigation Measures during Operation

Number	Impact Description	Impact Assessment	Mitigation Measures	Residual Impacts
3.	Fuel consumption (operation)	Minor	■ Optimize the timing for works implementation (Traffic management) to minimize traffic delays due to rehabilitation or maintenance work zones on road sections. ■ Optimize transport logistics (locations/routes) to ensure efficient carriage of raw materials for road repairs/maintenance works and reduce vehicle idling times. ■ Ensure regular maintenance of company vehicles per manufacturer specifications. ■ Refuelling shall be done from authorised fuel stations.	Minor

Table 6-27 Further Voluntary Measures to Reduce GHG Emissions during Operation

Impact Description	Measures
Electricity use (operation)	■ Company buildings can be equipped with photovoltaics so that they can produce their own renewable electricity. ■ The streetlights should only be on when the lighting conditions require it. This can be achieved by lumen meters. ■ Motion sensors on the buildings can ensure that lighting is on only when people or vehicle are in the vicinity only. ■ A speed limit significantly reduces CO_2 emissions. ■ Older vehicles with an old engine should pay a higher toll as they generate more CO_2. ■ Traffic jams and slow-moving traffic should be avoided as they cause vehicles to generate more CO_2. This can be achieved through intelligent management of the access roads. ■ A general possibility to reduce emissions in road traffic is the Transition to low carbon transportation.by using hybrid vehicles for operation and maintenance and promoting electromobility.

6.1.4 Geology and Soil

6.1.4.1 Impact Assessment

Results of the Scoping assessment indicated that the potential consequences of the Project are:

- Stability Risks and Soil Erosion
- Seismic Risks
- Contaminated Land
- Contaminated Spills and Runoff

These impacts were evaluated separately for each impact category for the construction and operational phases. A description of key mitigation measures is given in the respective sub-sections.

6.1.4.2 Impact Assessment Methodology

The impacts assessments were determined by assigning ratings for the impact magnitude and the sensitivity/vulnerability/importance of receptors/resources as follows.

Table 6-28 Magnitude of Impact on Geology and Soils

Magnitude	Definition
Large	■ Continuous/long-term oil spills during construction activities on soils and during operation (e.g. accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded to cause long term cancer and hazard risk) ■ In case of disturbance of contaminated soils, increase contamination in nearby non-contaminated soils to above the background level that will be hazard to human health ■ Major impacts on the integrity of structures and functionality of the Project (e.g., collapse of the buildings) during a seismic event. ■ Soil stability issues leading to landslides ■ Soil erosion process during construction that would lead to sediment loading into the sensitive receptors

Magnitude	Definition
Medium	■ Continuous/long-term oil spills during construction activities on soils and during operation (e.g. accidents) (concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded above the generic contamination levels but below the long term cancer and hazard risk) ■ In case of disturbance of existing contaminated soils: increase contamination in nearby non-contaminated soils to above the background level that is above the generic risk levels stated in the Soil Pollution Control Regulations but below long-term cancer and hazard. ■ Moderate impacts on the integrity of structures and functionality of the Project (e.g. major cracks in the structures) during a seismic event. ■ Soil stability issues leading to small settlements and ■ Soil erosion process during construction that would lead to sediment loading into local waterways-drainage areas
Small	■ Temporary small-scale oil spills during construction and operation (e.g. accidents) activities on soils that lead to contamination below generic contamination levels stated in the Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites (Soil Pollution Control Regulations) ■ In case of disturbance of existing contaminated soils: increase contamination in nearby non-contaminated soils to above the background level but below the generic contamination levels stated in the Soil Pollution Control Regulations. ■ Minor impacts on the integrity of structures and functionality of the Project (e.g. minor cracks in the structures) during a seismic event. ■ Soil stability issues that do not cause health and safety risk concerns ■ Soil erosion process during construction that would lead to small loading in the amount acceptable to the normal sediment loading process
Negligible	■ Temporary use of land (with soil surface) for the storage of excavated materials and construction equipment with no or little impact that is recoverable within a short time scale ■ No earthquake impact ■ No soil stability issue ■ No soil erosion

Table 6-29 Geology and Soils Resource Sensitivity/Vulnerability/Importance

Value	Definition
High	■ Highly fertile soils for agricultural production ■ Areas that are extensively impacted from soil stability issues so that community health and safety is impacted ■ Receiving bodies soil erosion deposition area that feeds directly into sensitive watercourses ■ Areas falling into 1st – 2nd-degree seismic zones (as detailed by AFAD (3))
Medium	■ Soils with good quality to support agricultural production ■ Areas that are locally impacted by soil stability issues ■ Localized Receiving bodies soil erosion deposition area that does not feed directly into sensitive watercourses ■ Areas falling into 3rd – 4th-degree seismic zones (as detailed by AFAD (2))
Low	■ Soils that are not used for agricultural purposes ■ Areas that are not impacted by soil stability issues ■ Receiving bodies away from soil erosion deposition area ■ Areas falling into the 5th-degree seismic zone (as detailed by AFAD (1))

6.1.4.3 Construction and Operation Activity Impacts

Based on an evaluation of the baseline geological characteristics, no features of geological-scientific or cultural importance have been identified to date along the route.

The literature survey results described in the baseline above were reviewed, and several areas with potential and active highland regions in the part of the route that corresponds to the range of Km: 45 +000-50 +000 in the Deliklikaya location.

There are areas along the Motorway which have a natural erosion risk due to their subsurface characteristics soil movement such as steep slopes at cut and fill sections, and risks related to medium stable soils.

Should an earthquake occur either during the construction or the operation of the Motorway, major impacts could be expected to arise on all aspects of environmental and social conditions along the route.

As mentioned in the preceding baseline chapter, there are no known areas of contaminated land along the route, the potential of encountering historical soil contamination is considered to be low.

Impacts to soil and groundwater can occur via accidental leaks and spillages of fuels from vehicles, tankers, lorries.

The maintenance of vegetation within the Right of Way (RoW) may involve the use of herbicides, and unintentional drift or runoff can occur during transfer, mixing, and storage of herbicides, affecting surface water sources and impacting the soil and groundwater.

6.1.4.4 Mitigation Measures

6.1.4.4.1 Embedded Measures

In this chapter, mitigation measures are given concerning the identified potential impacts assessed above. The design phase is a crucial stage for avoiding/mitigating potential impacts that might occur during construction or operation, in the following ways:

- Several structures will be developed as part of the Motorway (road base, viaducts, embankment supports, bridge, etc.) and these will all be designed according to Turkish and international design standards (KGM Specifications, AASTHO, further US American and European standards) requiring specific structural characteristics related to slopes of cuts and fills, footing sizes of viaducts and many other considerations. Soil erosion during construction and operation stages of the Motorway was noted to represent potential impacts in sensitive areas such as surface water crossings (Km: 43+200 and Km: 51+500).
- The road design shall be optimized to limit the gradient of the access roads to reduce runoff-induced erosion and provide adequate road drainage based on road width, surface material, compaction, and maintenance.
- The Project area is in a high-risk earthquake area. Detailed investigations will be conducted for assessing the stability conditions for the structural elements for both normal operation loads and under seismic loads. The Motorway (and the Bridge) is required to be designed and built to stringent Turkish and international engineering standards that will minimize the potential damage in event of an earthquake.
- All wastewaters will be either discharged into the local/municipal sewage network (if available nearby) or otherwise treated decentral before discharge to the suitable receiving environment. All wastewater discharges must comply with relevant Turkish legal requirements (Water Pollution Control Regulation 2004, No. 25687) and other Lender Standards (e.g., the IFC General EHS Guidance) before disposal
- Retaining walls and Mechanically Stabilized Earth (MSE) walls will be built in sections of the motorway to ensure soil and slope stability and the prevention of rock fall.

6.1.4.4.2 Construction Phase Mitigation Measures

A ***Soil Management Plan is*** developed that will lead to the following conditions:

- The area of soil exposure and disturbance shall be limited to the construction site only, as much as possible;
- Measures to prevent erosion from excavated areas and soil storage heaps;
- Prevent sediments flowing into surface waters and drainage channels by localized control measures (e.g. sediment fences, check dams, or fabric barriers, sediment basins), appropriate contouring to optimize slope angle and steepness;
- Prevent wind erosion via fencing, covering, etc.;
- Measures to divert external 'clean' runoff around the construction area to prevent mixing of 'clean' and 'dirty' runoff and reduce the size of the required sediment basins;
- Covering of disturbed fertile topsoil and protection with vegetation, mulch, or erosion-resistant material;
- Approach to the storage of topsoil for re-use, to preserve it to the maximum extent possible to facilitate re-vegetation of excavated areas, cut and embankment areas;
- Early construction of all drainage structures (i.e. culverts, sediment basins, and catch drains) along the Road.
- Construction of all drainage structures (i.e. culverts, sediment basins, and catch drains) should be carried out as early as possible.
- Identified existing drainage channels are to be protected using appropriate measures such as sediment barriers, grassed areas, swale drains, and buffer strips, for erosion and sediment control.

A ***Soil Management Plan*** is developed and includes the key points described below:

- Pro-active risk assessments will be conducted based on the potential for the presence of soil contamination on the ROW of the Motorway. These risk assessments should follow the Turkish Regulation on Soil Pollution Control and Point-Source Contaminated Sites as well as best practices to assess the potential of contamination;
- Construction crews will be trained to spot signs of contamination during earthworks. Any contaminated soils/wastes encountered during construction must in any case be reported to the local responsible authorities and further measures conducted as agreed with the authorities and local enterprises. It may be possible (even preferable) that lightly contaminated material remains in place, with the roadway forming a protective cap. More heavily impacted soils and sludges will probably need to be taken offsite for appropriate treatment and/or disposal in an appropriately licensed disposal site.
- A methodology will be set up for identifying and dealing with contaminated materials when unexpectedly encountered during construction, including the appropriate temporary storage of contaminated soils until further steps can be agreed upon with the authorities. The temporary storage must be such that the contaminated materials are placed in appropriate metal skips or other containers with sealed bottoms and covers to prevent runoff and wind dispersion.
- Any spillages from handling fuel and other hazardous liquids will be immediately contained on-site and the contaminated soil will be removed from the site for suitable treatment and/or disposal.
- Further measures will be conducted as agreed with the authorities and local enterprises.

A Hazard and Risk Management Procedure is developed that includes:

- Procedures for handling and storage of hazardous materials following manufacturer's instructions

- Register of hazardous materials and identification of dangers posed by hazardous materials within the Project site;
- Obtaining and retaining material safety data sheets for all hazardous materials used;
- Risk assessment for the use of hazardous substance;
- Appropriate labelling of hazardous substances using the globally harmonised system of classification and labelling of chemicals;
- Storage of fuels, oils, and hazardous materials on a suitably sized impervious and bunded base and use of drip trays for fuelling;
- Training of on-site personnel on the presence, handling, transport, and disposal of hazardous materials and emergency response management;
- Provision of personal protective equipment (PPE) to staff who are required to handle certain chemicals;
- Protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odours, or other emissions.

An ***Emergency Preparedness and Response Plan is*** developed for the construction phase which covers the emergency response for the events including spills, fire, accidents, earthquake, and flood. The Plan will specify that any spillages from handling fuel and other hazardous liquids will be immediately contained on-site and the contaminated soil will be removed from the site for suitable treatment and/or disposal.

6.1.4.4.3 Operation Phase Mitigation Measures

The following plans and procedures will be developed and implemented during the operation phase:

- An ***Emergency Preparedness and Response Plan*** is developed for the operation phase which will cover the emergency response for the events including spills, fire, accidents, earthquake, and flood. The Plan will specify that any spillages from handling fuel and other hazardous liquids will be immediately contained on-site and the contaminated soil will be removed from the site for suitable treatment and/or disposal. Besides medical rescue and fire-fighting resources, appropriate spill response equipment must be available along the route, with particular emphasis on quick-response in areas of higher ecological settings.
- Training of personnel will be undertaken for the application of herbicides in the maintenance of ROW and ensure that person has received applicable certifications or equivalent training where such certifications are not required.
- A ***Landscape Management Plan*** will be developed to address integrated vegetation management (IVM) for the maintenance of the ROW to ensure that biological, mechanical, and thermal vegetation control measures are used were practical, and avoid the use of chemical herbicides. The procedures will specify that when using pesticides and herbicides for the maintenance of ROW, potential impacts to soil and groundwater will be minimized by implementing landscaping plans which have to be submitted to KGM for approval. These plans will address pesticide management. Further, they will address the following measures:
    - Complying with Turkish regulations on pesticide use. If pest infections are detected the competent authority needs to approve the respective pesticide/biocide for pest control. Pesticides of WHO Type 1a and 1b will not be used[193];

([193]) WHO recommended classification of Pesticides by Hazards 2009:
http://www.who.int/ipcs/publications/pesticides_hazard/en/index.html

- Only use registered or approved[194] herbicides, and ensure they are properly labelled;
- Select applicable technologies and practices designed to reduce unintentional drift or runoff;
- Establish buffer zones or strips along with water sources and surface water bodies; and
- Store appropriately by following good hazardous materials storage and handling management practices.

6.1.4.5 Summary Impact Table (Pre and Post-mitigation – Residual)

6.1.4.5.1 Construction Phase

The table below includes a summary of the impact assessment – pre and post-mitigation(s).

Table 6-30 Rating of Impacts Related to Erosion and Soil Instability Risk

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Medium-term*	Impacts expected throughout construction.	*Medium-term*	Impacts expected throughout construction.
Scale	*Large*	Areas that have a natural erosion risk Several areas with potential and active highland regions	*Negligible*	Soil Management Plan Appropriate techniques to be implemented
Frequency	*Regular*	Impacts expected throughout construction.	*Regular*	Impacts expected throughout construction.
Likelihood	*Possible*	Earth and excavation works have the potential to create soil instability	*Unlikely*	Appropriate techniques to be implemented
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Moderate Magnitude			*Negligible Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			**Negligible Impact**	

([194]) Registered or approved by competent authorities and in accordance with the Food and Agriculture Organisation's (FAO) International Code of Conduct on the Distribution and Use of Pesticides, and FAO Revised Guidelines for Good Labeling Practice for Pesticides.

Table 6-31 Rating of Impacts Related to Disturbance of Contaminated Land

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Medium-term*	Impacts expected throughout construction.	*Medium-term*	Impacts expected throughout construction.
Scale	*Low*	No contaminated land identified to date in the project area	*Low*	Implement Soil Management Plan
Frequency	*Low*	Impacts expected throughout construction.	*Low*	Impacts expected throughout construction.
Likelihood	*Possible*	Potential presence of contaminated land in the project area	*Unlikely*	Soil Management Plan to be implemented in case of contaminated land presence
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate			Minor Impact	

Table 6-32 Rating of Impacts Related to Seismic Events[195]

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Short-term*	Short-term, immediate.	*Short-term*	Short-term, immediate.
Scale	*Major*	Earthquakes of a size that will have a destructive effect in İstanbul province are expected to arise from the active fault system in the Marmara Sea.	*Moderate*	Earthquakes of a size that will have a destructive effect in İstanbul province are expected to arise from the active fault system in the Marmara Sea.
Frequency	*Infrequent*	significant earthquakes have struck and continue	*Infrequent*	Significant earthquakes have struck and continue to strike the İstanbul Region

[195] Both pre and post mitigation (with embedded measures) the extent, duration, scale, frequency and likelihood of earthquakes cannot be different. Scale of impact would be reduced through mitigation.

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
		to strike the İstanbul Region		
Likelihood	*Unlikely*	Unlikely a seismic event will occur during construction	*Unlikely*	Unlikely a seismic event will occur during construction
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Major Magnitude			Low Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor Impact	

Table 6-33 Rating of Impacts Related to Soil Contamination due to Runoff-Spills

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Medium-term*	Impacts expected throughout construction.	*Medium-term*	Impacts expected throughout construction.
Scale	*Moderate*	Potential runoff-spills throughout construction Potential Soil erosion	*Low*	A Soil Management Plan An Emergency Preparedness and Response Plan Hazard and Risk Management Procedure
Frequency	*Regular*	Impacts expected throughout construction.	*Regular*	Impacts expected throughout construction.
Likelihood	*Possible*	Use of herbicides for maintenance Spills the event of spills, fire, accidents, earthquake, and flood.	*Unlikely*	Implementation of relevant mitigation measures to prevent soil contamination
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor Impact	

Table 6-34 Rating of Impacts Related to Soil Contamination due to Runoff-Spills-Maintenance

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Medium-term*	Impacts expected throughout the operation.	*Medium-term*	Impacts expected throughout construction.
Scale	*Moderate*	Potential runoff spills throughout the operation	*Low*	Emergency Preparedness and Response Plan Hazard and Risk Management ProcedureLandscape Management Plan
Frequency	*Regular*	Impacts expected throughout the operation	*Regular*	Impacts expected throughout the operation
Likelihood	*Low*	Use of herbicides for maintenance Spills the event of spills, fire, accidents, earthquake, and flood.	*Likely.*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Major Magnitude			Low Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor Impact	

6.1.5 Materials and Waste Management

6.1.5.1 Impact Assessment

This chapter presents the potential impacts and mitigation measures related to material supply and usage (including quarries) and waste management.

6.1.5.2 Potential Impacts

Potential impacts associated with material supply and waste management during construction will include:

- Potential to cause local nuisance due to dust generation related to excavated soil generation;
- Potential impacts related to storage of surplus excavated material depending on the area to be designated for storage;
- Risk of destruction of habitats and vegetation during earthworks and resource extraction;

- Additional load to the existing waste management infrastructure (e.g. sanitary landfills, licensed waste recycling facilities) for the management of hazardous and non-hazardous wastes to be generated during construction;
- Potential to cause soil, surface water and groundwater contamination if wastes (including wastewater) are not handled and disposed of in an appropriate manner (e.g. contamination of soils through spills of hazardous chemicals; contamination of surface waters through improper discharge of domestic wastewater);
- Potential impacts on personnel and public health and safety if wastes are not handled and disposed of in an appropriate manner (e.g. improper handling of special wastes such as mineral oils, batteries and accumulators may give rise to adverse impacts on human health due to hazardous, toxic and polluting properties of these wastes; improper handling of medical wastes could give rise to transmission of infectious diseases).
- Other impacts related to noise and air quality in the vicinity of quarry sites and access roads are considered in Air Quality and Noise and Vibration chapters.

Potential impacts associated with waste management during operation will include:

- Additional load to the existing waste management infrastructure (e.g., sanitary landfills, licensed waste recycling facilities) for the management of hazardous and non-hazardous wastes to be generated during operation.
- Potential to cause soil, surface water and groundwater contamination if wastes (including wastewater) are not handled and disposed of in an appropriate manner (e.g., contamination of soils through spills of hazardous chemicals; contamination of surface waters through improper discharge of domestic wastewater);
- Potential impacts on personnel and public health and safety if wastes are not handled and disposed of in an appropriate manner (e.g., improper handling of special wastes such as mineral oils, batteries and accumulators may give rise to adverse impacts on human health due to hazardous, toxic and polluting properties of these wastes).

6.1.5.3 Baseline Conditions

The baseline conditions are outlined in Chapter 5.1.4. In summary:

- For the construction of the Motorway and all related infrastructure, significant quantities of various typical construction materials will be needed; these will include concrete, prefabricated segments (e.g. retaining walls), steel, aggregates, and asphalt.
- Large volumes of soil/topsoil will need to be excavated for the motorway which will be partly re-used as fill material. Nevertheless, there will be a generation of surplus excavated material along the Project route that will require permanent storage at surplus material dumpsites which will be subject to rehabilitation and reinstatement after 30 months.
- Different types of non-hazardous and hazardous wastes will be generated during construction and operation.
- A large number of licensed waste management facilities are available in İstanbul (625 facilities based on data obtained from MoEUCC website on 23.08.2021 – https://eizin.cevre.gov.tr/Rapor/BelgeArama.aspx), out of which 226 are located in Başakşehir and Arnavutköy districts where the main Project route will be located.

6.1.5.4 Embedded Measures

The Project has committed to comply with the following standards which will provide control of resource usage and waste:

- Compliance with the Turkish Regulatory Framework which governs the management of the solid, hazardous, non-hazardous and liquid wastes which are in line with EU regulations. For example, the EU Waste Directive has been transposed directly as the Turkish waste management regulations.
- EBRD/IFC Standards and relevant IFC EHS guidelines (IFC General EHS Guidelines, EHS Guidelines for Toll Roads, EHS Guidelines for Construction Materials Extraction) as appropriate and applied.

In order to meet the requirements of these standards, the following mitigation measures which can be viewed as embedded measures, will be adopted by the Project:

6.1.5.4.1 General Mitigation Measures

A Waste Management Plan is developed with the basis of the waste management hierarchy to comprise of the following:

- Waste avoidance: Minimising the amount of material that needs to be generated and managed in the first place.
- Re-use on site: Where possible, the re-use of excavated materials within the Project site is to be maximised. This reduces the need to import materials onto the site, reduces the need to find off site re-use or disposal locations and the associated materials handling and transport issues, reduces fuel use and minimises the project footprint.
- Re-use off site: Where all attempts to re-use excavated materials on site have been exhausted, re-use opportunities must be found off site. This includes finding sites that are approved by the relevant planning consent authorities to accept the specific wastes.
- Disposal: Disposal is the last and least preferable management option to be considered.

This will apply to the following:

- Material supply and transport from quarries;
- Handling of hazardous materials during construction;
- Spoil and construction waste management;
- Waste management generated during operation Phase.

During the detailed design and procurement stage, Nakkaş Otoyol A.Ş. will be responsible for the identification of sources for all materials and equipment. The Contractor will be required to consider the environmental impacts when selecting the materials used for the Project. This will include using less harmful materials where possible, considering the carbon footprint of alternative materials and examining the impacts of extraction, processing and transport. The Contractor will be required to develop sustainability practices and organizational competency that will ensure that the mitigation measures are implemented efficiently. The organisational capacity and practices will be reviewed by Nakkaş Otoyol A.Ş.

The excess excavated material that is not reusable will be disposed at areas deemed suitable for soil disposal in line with the Nakkaş Otoyol A.Ş. policies, and as per the specific the Regulation on Control of Excavation Soil, Construction and Demolishment Waste and international best practices.

Mitigation measures according to Turkish regulations and international best practices (e.g. IFC General EHS Guidelines) for reducing air and noise emissions and potential impacts in sensitive habitats are described in the Chapters 6.1.2 and 6.1.7 and in the Pollution Prevention Plan and subsequent procedure (see the ESMMP). These documents will be in accordance with international good practice (EBRD PR 3; IFC PS 3; IFC General EHS Guidelines and sectoral Guidelines on Construction Materials Extraction and Toll Roads).

The mitigation measures and commitments listed below comprise of provisions of relevant rules, regulations and laws and some “good practice”. Both of them should be adopted by Nakkaş Otoyol A.Ş. and/or EPC Contractor as they are obliged to obey Turkish legislation and “good practices” should be standard practices for the Project.

6.1.5.4.2 Mitigation Measures for Waste Storage and Handling

- Waste generation will be recorded in terms of type (EU Waste Code) and quantity at all points of generation (camps, quarries, plants, etc.).
- Waste will be collected and segregated according to its type, whether it is reusable, recyclable, non-hazardous, or hazardous waste.
- Wastes will be stored according to international best practices (e.g. IFC EHS General Guidelines). Additional measures for storage of hazardous wastes (such as use of secondary containment, access restriction, provision of PPE etc.) will be applied as necessary to prevent harm to construction staff, environment and the public.
- Designated waste collection containers and storage areas will be used for different kinds of wastes (hazardous and non-hazardous).
- Waste collection containers and storage areas will be adequately labelled for different kinds of wastes (hazardous and non-hazardous).
- Records will be kept of the types and quantities of wastes that are reused, recycled, recovered or disposed both on and off the site to assess waste hierarchy effectiveness.
- Scrap materials (towers and cables) generated by removal of the existing OHTLs will be handed over to TEIAS based on the requirements of protocol signed between Nakkaş Otoyol A.Ş. and TEIAS.

6.1.5.4.3 Mitigation Measures for Material Supply and Transport from Quarries

Quarries and borrow pits that will be identified later as necessary by Nakkaş Otoyol A.Ş. or the EPC Contractor, the following mitigation measures will be taken:

- Establish a Quarry Management Plan will (as explained below) as part of the Environmental and Social Management and Monitoring Plan. The plan will include criteria for selecting quarry and spoil disposal sites that integrates the relevant international requirements.
- Include environmental and community health and safety factors like site sensitivity, travel routes, mining methods etc. in the decision-making process.
- Whenever possible, general preference will be given to using existing (fully licensed) quarries over opening new quarries.
- A due diligence will be conducted for existing quarries to ensure permits are valid and operations are in compliance with national regulations and international guidelines. Relevant suggestions should be made to improve current standards of the quarry. Quarries will be monitored frequently.
- In case of opening a new quarry, all necessary permits will be obtained, operations will be setup in accordance with international standards and quarries should be monitored frequently.

The Quarry Management Plan is developed to ensure compliance with applicable Turkish environmental standards and IFC Guidelines for Construction Materials Extraction (IFC, 2007). The IFC Guidelines for Construction Materials Extraction details the environmental issues during the operational, construction, decommissioning phases of construction materials extraction which primarily include air emissions, noise and vibrations, water as well as waste. Particular importance will be the land conversion aspects which will take into account the findings of the biodiversity setting established in this ESIA and integrate into site rehabilitation practice. In addition, procedures will be implemented with

respect to traffic safety as per the Nakkaş Otoyol A. Ş. Traffic Management Plan and its subsequent procedures (for on-site and off-site).

The EHS considerations that will need to be taken into account in the selection of appropriate quarry sites and access routes will be based on IFC General EHS Guidelines (IFC, 2007) as well as guidelines for IFC EHS Guidelines for Construction Materials Extraction (IFC, 2007). These mitigation measures together with the existing permitting framework in Turkey will be used to minimize the worst-case scenario impacts and allow for residual impact assessment. Gaps identified based on ES site selection will be requested to be mitigated by third party quarry operators. The use of the third-party quarries will be based on their suitability to be in line EBRD[196] and IFC guidelines[197].

To avoid adverse impacts during quarry operations, the following mitigation measures inter alia will be applied within the Quarry Management Plan to be developed:

- When designing the transport routes, the EPC Contractor shall consider social issues to minimize the impacts from passing through populated areas;
- To ensure community safety, all truck drivers shall receive internal safe driving training which includes safe driving through small villages;
- Quarry access roads shall be well maintained. Water will be sprayed on unpaved roads to minimize dust generation and will be surfaced or stabilized where feasible;
- The EPC Contractor will ensure that the width of the access roads is adequate, especially in villages;
- During the operation of the quarries, dust generation shall be avoided by covering, shielding or watering the dusty surface areas as per the Turkish Industrial Air Pollution Control Regulation for the Operation of Stone Crushing and Screening Plants; and
- Roads damaged during the operation of a quarry shall be repaired on a timely basis.

The operation permit holder Nakkaş Otoyol A.Ş. or its EPC Contractor will develop and follow the renaturation/rehabilitation plans as required by Turkish Regulation on the Rehabilitation of Land Destroyed by Mining Activities (published in the Official Gazette on January 23, 2010, No. 27471, with last changes on September 28, 2012) as well as the IFC Guidelines for Construction Materials Extraction (IFC, 2007)) According to Turkish regulations, the renaturation work will include the following issues:

- Arrangements to be in compliance with the requirements of local authorities, environmental conditions and safe conditions for all living organisms.
- Geological and geotechnical investigations to define land use properties and morphological conditions and define measures against geohazards and stability of the area.
- Safety precautions for people, if the area will be open to human use.
- Measures to reduce risks of surface cracks (for underground sourcing) to prevent damage to wildlife.
- The cuts are filled and the deposits are removed according to the geotechnical and geological survey results, land is prepared and conditions are provided for landscaping.
- Suitable areas are planted according to the land use targets and measures are taken to prevent erosion.
- List of species (including local endemic species under protection of national and international jurisdiction) and renaturation of excavated areas.

[196] https://www.ebrd.com/downloads/policies/environmental/mining/stone-sand.pdf

[197] https://www.ifc.org/wps/wcm/connect/dad17995-66be-4280-86da-b438cf9fbefc/Final%2B-%2BConstruction%2BMaterials%2BExtraction.pdf?MOD=AJPERES&CVID=jkC-EN.&id=1323162191491

- Drainage control and siltation prevention systems.

6.1.5.4.4 Mitigation Measures for Handling of Hazardous Materials during Construction

Nakkaş Otoyol A.Ş. developed Hazard and Risk Management Procedure in line with Turkish regulations and IFC General EHS Guidelines (IFC, 2007). The IFC General EHS Guidelines which are applicable to all projects or facilities that handle or store any quantity of hazardous materials and the management of major hazards will be used to obtain additional guidance for handling hazardous materials at, or above, threshold quantities. In this case, if needed special treatment to prevent accidents such as fire, explosions, leaks or spills, and to prepare and respond to emergencies will be implemented. The following measures will be applied during construction at a minimum:

- Procedures for handling and storage of hazardous materials shall be in line with manufacturer's instructions;
- Register hazardous materials and identify dangers posed by hazardous materials within the Project site; this will include the retention of safety data sheets, the assessment of the hazards specific to the materials' use and the implementation of the identified control measures that are based on this assessment;
- Fuels, oils and hazardous materials to be stored on a suitably sized impervious and bunded base (bund capacity shall mean 110% of a bulk storage tank or 25% of the aggregate capacity of drums (typically 205 litre capacity) stored within that bund whichever is greater);
- Use of drip trays for fueling;
- No fueling of vehicles or equipment to take place within excavated areas, if practically feasible;
- Procurement and appropriate use of spill kits in the event of accidental spillage or potential loss of containment;
- Training on the maintenance, handling, transport and disposal of hazardous materials and on emergency response management to be provided to onsite personnel;
- Provide adequate personal protective equipment (PPE) to staff who handle certain chemicals;
- Ensure proper ventilation is provided when handling hazardous materials;
- Protect the public from major hazards due to incidents or process failures involving hazardous materials. Also, minimize nuisance issues related to noise, odours, or other emissions;
- Follow practices given in IFC guidelines for minimizing risks during road paving activities (i.e. paving in dry weather to prevent runoff of asphalt or cement materials).
- If heavy equipment cannot be moved to appropriate fuelling points, an impervious surface (such as a drip-tray) has to be used for refuelling this equipment to hinder accidental spillage to drain into the soil and therefore in potential groundwater aquifers.

6.1.5.4.5 Mitigation Measures for Construction Waste and Spoil Management

All wastes (including spoil from excavations, non-hazardous and hazardous waste) generated during construction of the Project will be managed according to the waste management hierarchy which will be the basis for the following plans to be developed as included in the ESMMP:

- Waste Management Plan;
- Pollution Prevention Plan;
- Soil Management Plan;
- Landscape Management Plan

The plans and subsequent procedures will be based on Turkish laws, EBRD and IFC Guidelines, and international environmental and safety management systems. The procedures will include instructions for waste prevention, proper storage and handling of construction wastes, as well as impact mitigation measures and monitoring. These procedures will be reviewed and updated as warranted prior to the commencement of the main construction works.

The following mitigation measures will be applied for all wastes generated during construction according to the Waste Management Plan and subsequent Procedure to be developed:

- Training on safe management of all types of waste to be provided to construction staff to prevent any harm on staff, the environment and the public;
- Storage of wastes according to international best practices (e.g. IFC EHS General Guidelines). Apply additional measures for storage of hazardous wastes (such as use of secondary containment, access restriction, provision of PPE etc.) as necessary to prevent harm to construction staff, environment and the public;
- Use of designated waste collection containers and storage areas for different kinds of wastes (hazardous and non-hazardous);
- Adequate labelling on waste collection containers and storage areas for different kinds of wastes (hazardous and non-hazardous);
- Re-use of excavated soils in the Project area as far as possible and seek alternative uses of surplus spoil where practicable (e.g. landscaping and earth works for other projects) to minimise the requirements for off-site disposal;
- Transport of waste in licensed vehicles designed appropriately to the type of waste to minimise the risk of release of materials (hazardous and non-hazardous materials) and windblown debris. Provide training to drivers on handling and disposal of their cargo and the documentation of the transport describing the nature of the waste and its degree of hazard; and
- Dispose wastes at licenced waste facilities; prior to facility selection, a due diligence review shall be performed to assess whether the facilities are materially in compliance with laws and regulations. If the sites do not fulfil the main requirements, Nakkaş Otoyol A.Ş. will seek for alternative solutions.

For construction spoil, Soil Management Plan, Landscape Management Plan and Pollution Prevention Plan are developed and applied to ensure proper storage of excavated soils and allow re-use of spoil to the extent possible. The above-mentioned plans will include the following measures:

- The area of soil exposure and disturbance shall be limited to the construction site only;
- Measures to prevent erosion from excavated areas and soil storage heaps;
- Prevent sediments flowing into surface waters and drainage channels by implementing localised control measures (e.g. sediment fences, check dams, mulch barriers, rock groynes, or geofabric barriers, sediment basins) and establishing appropriate contouring to optimize slope angle and steepness;
- Prevent wind erosion via fencing and covering, etc.;
- Cover disturbed fertile topsoil and protect the topsoil with vegetation, mulch or erosion-resistant material;
- Measures to store topsoil for re-use and to preserve it to the maximum extent possible to facilitate re-vegetation in excavated areas, cut and embankment areas;
- Measures to store, reuse and (if necessary) recondition (improve) topsoil quality prior to reuse on the Project; and

- Early construction of all drainage structures (i.e. culverts, sediment basins and catch drains) along the Motorway.

In case the excavated soil is contaminated (or spills/incidents during construction result in contaminated soil), these plans and relevant procedures to be developed will be applied. Prior to construction, a risk assessment shall be carried out to assess the presence of potential soil contamination on the ROW of the Motorway according to best practices and further measures will be identified if necessary. The testing for potential soil contamination, as needed, will be conducted based on the Turkish Regulation on Soil Pollution Control and Point-Source Contaminated Sites (Official Gazette Date/Number: 08.06.2010/27605) and IFC EHS General Guidelines (IFC, 2007).

Measures to appropriately handle contaminated land include the following:

- Report to the responsible local authorities;
- Conduct further measures as agreed with the authorities and local enterprises;
- Assess whether lightly contaminated material could remain in place;
- Appropriate removal/storage, treatment and disposal practices of contaminated soils; and
- Provide training to construction staff on how to recognize and appropriately handle contaminated land when encountered during construction activities.

In case the excavated soil is re-used, such as for landscaping purpose, the Soil Management Plan and Landscape Management Plan are developed and all applications will be accordingly.

6.1.5.4.6 Mitigation Measures for Waste Management during Operation Phase

Mitigation measures to ensure appropriate handling of non-hazardous and hazardous wastes generated during the operation of the Project will be set out in the Waste Management Plan. A standalone spill prevention and response/hazardous materials storage plans (as per the construction phase) as part of the ESMMP.

The procedures will take into account the Turkish regulations and the requirements of IFC General EHS Guidelines and EHS Guidelines for Toll Roads (IFC, 2007). These measures will include inter alia the following:

- Regular inspections of sites to ensure waste facilities are correctly used and are kept clean and tidy;
- Maintain full records of the type, quantity, composition, origin, disposal destination and method of transport for all wastes. Collect solid wastes on a regular basis and dispose them appropriately at a designated disposal site;
- Provide training on proper collection and disposal of solid wastes to staff;
- Use solid waste containers that will not be affected by weather conditions and which will adequately and safely contain the wastes;
- Waste containers shall have labels which describe the waste type. Proper labelling may prevent mixing of hazardous waste and non-hazardous solid wastes;
- Reuse/recycling methods shall be considered to minimise solid waste generation;
- Use certified/licensed facilities for final disposal of solid wastes, which cannot be reused/recycled;
- Prevention of disposal of solid waste outside the designated sites and into any surface water or groundwater source, or any other location that could potentially affect the environment and human settlements;
- Use of signage and other postings to advise motorists not to litter;
- Collect road litter or illegally dumped waste along the Project route and dispose them appropriately;

- Maintain and manage supply inventories to minimise the disposal of unused products;
- Manage and appropriately dispose sediments and sludge removed from storm drainage systems;
- Manage old road surface materials by reusing them in paving, or stockpiling the materials for road bed or other uses;
- Hazardous wastes to be disposed of by licensed waste contractors; and
- Follow practices given in IFC EHS Guidelines for Toll Roads for minimizing risks during road paving maintenance activities (i.e. use of proper staging techniques to reduce the spillage of paving materials during the repair of potholes and worn asphalts)

The future Operation Contractor of the Project will be responsible for ensuring that all wastes generated during Project operations are properly managed. These obligations will be included in the contract specifications during tendering process.

6.1.5.5 Monitoring

The construction material will be monitored during the construction phase of the Project. Waste generation, handling and disposal will be monitored during the construction and operation phases of the Project. The monitoring program will include the following key items:

- Reviewing quarry operations and auditing against commitments;
- Review of construction and operation material management of EPC Contractor;
- Recording of waste generation in terms of type (EU Waste Code) and quantity at all points of generation (camps, quarries, plants, toll road stations);
- Keeping a record of the types and quantities of wastes that are reused, recycled, recovered or disposed both on and off the site to assess waste hierarchy effectiveness;
- Auditing and recording waste storage and handling conditions and recording non-compliances;
- Records of the waste disposal facilities being used and periodic auditing of the permits, facility visits or exemptions held by the sites that the waste is taken to;
- Recording of the licensed operators who remove the waste;
- Recording all waste transfer notes and hazardous waste consignment notes where the waste is being taken.

6.1.5.6 Impact Assessment

Impact assessment methodology is based on identifying the magnitude, establishing the sensitivity of the receptors and obtaining the significance of the impact. Clarifications for identification of magnitude of impacts, determination of impact significance together with impact magnitude and sensitivity of community (receptor) in the scope of resource and waste and identification of impact significance designations are presented in the tables below.

Table 6-35 Impact Magnitude Identification

Identification of Magnitude	Description
Negligible	Impact causes no change on receptors or impact causes a visible change on receptors which is in the range of receptor resilience.
Small	Impact causes a visible but local, rare and short durational difference on baseline conditions of the receptors.
Medium	Impact causes a clear difference from baseline conditions of the receptors. Impact most probably affects a considerable area or more than one receptor

Identification of Magnitude	Description
	(e.g. both water resource and soil). Impact causes a regional, occasional and medium durational change on baseline conditions of receptors.
Large	Impact causes a dominant change on baseline conditions. Impact affects the majority of the area and/or receptors in the Area of Influence of the Project. Impact causes a regional to international, ongoing and long durational change on baseline conditions of receptors.

Table 6-36 Impact Significance Matrix

		Receptor Sensitivity		
		Low	Medium	High
		High ability to adopt changes brought by relevant impact	Vulnerability exists but still retaining an ability to at least in part adopt to change brought by the relevant impact	Vulnerability is high that undermine the ability to adopt changes brought by the relevant impact
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Table 6-37 Impact Significance Designations

Significance designation	Significance context
Negligible	Minor irritation or stress caused by the impact. No treatment needed, no long-term consequences.
Minor	Impact causes reduction of quality and/or quantity of receptors but that can be easily treated. No long-term consequences.
Moderate	Impact causes high risk of quality/quantity loss. Impact may lead to long-term consequences but it is still reversible
Major	Impact causes loss of habitat, severe quality which are mostly irreversible. Likely to have long-term consequences.

Non-compliance with storage, transport and final disposal of wastes according to the Turkish regulatory framework constitutes a major impact. The existing Turkish waste management regulatory framework has been set to be in line with the existing EU Waste Legislative framework and specify the proper storage, labelling, containment conditions, as well as transport conditions and final disposal/treatment standards.

All of the Turkish waste management regulations will need to be followed by the responsible contractors during the construction and operation phases of the Project. Information provided in Chapter 5.1.4.3 indicates that the Turkish regulatory framework is in place for assigning specific waste codes to each of the waste stream to be generated during construction and operation phases of the Project. Furthermore, the waste disposal infrastructure for domestic, hazardous and non-hazardous waste streams are available and operational in İstanbul.

Assuming that the embedded mitigation measures are properly implemented as required and the wastes are disposed of appropriately in licensed waste management facilities, the magnitude of potential impacts can be viewed as negligible or small. If a new/greenfield quarry is developed and operated in line with permits and good practice (and later properly restored), the magnitude might be medium.

We currently have little information about the sensitivity of potential human or natural receptors subject to the activities described in this section. However, we can reasonably assume that based on the numerous controls described above, any locations with high receptor sensitivity would be avoided during planning, and therefore the likely scenario is receptors of low or medium sensitivity (see Table 6-35).

As shown in the matrix of Table 6-36, the combination of negligible to small magnitude and low to medium sensitivity results in an overall impact significance of negligible to minor. Impacts with such significance will not require additional Mitigation Measures – the numerous existing obligations would be therefore considered sufficient.

In the event of activities resulting in a medium impact magnitude and a medium or high sensitivity, the resulting significance (per Table 6-37) would be moderate or major (in worst case). In such scenarios, activities affecting receptors of high sensitivity should therefore be avoided as far as possible (e.g. quarry trucks using unpaved roads in small villages). If no alternatives are feasible, then appropriate additional mitigation measures will be required to reduce the impact magnitude and resulting significance as far as possible (e.g. paving roads, enforcing very stringent driving restrictions in certain high-risk areas).

6.1.5.7 Mitigation Measures

Embedded mitigation measures will be part of the Project design in order to meet the requirements of Turkish regulations and international Project standards. No additional mitigation measures are foreseen at this stage. The need for additional mitigation measures will be assessed in accordance with the Change Management Plan and subsequent procedures once the planning decisions are finalized (e.g. exact locations of quarries and surplus excavated material dumpsites).

6.1.5.8 Summary Impact Table (Pre and Post-mitigation – Residual)

6.1.5.8.1 Construction Phase

The table below includes a summary of the impact assessment for the construction phase – pre- and post-mitigation(s).

Table 6-38 Rating of Impacts Related to Disposal of Surplus Excavated Material

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Up to 1.5 km to 3 km distance from project route	*Local*	Up to 1.5 km to 3 km distance from project route
Duration	*Long-term*	Permanent storage at the designated area	*Long--term*	Permanent storage at the designated area
Scale	*Moderate*	Potential uncontrolled conditions for surplus excavated material storage	*Minor*	Storage of surplus excavated material in designated areas in line with relevant Turkish regulations
Frequency	*Infrequent*	Impacts expected throughout the duration of excavation works	*Infrequent*	Impacts expected throughout the duration of excavation works
Likelihood	*Likely*	During construction phase	*Unlikely*	Implementation of mitigation measures

Magnitude:	
Pre-mitigation	**Post-mitigation (Residual)**
Large Magnitude	Small Magnitude
Sensitivity/Vulnerability/Importance of the Resource/Receptor:	
Medium Sensitivity	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Minor Impact

Table 6-39 Rating of Impacts Related to Waste Generation during Construction

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Across the Project ACI	*Local*	Across the Project AOI
Duration	*Medium-term*	Impacts expected throughout the duration of construction phase	*Medium-term*	Impacts expected throughout the duration of construction phase
Scale	*Major*	During construction phase	*Minor*	Implementation of mitigation measures during construction phase
Frequency	*Regular*	Waste generation throughout the duration of construction phase	*Regular*	Waste generation throughout the duration of construction phase
Likelihood	*Likely*	Waste generation throughout the duration of construction phase	*Unlikely*.	Controlled waste management throughout the duration of construction phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor Impact	

6.1.5.8.2 Operational Phase

The table below includes a summary of the impact assessment for the operational phase – pre- and post-mitigation(s).

Table 6-40 Rating of Impacts Related to Waste Generation during Operation

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Across the Project ACI	*Local*	Across the Project AOI
Duration	*Long-term*	Impacts expected throughout the duration of operation phase	*Long-term*	Impacts expected throughout the duration of operation phase
Scale	*Moderate*	During operation phase	*Minor*	Implementation of mitigation measures during operation phase
Frequency	*Regular*	Waste generation throughout the duration of operation phase	*Regular*	Waste generation throughout the duration of operation phase
Likelihood	*Likely*	Waste generation throughout the duration of operation phase	*Unlikely*.	Controlled waste management throughout the duration of operation phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.1.6 Surface and Groundwaters

6.1.6.1 Impact Assessment

The potential consequences of the Project given the presence of hydrological-hydrogeological receptors identified in the baseline were assessed to be:

- Changes to the hydrology-hydrogeology or quality of the water environment from physical intervention and intentional and accidental discharges during construction
- Impacts on the water environment during operation of the Motorway including at bridges, underpasses, viaducts, and culverts

These impacts were evaluated separately for each impact category for the construction and operational phases. A description of key mitigation measures is given in the respective sub-sections.

6.1.6.2 Impact Assessment Methodology

The impacts assessments were determined by assigning ratings for the impact magnitude and the sensitivity/vulnerability/importance of receptors/resources as follows.

6.1.6.2.1 Designations For Surface Water Impacts

Table 6-41 and Table 6-42 describe the designations used for impact magnitude and resource sensitivity/vulnerability/importance when assessing impacts to surface water resources.

Table 6-41 Impact Magnitude on Surface Water

Magnitude	Definition
Large	■ Contamination of surface water degrades the existing water quality by 100 % of the original water quality. ■ Potentially severe effects on surface water quality are likely to be long-lasting (e.g., months or more) or permanent and/or give rise to indirect ecological and/or socio-economic impacts. ■ There are known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could experience a 'significant increase in flood frequency (above baseline conditions) as a result of the Project.
Medium	■ Contamination of surface water degrades the existing water quality by 50 % of the original water quality. ■ Potential localized effects on water quality are likely to be fairly long-lasting (e.g., weeks or months) and/or give rise to indirect ecological and/or socio-economic impacts. ■ There are known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could experience an increase in flood frequency (above baseline conditions) as a result of the Project.
Small	■ Contamination of surface water degrades the surface water run-off quality by 10 % of the original water quality. ■ Potential short-term localized effects on water quality but which are likely to return to equilibrium conditions within a short timeframe (e.g., hours or days at most). ■ There are no known/expected physical (property, agricultural fields, infrastructure, etc.) or sensitive ecological receptors upstream or downstream within the catchment that could be affected by the changed drainage regime.
Negligible	■ Contamination of surface water that is temporary and that does not degrade the existing surface water run-off quality. ■ Potential short-term localized effects on water quality but likely to be highly ■ Transitory (e.g., lasting a matter of hours) and well within natural fluctuations. ■ There is likely to be no alterations to existing drainage regimes and characteristics at any time of year

Table 6-42 Surface Water Sensitivity/Vulnerability/Importance

Value	Definition
High	■ Watercourse with high quality e.g., in its natural state and with ecological importance. ■ The watercourse provides vital ecosystem services. ■ The watercourse provides urban water supplies, major industrial abstraction or large irrigation supplies.
Medium	■ The watercourse supports diverse populations of aquatic habitats. ■ The watercourse provides ecosystem services to some extent. ■ Watercourse used for local water supply source, small industrial abstraction ■ Or minor irrigation scheme.
Low	■ Watercourse located in the vicinity that does not support diverse aquatic habitat. ■ Watercourse already significantly modified from some aspect of a natural condition. ■ Watercourse with little or no community use.

6.1.6.2.2 Designations for Groundwater Impacts

Table 6-43 and Table 6-44 describe the designations used for impact magnitude and resource sensitivity/vulnerability/importance when assessing impacts to groundwater resources.

Table 6-43 Magnitude of Impact on Groundwater

Magnitude	Definition
Large	Discharges to groundwater are likely to cause breaches of statutory discharge limits (over extended periods) and cause background levels to be above the site-specific long-term cancer and hazard risk levels (provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Medium	Discharges to groundwater bodies are expected to cause breach(s) of statutory limits (over limited periods) and cause background levels to be below the site-specific but above the generic long-term cancer and hazard risk levels (provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Small	Discharges to groundwater are expected to be within (but perhaps close to) statutory limits and will cause background levels to increase but remain below the generic risk levels for all sites (levels provided in Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites).
Negligible	Discharges to groundwater are expected to be well within statutory limits.

Table 6-44 Groundwater Resource Sensitivity/Vulnerability/Importance

Value	Definition
Low	■ No aquifer or groundwater in deep aquifers. ■ Low-quality groundwater is not used by the community. ■ Groundwater that does not provide or provide very little baseflow to surface watercourses or support habitats.
Medium	■ Medium quality groundwater. ■ Groundwater that provides baseflow to surface watercourses used for recreational fishing. ■ Groundwater that is abstracted for industrial purposes or agriculture (i.e., irrigation purposes).
High	■ High-quality groundwater that is used for drinking or domestic purposes. ■ Groundwater that provides baseflow to surface watercourses that have high quality or supports a wetland with ecological importance.

6.1.6.3 Construction Activities

Projects of this nature typically present more significant risks to the water environment during construction than during operation. Large construction sites, if not properly managed and operated, can lead to significant impacts on surface water quality. The main source of construction contamination is typically suspended sediment in runoff waters from the worksite and accidental spillages of hazardous material from construction if not controlled. The following impacts identify the main potential issues which can arise in the absence of appropriate mitigation.

6.1.6.3.1 Potential Impacts on Surface Water

i) Impacts on Surface Water Quality

Potential impacts on surface water quality are considered to be temporary and include the following:

- Silty/soiled water can arise from excavations (e.g. cut and fill), exposed ground, stockpiles of soil, quarries, topsoil placing and excess material, plant and wheel washings, construction roads, washing of finished road surfaces to remove accumulated soil and disturbance of drains and streambeds (i.e. in-stream construction of culverts and channel diversions/improvement works), and landscaping e.g. of road embankments. Potential localized effects on water quality are likely

to be fairly long-lasting (e.g. weeks or months) and/or give rise to indirect ecological and/or socio-economic impacts – ***small to medium impact magnitude.***

- If a construction site or a refuelling and storage depot is located near a surface water body, the surface water is endangered by the spill of hazardous substances. Liquid cement (and associated wastewater run-off), due to its high alkalinity and corrosive nature, is highly polluting and can give rise to major fish kills in aquatic environments. The accidental spillage of cement and of fuel, oils and lubricants can have significant water quality consequences on watercourses, aquatic ecology and downstream users – ***medium impact magnitude.***
- Other sources of contamination during the construction phase arise from the use of bitumen compounds in the wearing course of the road and materials used for waterproofing of concrete surfaces. This would lead to the contamination of surface water degrades the existing water quality by 50 % of the original water quality – ***medium impact magnitude.***
- Waste from construction activities and wastewater generation from construction accommodations may impact the surface water quality. All wastewater from these compounds poses a risk to the water environment if not treated before discharge (either by on-site treatment or removal for disposal via the local sewage network, if available). This would lead to the contamination of surface water degrades the existing water quality by 50 % of the original water quality – ***medium impact magnitude.***

ii) Potential Physical Impacts on Surface Water Bodies and Channels

During construction, existing surface water bodies (e.g., rivers or creeks, drainage or irrigation channels) located within the Motorway might be permanently lost in the absence of appropriate design and construction management measures. However, based on the current design works there is no plan to permanently remove any existing water body. Some channels/streams may need to be re-routed, deviated or channelized but the overall hydraulic/hydrological functionality will be retained. The potential impacts on water bodies due to stream deviation or bridge/viaduct structures in the stream bed, which might become permanent if not mitigated properly during construction and design, are summarised in the following tables.

Table 6-45 Potential impacts on streams

Chainage & Name	Stream Structure (natural/disturbed)	Potential Impact
Between 57+000 and 57+000 Creek 1	Stream already disturbed by other infrastructure in its lower course. Viaduct footings are located in the vicinity of the stream	No disturbance in alteration and reduction of streambed diameter
Between 57+000 and 57+000 Creek 2	Stream is a concrete-lined channel that is part of the surface water control infrastructure in the area. Viaduct footings are located in the vicinity of the stream	No disturbance in alteration and reduction of streambed diameter
Sazlıdere Stream (Creek) Between 51+000 and 52+000	Streambed has been developed by DSI being downstream of the Sazlıdere Dam.	No disturbance in alteration and reduction of streambed diameter
Between 57+000 and 57+000 Creek 4	natural structure with meandering streambed Viaduct footings are located in the vicinity of the stream	No disturbance in alteration and reduction of streambed diameter
Between 57+000 and 57+000 Creek 5	natural structure with meandering streambed Crossing via a culvert structure	Change in flow velocity and structural alteration due to stream deviation.

6.1.6.3.2 Potential Impacts on Ground Water

Large construction sites, if not properly managed and operated, can lead to significant impacts on groundwater quality. The main risk of contamination is intentional discharges or accidental leaks and spills of liquid cement, fuel oils, and lubricants from construction. The following identifies the main potential issues that have been considered in the assessment which can arise in the absence of appropriate mitigation and controls:

i) Potential Impacts on Ground Water Quality

There is the possibility of contamination of the shallow water table in the event of intentional or accidental discharges of hazardous materials to the ground during construction, particularly in shallow overburdened areas. The bedrock aquifers may be impacted by various activities involving site clearance/earthworks, and spillages/leakages from construction plants and at refuelling and storage depots located on-site – ***medium impact magnitude.***

Construction accommodation compounds along the route will be developed to house construction workers. All wastewater from these compounds poses a risk to the water environment if not treated before discharge (either by on-site treatment or removal for disposal via the local sewage network, if available) – ***medium impact magnitude.***

ii) Potential Impacts on the Ground Water Table

The Project designers have confirmed that no permanent dewatering will be needed for the Project, and thus there will be no such potential impacts on groundwater.

6.1.6.4 Operational Activities

The scale and nature of the proposed Motorway have significant potential to impact the surface water of the area it traverses. In scoping the assessment, the following types of impact were identified as potential consequences of the Project:

6.1.6.4.1 Potential Impacts on Surface water

i) Impacts on Surface Water Quality (temporary)

Surface water can be affected during operation by maintenance activities such as fertilizing in the Right of Way or de-icing agents (the Project will use salt as de-icing agent). Spills during road accidents and spillages/leakages present further risks of pollution during operation. Severe impacts on the surface water could occur by accidents when high amounts of water with hazardous substances may be discharged into the surface water. The risk of water pollution is also high within all road sections close to surface water bodies such as stream crossings – ***medium impact magnitude.***

ii) Impacts on Surface Water Quality (permanent)

Surface water can be affected during operation by routine deposits from vehicles (e.g., tire and brake deposits, hydrocarbons from engines, liquid exhaust emissions, etc.) being deposited on the Motorway surface and carried into the road drainage system. The road-induced sources are leakage of the road body itself (tar oils) and road marking materials. Local receiving streams may be negatively affected in case of the wastewater discharge is not adequately treated in line with Turkish and international standards/guidelines – ***medium impact magnitude.***

iii) Structural Impacts on Surface Water Bodies (permanent)

The project will involve several stream crossings. New structures will include viaducts and bridges of the major watercourse and culverts for smaller streams. The construction of structures within these

watercourses such as bridge piers and abutments may change the hydrological regime with potential impacts on the beds and banks of rivers (scour, erosion, deposition*)* – ***medium impact magnitude.***

Physical interference of streams at crossing points through the installation of temporary culverts and roadways can have significant hydrological consequences on watercourses and aquatic life if not appropriately designed – ***medium impact magnitude.***

Structures such as grade-separated intersections, bridges, culverts, and embankments can obstruct and cause interference with rivers, streams and floodplains at road crossing points causing impacts on the stream bed, and downstream flows and water quality.

iv) Impacts on Land Drainage and Flooding

Development of the Motorway will lead to an increase in the impermeable surface area and the rate of surface water runoff. High stormwater flow rates can lead to erosion, habitat deterioration, and flooding. The Project may increase local flood risk by altering the local topography and hydrological regime. Project structures can result in the removal of flood storage capacity causing an increased risk of flooding elsewhere. Current seasonal flooding may be important to some specific ecosystems and the impact of the Project on these conditions will need to be considered – ***medium impact magnitude***

Hydraulic structures such as bridges, culverts, and diversion channels can also impede flow during times of flood thus causing water levels upstream of structures to be raised above what would occur in the absence of the structure – ***medium impact magnitude***

6.1.6.4.2 Potential Impacts on Groundwater and Hydrogeology (long term and permanent)

The following types of impact have been identified as potential consequences of the Project for groundwater:

i) Impacts on Ground Water Quality

There may be a reduction in the quality of groundwater locally as a result of contaminated operational road runoff infiltration entering the groundwater environment via proposed filter drains. Runoff from the road pavement is likely to contain some degree of silt/dust and pollutants from atmospheric deposition, vehicle emission, litter and general road maintenance, as well as from possible accidental road spillage incidents – ***medium impact magnitude.***

Fill sections may also have an impact, in particular from potentially contaminated material. Any surface water runoff has the potential to infiltrate the subsoil and migrate into the groundwater. Where groundwater wells are located down-gradient and short distances from the proposed alignment, and where the subsoil thickness is shallow corresponding to an ‘extreme’ vulnerability rating, they will be considered at risk of contamination – ***medium impact magnitude.***

ii) Impacts on the Groundwater Table

The Project will require several areas of cuttings, and these may impact the local or groundwater regime, with subsequent impacts on groundwater abstraction sources (both licensed/official and illegal/unlicensed abstractions). The sealing of surfaces by the motorway may lead to a reduction of groundwater recharge – ***low impact magnitude.***

iii) Impacts on Groundwater Flow Regime

No impacts on the groundwater flow regime are expected, as no dewatering is required for deep cuts, nor is it planned to permanently dewater any other Motorway installations.

6.1.6.5 Mitigation Measures

Embedded Measures

In this chapter, mitigation measures are given concerning the identified potential impacts assessed above. The mitigation measures are divided into three phases: (i) Design, (ii) Construction, and (iii) Operations.

Design Phase

The design phase is a crucial stage for avoiding/mitigating potential impacts that might occur during construction or operation, in the following ways:

- The road design shall be optimized to limit the gradient of the access roads to reduce runoff-induced erosion and provide adequate road drainage based on road width, surface material, compaction and maintenance.
- Sustainable road drainage and stormwater management practices will be implemented and maintained following international guidelines (such as the AASHTO Motorway Drainage Guidelines) to minimize impacts of road drainage on surrounding water resources. Such practices will include, e.g., measures to slow peak runoff flow (retention basins, rock/riprap), reduce sediment load, and increase infiltration, including vegetated swales (planted with salt-resistant vegetation), filter strips, terracing, check dams, detention ponds or basins, or infiltration trenches. If the direct discharge is inevitable next to sensitive areas the stormwater management will also include appropriate means to reduce oily discharges, e.g., via oil separators, sand filters.
- Sand layers will be used as filters in seepage pits (detritus basins in the form of a shallow pit connected to drain trenches), to prevent harmful substances to percolate into deeper soil layers or into the groundwater (this approach may not be feasible in highly vulnerable karst ground water systems or alluvial aquifers with high water tables and thin soil coverage).
- All wastewaters will be either discharged into the local/municipal sewage network (if available nearby) or otherwise treated before discharge to the suitable receiving environment. All wastewater discharges must comply with relevant Turkish legal requirements (Water Pollution Control Regulation 2004, No. 25687) and other Lender Standards (e.g., the IFC General EHS Guidance) before disposal. The design of structures will minimize changes in the hydrology and flow of watercourses and ensure an appropriate capacity for culverts through embankments when flood plains are cut off. According to KGM's Technical Specifications (2006), structures will be designed to comply with the following requirements:
    - Bridges will be designed to meet the discharges of 100 to 500-year floods. In general, bridge openings will be designed to minimize flow velocity to minimize scour of riverbeds and slopes near bridges. Erosion and scour potential under flood conditions will be considered and appropriate precautions are taken.
    - Culverts will be designed to meet the discharge of a 10-year flood unless the structure is located near sensitive locations such as residential areas or farmland where the discharge of a 100-year flood will be met.
    - In the vicinity of large river crossings, the Motorway will be designed to accommodate a 100-year flood.
- Culverts will be designed to maintain the natural riverbed width and the natural riverbed level. If it is not feasible to use bottomless culverts, then the culvert base will be buried to restore the riverbed as described in the *Good Practice Guides for Engineering in the Water Environment of the Scottish Environment Protection Agency (SEPA 2009).*

- The Project will be designed to minimize risks of flash flooding and an ***Emergency Preparedness and Response Plan*** will be developed for the operation phase which will include the emergency response in the event of spills, fire, accidents, earthquake, and flash flood.
- A Hazard and Risk Management Procedure will be developed that will include:
  - Procedures for handling and storage of hazardous materials following manufacturer's instructions
  - Register of hazardous materials and identification of dangers posed by hazardous materials within the Project site;
  - Storage of fuels, oils, and hazardous materials on a suitably sized impervious and bunded base and use of drip trays for fuelling;
  - Training of on-site personnel on the presence, handling, transport, and disposal of hazardous materials and emergency response management;
  - Provision of personal protective equipment (PPE) to staff who are required to handle certain chemicals;
  - Protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odours, or other emissions.
- A ***Waste Management Plan*** will be developed that will include:
  - Application of waste hierarchy to avoid, segregate, re-use, recycle wastes as much as possible and as of last option safely dispose of wastes;
  - Training of construction staff to ensure safe management of all types of waste preventing harm to themselves, the environment, and the public;
  - Collection and segregation of waste according to its type, whether it is reusable, recyclable, non-hazardous, or hazardous waste;
  - Storage of wastes according to international best practice (IFC EHS General Guideline).
  - Use and labelling of designated waste collection containers and storage areas for different kinds of wastes (hazardous and non-hazardous);
  - Re-use of excavated soils in the Project area as far as possible and seeking alternative uses for surplus spoil where practicable (e.g., landscaping and earthworks for other projects) to minimize the requirements for off-site disposal;
  - Transport and dispose wastes at licensed waste management sites; before selecting a due diligence review will be undertaken to understand if the sites are materially compliant with EU requirements;
- A ***Soil Management Plan*** will be developed that will lead to:
  - The area of soil exposure and disturbance shall be limited to the construction site only;
  - Measures to prevent erosion from excavated areas and soil storage heaps;
  - Prevent sediments flowing into surface waters and drainage channels by localized control measures (e.g., sediment fences, check dams, mulch barriers, rock groins, or fabric barriers, sediment basins), appropriate contouring to optimize slope angle and steepness;
  - Prevent wind erosion via fencing, covering, etc.;
  - Measures to divert external 'clean' runoff around the construction area to prevent mixing of 'clean' and 'dirty' runoff and reduce the size of the required sediment basins;
  - Covering of disturbed fertile topsoil and protection with vegetation, mulch or erosion-resistant material;

- Approach to the storage of topsoil for re-use, to preserve it to the maximum extent possible to facilitate re-vegetation of excavated areas, cut and embankment areas;
- Measures to store, reuse and (if necessary) recondition (improve) topsoil quality prior to reuse on the Project;
- Early construction of all drainage structures (i.e., culverts, sediment basins and catch drains) along the Road.

- A ***Water Management Procedure*** will be developed that will include
  - Consideration of the management of the construction sites during periods of heavy rainfall.
  - High sediment generating activities such as road paving will be avoided, and exposed surfaces and stored materials covered if necessary to reduce erosion of sediments into surface waters

Construction Phase Mitigation Measures

Surface and Groundwater Quality

- Water quality will be monitored at upstream and downstream of the river before and after the construction activities are completed. Samples will be analysed for a suite of analyses suitable to identify potential contaminants from project activities, e.g.: total petroleum hydrocarbons, dissolved metals, cations and anions (Ca, Mg, K, Fl, Cl, SO4), pH, total dissolved solids (TDS) and total suspended solids (TSS), and other compounds of potential concern based on chemicals compounds used during the project (e.g.: lubricants, degreasers).
- Water analysis will be conducted in line with World Health Organization (WHO) Standards if water will be provided for human consumption purposes.
- No fuelling of vehicles or equipment will take place within excavated areas, if practically feasible. If heavy equipment cannot be moved to appropriate fuelling points, an impervious surface (such as a drip-tray) has to be used for refuelling this equipment to hinder accidental spillage to drain into the soil and therefore in potential groundwater aquifers.
- No hazardous materials will be stored in excavated areas and all handling of all hazardous materials will be under the *Hazard and Risk Management Procedure*. Suitably sized impervious bunds or other containment will be installed where hazardous materials are handled (e.g., fuel stores and loading areas, concrete mixing, hazardous material stores) to prevent hazardous materials from entering the site drainage.
- Wastewater from all construction compounds and the associated building will be either discharged into the local/municipal sewage network or treated before discharge to the suitable receiving environment or collected on site and transported by tanker for disposal at the local sewage treatment works. All wastewater discharges must comply with relevant Turkish legal requirements (Water Pollution Control Regulation 2004, No. 25687) and other Lender Standards before disposal.
- Drainage from excavations will be collected and settled to remove suspended materials before discharge by required permits. If physically possible, local perimeter drains will be constructed around working areas to collect potentially suspended run-off and direct it to a system of settlement basins before discharge by required permits.
- To minimize dust and dirt on neighbouring roads the EPC Contractor will be required to install wheel washing equipment for all vehicles leaving the site. The effluent from wheel washing will be collected and subjected to settlement to reduce suspended solids before recycling of the wash water as far as possible, and any surplus will be discharged into the existing road drainage system. Collected soil will be removed for disposal at a suitably licensed facility.
- There will be no direct discharge of contaminated run-off from worksites to any watercourse along the alignment.

- Channels, bunds and sandbag barriers will be provided on-site to direct run-off to the collection system.
- Construction equipment will be cleaned away from surface waters.
- All facilities and structures will be regularly inspected and maintained to ensure proper and efficient operation at all times, and especially after heavy rainfall. Sediment deposits will be regularly removed and disposed of either by spreading on-site (if uncontaminated) or at a suitably licensed facility.
- Spoil and soil storage areas and open stores of construction materials will be designed and managed to control the loss of sediments into run-off by minimizing the length and angle of slopes.
- The size and duration of exposure of areas of the open ground will be kept to a minimum.

Surface Water Bodies and Water Infrastructure (Channels)

- Work on stream crossings will be carried out, where technically feasible at least 50 m away from the banks above the channel and avoiding direct intervention in the watercourse unless the existing bank reinforcement needs to be replaced.
- Sensitive areas of rivers and drains will be protected from impacts of vehicles and other construction activities via fencing or other appropriate means.
- Driving within streams or on their banks will be forbidden except if unavoidable to construct a particular structure. Then appropriate measures will be implemented to protect the sensitive areas, for example by placing with metal plates to drive on.
- If technically feasible small drains within the construction area will be covered with metal plates which can be passed over by construction machines, to protect them against disturbance, or conveyed to have free flow through the pipes placed for this purpose.
- Protection measures to prevent soil erosion after the finalisation of the earthwork will be implemented where required such as:
  - use of grass turf to cover the soil surface;
  - use of erosion-control blankets or mats;
  - renaturation as soon as feasible.
- The design of the channels considers the flow from the whole basin at that specific section and 10 year and 100-year flood regimes (which is also the same as the design criteria of the attached culvert(s)). Derivation channels will be made of concrete and will be designed in a box shape or open channel format depending on the site conditions.

6.1.6.5.1 Operational Phase Mitigation Measures

Surface and Groundwater Quality (non-routine operation)

Accidental Spills

- A spillage risk assessment will be undertaken as part of the development of the Emergency Preparedness and Response Plan (EPRP) (e.g., to determine the areas of the Motorway most susceptible to spills/accidents, sensitive areas compare with local response capability/backup capacity) to determine the optimal location and type of emergency response equipment and the required capacities for handling liquid spills.
- ERT will be trained about roles and responsibilities and regular drills will be conducted.
- The EPRP Plan specifies that Spill Response Kits will be available, including absorbent materials suitable for the materials to be handled on-site, will be held at secure, clearly signposted locations, instructions will be provided with the kits and personnel will be trained in their use.

- Any spillages will be immediately contained on-site and all contaminated materials including soils will be removed from the site for suitable treatment and disposal.
- All staff and subcontractors will be required to report any incidents, and these will be subject to investigation and remedial and preventive actions will be taken.

Surface and Groundwater Quality (routine operation)

- For fertilizing the landscaping in the Right of Way, only natural fertilizer will be used as required in KGM's Technical Specification for landscaping of Motorways, published in 2008. If pest infections are detected the competent authority needs to approve the respective pesticide/biocide for pest control.
- Permanent erosion and runoff control features will be regularly inspected and maintained during operation.
- Oil separators will be operated and maintained to achieve the desired water treatment results.

Structure of Surface Water Bodies, Drainage and Flash Flooding (permanent)

Permanent impacts on surface water bodies, drainage and flash flooding have to be mitigated within the design phase.

6.1.6.6 Summary Impact Table (Pre- and Post-mitigation – Residual)

Construction Phase

The table below includes a summary of the impact assessment for the construction phase – pre- and post-mitigation(s).

Table 6-46 Rating of Impacts Related to Surface Water – Water Quality

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Long term*	Impacts expected throughout operations	*Medium-term*	Impacts expected throughout operations
Scale	*Moderate*	Potential uncontrolled conditions leading to contamination of surface and groundwater media	*Low*	Effective water management, hazardous materials management, Waste Management and Soil Management Plan Implementation of Operation Phase mitigation measures
Frequency	*Regular*	Only expected through maintenance activities Surface water discharge from motorway	*Regular*	Only expected through maintenance activities Surface water discharge from motorway
Likelihood	*Possible*	Will occur during maintenance activities and rainfall events	*Unlikely*	Implementation of preventative mitigation measures
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity (Surface water drainage pathways of the motorway are present in the Sazlıdere Dam and Büyükçekmece Lake watershed area)				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-47 Rating of Impacts Related to Groundwater-Water Quality

Project Phase: *Construction* Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Medium-term*	Impacts are expected throughout construction.	*Medium-term*	Impacts are expected throughout construction.
Scale	*Moderate*	Work implemented in areas where the groundwater table is close to the surface	*Low*	Effective water management, hazardous materials management, Waste Management, and Soil Management Plan Implementation of Construction Phase mitigation measures
Frequency	*Regular*	Impacts are expected throughout construction.	*Regular*	Impacts are expected throughout construction.

Likelihood	*Likely*	Construction activities inherently will pose risk to surface water quality	*Likely*	Construction activities inherently will pose risk to surface water quality
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Moderate Magnitude			Low Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

Operational Phase

The table below includes a summary of the impact assessment for the operational phase – pre- and post-mitigation(s).

Table 6-48 Rating of Impacts Related to Surface and Ground water – Water Quality

Project Phase: *Operation* Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Long term*	Impacts expected throughout operations	*Medium-term*	Impacts expected throughout operations
Scale	*Low*		*Low*	Effective water management, hazardous materials management, Waste Management and Soil Management Plan Implementation of Operation Phase mitigation measures
Frequency	*Regular*	Only expected through maintenance activities Surface water discharge from motorway	*Regular*	Only expected through maintenance activities Surface water discharge from motorway
Likelihood	*Likely*	Will occur during maintenance activities and rainfall events	*Likely*	Will occur during maintenance activities Will occur during maintenance activities and rainfall events
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Low Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity (Creek 5 and surface water drainage pathways of the motorway are present in the Sazlıdere Dam and Büyükçekmece Lake watershed area)				

Significant Rating:	
Pre-mitigation	**Post-mitigation**
Moderate Impact	Minor Impact

Table 6-49 Rating of Impacts Related to Accidental Events

Project Phase: *Construction* Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Short-term*	Impacts expected throughout operations	*Short--term*	Impacts expected throughout operations
Scale	*Major*	Potential accidental events leading to contamination of surface and groundwater media	*Low*	Emergency Preparedness and Response Plan Implementation
Frequency	*Infrequent*	Only as a result of accidental events.	*Infrequent*	Only as a result of accidental events.
Likelihood	*Possible*	Only in the case of accidents	*Unlikely*	Implementation of mitigation measures

Magnitude:	
Pre-mitigation	**Post-mitigation (Residual)**
Large Magnitude	Small Magnitude

Sensitivity/Vulnerability/Importance of the Resource/Receptor:
High Sensitivity (Surface water drainage pathways of the motorway are present in the Sazlıdere Dam and Büyükçekmece Lake watershed area)

Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Moderate Impact

Table 6-50 Rating of Impacts Related to Flash Flooding

Project Phase: *Construction* Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Across the project AOI	*Regional*	Across the project AOI
Duration	*Short-term*	Impacts expected throughout operations	*Short-term*	Impacts expected throughout operations
Scale	*Major*	Sazlıdere Dam overflow may occur from large rainfall events	*Low*	Project design taking into account flooding conditions
Frequency	*Infrequent*	During periods of high rainfall	*Infrequent*	During periods of high rainfall
Likelihood	*Possible*	During wet season.	*Unlikely*	Project design taking into account flooding conditions
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.1.7 Noise and Vibration

6.1.7.1 Impact Assessment

Noise and vibration assessment makes use of Turkish standards and guidelines and those issued by the IFC/WB EHS Guidelines to determine if noise impacts of the Project's construction or subsequent operations may be significant. Mitigation is considered in line IFC/World Bank guidance.

Mitigation performance in typical situations has been tested via modelling, and based on these results the way in which noise mitigation will be prioritised in the final motorway design is described. The likely residual impacts are then determined and summarised at the end of each section. This chapter is divided into three sections:

- noise impacts during construction (including quarries);
- vibration impacts during construction;
- air blast overpressure and vibration impacts due to blasting; and
- noise impacts during motorway operation.

According to UK Motorways Standards on "Noise and Vibration[198]", the vibration arising from the operation of a road maintained in good condition is unlikely to be a source of perceptible structural vibration in properties located adjacent to these roads. Hence, no significant impact is expected for the operation phase.

[198] LA 111 Noise and vibration Rev 2 (formerly HD 213/11, IAN 185/15)
https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364

Each section includes respective subsections describing the assessment methodology for noise-related subtopics, types of impacts, mitigation measures and residual impacts. Annex 10 provides further details of the baseline noise survey results.

6.1.7.2 Legislative Framework and Guidance

6.1.7.2.1 Turkish Regulation

In Turkey, environmental noise is regulated by the Regulation on the Assessment and Management of Environmental Noise – CGDYY – Official Gazette Date and Number: 04.06.2010/27601. The regulation stipulates noise standards for areas of specific sensitivity with respect to noise exposure on human beings, residential areas, schools, industrial sites.

Construction

Limits are defined for noise exposure during daytime, evening hours, and night time. It shall be noted that if night time work is required, this activity is subject to permit to be acquired from Provincial Local Environmental Board. Noise standards applicable to construction noise are provided in Table 6-51.

Table 6-51 Turkish Standards for Construction Noise

Type of Construction	Lday in dBA 07:00 – 19:00	Leve in dBA 19:00 – 22:00	Lnight in dBA 22:00 – 07:00
Roads	75	70	65

Table 7 of Annex 7 of the Regulation on the Assessment and Management of Environmental Noise – CGDYY, also stipulates vibration standards that are applicable in Turkey for very sensitive areas. These levels are applicable to general construction activities of the Project (excluding blasting) and are listed in Table 6-52.

Table 6-52 Turkish Limits for Vibration from Construction Machines (per CGDDY)

Land Use Type (Receptor)	Maximum ground floor vibration values allowed for driven pile and construction machines (PPV in mm/s)*	
	Continuous	Discontinuous
Administrative and downtown areas	5	10
Industrial and commercial areas	15	30

***** *Frequency: 1 Hz to 80 Hz*

Blasting

Table 6 of Annex 7 of the CGDYY stipulates a different maximum Peak Particle Velocity (PPV) for blasting activities that might happen during construction. Vibration criteria from blasting at the nearest receptors specified by the Turkish Regulations are listed in Table 6-53:

Table 6-53 Turkish Standards for Blasting Vibration

Frequency	Peak Particle Velocity (mm/s)
1	5
4 – 10	19
30 – 100	50

For frequencies between 1 – 4 Hz, the PPV limit changes from 5 to 19 mm/s, and between 10 – 30 Hz changes from 19 to 50 mm/s linearly.

As vibrational waves travel outwards from the source of explosion, higher frequencies are damped[199]. In most civil construction blasting projects, where measurements have been conducted in near field, a good blast designer can use advanced blasting techniques to channel vibration above 35 Hz[200]. However, since information about frequency range due to blasting at this area is not available, ERM has adopted the most stringent criterion of 5 mm/s.

Quarries

For Quarries, noise limits applicable to industrial sites are used. According to CGDYY, villages in the vicinity of quarries to be used in the scope of the Project can be considered as 'mostly residential receptors', and noise limits of 60 dBA, 55 dBA, and 50 dBA apply for the daytime, evening and night-time periods.

Operation

Noise standards applicable to operation of planned or improved roads are presented Table 6-54.

Table 6-54 Turkish Standards for Traffic Noise (Planned or Improved Roads)

Type of Areas	Lday in dBA 07:00 – 19:00	Leve in dBA 19:00 – 22:00	Lnight in dBA 22:00 – 07:00	Lden Implied*
Noise sensitive areas including residential, educational, cultural and health centres	60	55	50	**60**
Mixed use areas with predominance of dwellings	63	58	53	**63**
Mixed use areas with predominance of commercial	65	60	55	**65**
Industrial Areas	67	62	57	**67**

*Since the exact noise units of these limits are not clearly stated in the Turkish regulations, it has been assumed that they are free-field L_{eq} noise levels over the periods shown.

European/EU Standards

The EC Directive 2002/49 requires EU Member States to report population noise exposure using the day, evening, night level (in the L_{den}, metric), and where necessary the night level (L_{night}) metric too. The L_{den} noise metric combines noise levels for the day (12 hour), evening (4 hour) and night (8 hours) periods, using weightings for each, into a single measure of the 24 hour noise exposure that is used to represent annual average noise exposure. The L_{den} levels corresponding to compliance with the noise limits for day, evening and night periods in the Turkish standards are included in Table 2.

[199] Vibration Control, Book edited by: Dr. Mickaël Lallart, ISBN 978-953-307-117-6, pp. 380, September 2010

[200] www.oricaminingservices.com | Document reference: 200281

IFC Guidance

The IFC General EHS Guidelines provide daytime and night time noise standards for two types of receptors: (i) Residential areas (55 dB (A) day/45 dB (A) night as the one-hour L_{Aeq}), and (ii) for Commercial/Industrial areas (70 dB (A) for day and night time). Furthermore, noise abatement measures should achieve either these standards or a maximum increase in background levels of 3 dB (A) at the nearest off-site receptor location shall be met. However, these Guidelines are designed to apply to noise emissions from facilities and stationary noise sources (such as factories), and are not applicable to linear infrastructure such as roadways. Therefore, reference is made for this study to the more directly applicable IFC EHS Guidance for Toll Roads, for which information is given in Box 6-1.

Box 6-1 IFC Noise Guidance for Toll Roads, April 2007

Traffic noise is generated by vehicle engines, emission of exhaust, aerodynamic sources, and tire/pavement interaction. For vehicle speeds over 90 kilometres per hour (km/h), the noise from the tire/pavement interaction predominates.[21] Traffic noise can be a significant nuisance and may be loud enough to interfere with normal conversation[22] and can cause stress in children and raise blood pressure, heart rates, and levels of stress hormones.[23] Traffic noise levels are reduced by distance, terrain, vegetation, and natural and manmade obstacles. Management practices to prevent, minimize, and control noise include:

(i) Consideration of noise impacts during road design to prevent adverse impacts at nearby properties through the placement of the road right-of-way and/or through the design and implementation of noise control measures discussed below.[24, 25]

(ii) Design and implementation of noise control measures may include the following:

- Construction of the road below the level of the surrounding land
- Noise barriers along the border of the right-of way (e.g. earthen mounds, walls, and vegetation)[26]
- Insulation of nearby building structures (typically consisting of window replacements)
- Use of road surfaces that generate less pavement/tire noise such as stone-matrix asphalt [27]

[21] The noise level is influenced by the type, volume, and speed of traffic (e.g. one five-axel truck sounds about as loud as 28 cars when traveling at 90 km/hr.). US Department of Transportation, Federal Motorway Administration. Motorway Traffic Noise. http://www.fhwa.dot.gov/environment/htnoise.htm.
[22] At a distance of 50 ft., traffic noise ranges from about 70 dBA for cars to 90 dBA for heavy trucks.
[23] Evans, Gary W. et al. (2001)
[24] For example, the U.S. Federal Motorway administration has established noise impact criteria, such as L10 (sound level exceeded 10 percent of the time) = 70 dBA for residential land use. A new road project should not cause a significant increase in existing noise levels at nearby properties.
[25] Traffic noise is generally not perceived as a nuisance for people who live more than 150 meters from heavily travelled motorways or more than 30 to 60 meters from lightly travelled roads.
[26] The most effective noise abatement measures include noise barriers and mounds, which can reduce noise by 5 dBA or more. The cost of noise walls in the US has been estimated at $1.3 million per mile (NCHRP Project 25-25 (04))
[27] Stone-matrix asphalt (SMA) is one of several alternative surfaces that can be used in new roads or as surface treatment in existing roads to provide a quieter surface. A double-layered porous asphalt construction results in a further reduction of traffic noise, from 3 to 4 dBA at 50 km/h up to 5.5 dBA at 100 km/h compared with regular asphalt and 7 to 12 dBA quieter than concrete pavements (NSW Roads and Traffic Authority (RTA), 2005).

6.1.7.2.2 British Standard (BS) 5228

This code of practice for noise and vibration control on construction and open sites states that it is likely that vibration will be perceptible and result in adverse comment from affected persons at levels as low

as around 1 mm/s[201]. The criterion of 1 mm/s has been applied to identify likely disturbance during general construction activities, thus reflecting a conservative and precautionary approach.

6.1.7.2.3 Australian and New Zealand Environment and Conservation Council (ANZECC)[202]

Airblast

The proposed design criteria for blast emissions associated with the Project are shown in Table 6-55. These criteria have been proposed based on the Australian and New Zealand Environment and Conservation Council (ANZECC) Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure. The criteria are proposed with the intention of ensuring the adequate protection of existing sensitive land uses whilst permitting the blasting to be conducted in a practical manner.

The criteria for air blast are presented as 95 percentile limits and maximum limits for human comfort in occupied buildings listed in Table 6-55. The lower 95 % compliance level has been adopted as the design criteria for this Project and should be adhered to at all times during normal operations. The maximum level should never be exceeded, even in exceptional circumstances.

Due to the nature of blasting emissions, compliance with these criteria would result in impacts that are unlikely to be significant (but the potential remains for local community objections and complaints to arise). Exceeding any of these recommended levels would result in significant impacts and the potential for regulatory issues.

Table 6-55 Airblast Overpressure Criteria

Receptor Type		Airblast (dB Linear)	
		95 % Compliance Level	Maximum Level
Residential	Day	115	125
	Night	105	115

Vibration

The criteria for ground vibration are considered both in terms of the risk of cosmetic and structural damage to buildings and structures and the effects of disturbance to building occupants and community health and safety. These criteria are given in Table 6-56. The lower 95 % compliance level for disturbance has been adopted as design criteria for this Project.

The most stringent design criterion is the 2 mm/s criterion for night-time residential areas. As such, if blasting activities can be designed to not exceed this criterion at any time, blasting could occur at day or night and would not be likely to cause significant adverse impacts. However, it is also recognised as good practice to avoid blasting at night. It is not always practical to achieve a level less than 2 mm/s and hence regulators typically recommended a 95 % compliance level, which should be adhered to at all times during normal, planned operations, and a maximum level, which should not be exceeded at any time. However, it is recommended that a level of 2 mm/s be considered as the long term goal for the control of ground vibration.

It is noted that this is a stringent approach and recognises the fact that frequent blasting would be noticeable at these levels although damage to buildings would not take place until levels were much higher.

[201] https://www.soundplanning.co.uk/services/construction-noise/

[202] Australian and New Zealand Environment and Conservation Council (ANZECC) Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC, 1990).

Table 6-56 Vibration Criteria

Receptor Type		Peak Particle Velocity (mm/s)	
Occupied Buildings (Disturbance)		**95 % Compliance Level**	**Maximum Level**
Residential	Day	5	10
	Night	2	5

6.1.7.2.4 Summary

Noise from Construction of the Motorway

Neither the EU Directive nor the IFC Guidelines do not define noise limits for the construction phase of the motorway. However, Turkish noise regulation clearly defines the noise standards applicable to the construction of new roads; forming the legal framework of our assessment. For vibration from construction, a combination of the Turkish criteria and BS 5228 standards have been used. Finally, potential impacts due to blasting activities are assessed based on Turkish regulations and international standards.

Noise from Operation of the Motorway

As discussed above, neither the EU Directive nor the IFC Guidelines prescribe noise limits that are directly applicable for new or existing roads. Most guidelines apply to the relevant receptors and as such depend on local conditions and are more appropriately set at national or regional level. Noise impact assessment criteria for the operation of the new motorway are derived by the following combination-approach:

- the IFC guidance is used to indicate the onset of possible impacts;
- the Turkish noise regulation, BS and ANZECC are used to judge significant impacts (for which mitigation is subsequently considered).

6.1.7.3 Potential Impacts during Construction Phase

6.1.7.3.1 Noise

Noise impact from construction activities may arise principally from the following activities:

- construction of the motorway itself;
- construction of the other engineering structures such as the Sazlidere bridge, viaducts, etc.;
- excavation and preparation of construction materials in quarries or stockyards; and
- transportation of excavated and construction materials.

Noise impacts can be caused by noise emissions from construction equipment, construction vehicles carrying materials and spoil to and from the locations where work is taking place along the motorway. Construction materials will be delivered from quarries and stockyard sites where asphalt and concrete batching facilities will be located.

Construction of the motorway will progress along the route, and will result in a noise impact on a short-term basis (as discussed below) as the construction approaches and moves past each settlement. Impacts from the main and satellite sites for construction material preparation, structures and quarries, would affect receptors over a relatively small area, but for a longer period during the temporary construction phase.

Significance Criteria

To evaluate the impact of temporary activities it is necessary to establish criteria above which some significant adverse effect may be experienced. International best practice has been followed and

thresholds values above which a significant construction noise impact is considered to occur have been based on Turkish Regulation on the Assessment and Management of Environmental Noise – CGDYY *(Official Gazette Date and Number: 04.06.2010/27601)*.

Turkish limits applicable to road construction and associated temporary activities are presented in Table 6-54. Exceedance of the construction noise standard is considered to be a significant impact.

In, or close to, residential areas, construction activities may not be carried out during evening or night-time. However, where a project is of public benefit, partial exemption is possible under certain circumstances.

When assessing the significance of an impact for the noise and vibration assessment, its significance takes into account factor such as:

- ***Design details of the noise sensitive property*** – for instance, if the construction will take place during a very short period of time, significance of the potential impacts may be downgraded; and
- ***Sensitivity of the receptor*** – receptors sensitive to noise during the daytime only are assessed using criteria that consider the impact of noise on daytime activities, whilst those rated as sensitive during the night time are assessed using criteria that consider the impact of noise on sleep disturbance.

The significance of noise effects is set out below in Table 6-57.

Table 6-57 Magnitude and Significance of Construction Noise Effects

Exceedance of criteria, dBA	Magnitude of predicted impact	Other relevant factors	Resulting Significance of effect
<5 below the criteria	Negligible	Factors which may influence significance of effects, e.g. duration of construction activity, sensitivity of the receptor.	Insignificant
> 5 below, up to the criteria	Small		Minor
Up to 5 dB above the criteria	Medium		Moderate
> 5 above the criteria	Large		Major

The classification of significance is referred to as: insignificant, minor, moderate and major. Impacts rated as Moderate or Major should be mitigated where practicable, feasible and reasonable with proportionately more emphasis on the Major items. Mitigation may not fully eliminate an impact, but is be expected to reduce its severity.

Methodology

The software Predictor (version 2020) was used to calculate the sound propagation according to ISO 9613-2[203]. In the absence of specific information regarding the type of ground between the construction sites and the nearest buildings, the assumption has been made that the ground absorption value around worksites is 0.5. This is a conservative approach because most of the land between the alignment and the buildings is agricultural land or otherwise unpaved/soft topography.

Modelling of noise impact from construction of the motorway was calculated based on a typical construction scenario where a construction team is working on a site on flat terrain without any noise shielding effects and from a topography which results in a worst-case (conservative) assessment of noise impacts. This scenario is sufficient to calculate noise levels at various distances from the motorway, and to calculate noise impacts at receptors from the construction activity as it moves along the route.

[203] Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation, ISO, 1996.

At the time of the assessment, construction details for the different time periods were not known, and it was assumed that construction activities will remain the same during the 24 hours period. Thus, the assessment below follows a conservative approach and is based on the night time noise limits criteria and therefore, following a conservative approach, the assessment presented below is based on the night time criteria.

Construction Plant Teams

Each construction activity will use different type and number of equipment. The determination of the total sound power level of each construction activity is based on the noise emission characteristics and sound power levels of the equipment type, the maximum number of equipment, and the duration of each equipment being active at one location. The tables below show these informations for each construction activity, presenting the total sound power level at the last row of each table. The construction equipment sound power level has been derived from BS 5228[204].

Table 6-58 Earthworks Construction Plant Team & Plus Crusher

Earthwork Equipment	Qty.	BS5228	Size	% on time	Lw, dB(A)
Backhoe	1	C.2.8	62 kW, 8 t	80	95
Bull Dozer	2	C.2.11	179 kW, 28 t	70	108
Wheel Loader	1	C.4.13	75 kW, 37 t	80	98
Truck	2	Av C.6.21 & 23	-	50	109
Hydraulic Driller	1	C.3.15	104 kW, 12.5 t	100	111
Steam Roller	1	D.3.116	50 kW, 7 t	100	106
Grinder	1	C.5.35	27 kW	100	103
Sprinkler (lorry)	1	Av C.6.21 & 23	-	100	109
Total					**116**
Crusher	1	C.9.14	310 kW	100	118
Total					**120**

[204] BS 5228-1:2009+A1:2014. The British Standards Institution 2014

Table 6-59 Roadworks Construction Plant Team

Roadwork Equipment	Qty.	BS5228	Size	% on time	Lw, dB(A)
Hydraulic Driller	1	C.3.15	104 kW, 12.5 t	100	111
Crawler excavator	1	C.2.19	125 kW, 25 t	80	105
Generator	1	C.4.83	3 kW, 210 kg	100	93
Finisher + Truck	1	C.5.31	94 kW, 18 t	80	104
Tandem roller	1	C.5.20	8.9 t	80	102
Wheel roller	1	D.3.116	50 kW, 7 t	80	105
Sweeper	1	C.4.90	70 kW	70	102
Distributor	1	C.2.30	306 kw, 29 t	50	104
Sprinkler (lorry)	1	Av C.6.21 & 23		100	109
Grinder	1	C.5.35	27 kW	100	103
Wheel loader	1	C.4.13	75 kW, 37 t	80	98
Compressor	1	C.5.5	1 t	80	93
Asphalt milling machine	1	C.5.7	185 kW, 17 t	100	89
Total					**115**

Table 6-60 Structures Construction Plant Team

Roadwork Equipment	Qty.	BS5228	Size	% on time	Lw, dB(A)
Mixer + concrete pump mobile	1	C.4.28	26 t	80	102
Concrete Pump	1	C.3.25	59 kW	80	105
Mobile Crane	1	C.4.39	315 kW, 80 t	60	102
Crane mounted on a truck	1	C.3.30	70 t	70	97
Vibrator	1	C.4.33	-	60	104
Motor pump	1	C.6.41	-	100	106
Wheel loader	1	C.4.13	75 kW, 37 t	80	98
Backhoe	2	C.2.8	62 kW, 8 t	80	98
Bull dozer	3	C.2.11	179 kW, 28 t	70	110
Truck	1	Av C.6.21 & 23	-	50	106
Grinder	1	C.5.35	27 kW	100	103
Roller	1	D.3.116	50 kW, 7 t	80	105
Total					**115**

Table 6-61 Toll Station Construction Plant Team

Toll Station Construction	Qty.	BS5228	Size	% on time	Lw, dB(A)
20T 360 deg Excavator	1	C.2.21	107 kw, 22 t	50	96.0
D6 Dozer 20T towing roller	1	C.2.36	142 kW, 20 t	75	107.8
Lorry Delivery	4	Av C.6.21 & 23	-	20	108.0
Lorry with lifting boom, 50kW, 6T	1	C.4.53	50 kw, 6 t	25	99.0
Tracked Mobile Crane 55T	1	C.3.29	132 kw, 55 t	25	92.0
Concrete Mixer Truck	1	C.4.20	-	20	101.0

Toll Station Construction	Qty.	BS5228	Size	% on time	Lw, dB(A)
Compaction of concrete – Compressor & poker vibrator	1	D.6.43	-	10	95.0
Compressor	1	D.7.9	-	10	92.0
Total					112

Table 6-62 Quarry Plant Team

Quarry Operation	Qty.	BS5228	Size	% on time	Lw, dB(A)
45T 360 deg Excavator	1	C.4.63	223 kW, 40 t	50	102.4
Wheel roller	1	D.3.116	50 kW, 7 t	80	105
D9 Dozer	1	C.2.13	82 kW, 11 t	75	105.3
Dust Suppression Plant	1	C.6.38	-	50	108.0
Water pump 4 inch	2	C.2.46	-	100	93.0
Crusher	1	C.9.14	310 kW	100	118
Total					120

For transportation of materials between the stockyard sites and the construction sites, it is assumed that primarily the new motorway will be used as a haul route. Transportation from the quarries to stockyards will be on the Motorway or public roads. An estimate of noise impact from lorry traffic is given based on the average number of vehicles in use at a particular site.

Impacts of Construction Noise

Table 6-63 presents the estimated distances at which the relevant impact magnitude will be met for each construction activity, based on the night time noise limit criteria.

As an example, receptors located within 50 meters from the construction boundaries of will have a major impact due to earthworks, however receptors located at a distance greater than 160 meters from the construction boundaries, will not have any significant impact due to earthworks. These predicted impacted zones can be applied along the entire length of the motorway where earthworks will take place.

Table 6-63 Distances in meters at which Night time Criteria will be met

Construction Activity	Noise Level dBA (Impact Magnitude)			
	<65 (Negligible)	65 – 70 (Small)	>70 – 75 (Medium)	>75 (Large)
Earthworks	>160 m	160 – 90 m	<90 – 50 m	<50 m
Earthworks & Crusher	>250 m	250 – 145 m	<145 – 85 m	<85 m
Roadworks	>145 m	145 – 85 m	<85 - 45 m	<45 m
Structures	>145 m	145 – 85 m	<85 - 45 m	<45 m
Operation Activity	**Noise Level dBA (Impact Magnitude)**			
	<45 (Negligible)	45-50 (Small)	>50-55 (Medium)	>55 (Large)
Quarry	>1000 m	1000 – 690 m	<690 – 440 m	<440 m

As mentioned above, criteria for quarries are more stringent, therefore calculated distances, at which the equivalent impact significance will be met, are greater.

In general, the construction noise assessment is based on the construction activity of earthworks as it represents the worst case scenario for the entire route. The earthworks worst-caseer scenario represents the worst case only for the area where the crusher will be located (KM: 52+400 – 55+100).

Table 6-64 presents the kilometric point of the motorway where a significant impact is possible at the closest buildings to the Motorway due construction activities. At the time of assessment it was not known which buildings will be relocated or demolished, therefore all buildings, presented in our data, outside the Project's boundaries have been considered for this assessment.

Table 6-64 Significance of Impact from Construction

Phase/Section/District	KM Motorway	Min. distance to construction site border (in meters)	Magnitude of Impact (Night time)
Çatalca	36+300	Bordering*	Large
Çatalca	36+900	34	Large
Arnavutköy	40+600 40+800 40+900	Bordering*	Large
Arnavutköy	42+000 42+300 42+600 43+350	Bordering*	Large
Arnavutköy	46+350	50	Large
Başakşehir	48+400	690	Negligible
Başakşehir	51+700/ 52+900/ 53+900/ 54+000/ 54+300/ 55+000/ 55+400	Bordering*	Large
Başakşehir	57+450 58+200	Bordering*	Large
Çatalca	36+300	34	Large
Arnavutköy	3+805	1130	Negligible
Çatalca	4+750	Bordering*	Large
Arnavutköy	5+300	125	Negligible
Büyükçekmece	6+000	40	Large
Büyükçekmece	6+900	25	Large
Başakşehir	0+000	700	Negligible
Başakşehir	3+100/ 3+200/ 3+300/ 3+400	Bordering*	Large
Avcılar	3+400	Bordering*	Large
Avcılar	4+300/ 4+700	Bordering*	Large

Bordering*: Less than 10 m

Impacts from Construction Traffic

Based on data from previous similar projects, it was assumed that for earthworks (excavation, filling and storing of excavated material), short-distance movement of materials may require approximately 10 to 40 hourly trips (20 to 80 movements). For earthworks, movement of heavy goods trucks will be limited to the alignment since excavated material is reused along the alignment or stored at adjacent area (e.g. for landscaping) as much as possible. Restricting the construction traffic to the motorway corridor is expected to reduce the noise effects to impact levels that are insignificant.

Transportation from quarries will be conducted through existing public roads until the motorway is reached, although it is also possible that new access roads could be needed. Based on a maximum rock crushing capacity of 400 t/h and a truck load of 25-30 tons, a frequency of about 30 hourly truck movements was estimated as the traffic load to the quarries.

Modelling shows that noise from such traffic exceeds the 63 dB (A) new road standard for daytime road traffic at distances up to approximately 50 m. Similarly, the new road standard for the evening hours (58 dB (A)) is exceeded at distances up to 130 m, and for nighttime the standard (53 dB (A)) is exceeded up to about 300 m. For low quality (gravel) roads or steep roads, the noise levels will be higher. There is clearly potential for significant noise impacts from quarry traffic if routed through villages or towns. Re-routing of truck movements to avoid residential and noise sensitive areas will be a key avoidance/mitigation measure so that truck traffic does not pass through villages or close to residential buildings. Speed restrictions, vehicle maintenance and driver behaviour will also comprise part of the mitigation measures. Truck routes through villages or towns will be strictly avoided during night-time hours (10pm to 7 am). The mitigation measures for hauling routes from quarries where villages are affected are addressed in sections below.

In the unexpected case that the alignment cannot be used for moving general construction material along the Motorway route, the same distances and approach to mitigation also apply for transportation of/from main/satellite construction sites.

Mitigation Measures for Construction Activities along the Motorway

The following mitigation measures will be used where necessary to keep the noise levels below the applicable national standards, at the closest sensitive receptors to the source:

Table 6-65 Mitigation Measures for Construction Activities along the Motorway

Type of Impact	Mitigation Measures
Construction Noise derived from Construction Equipment	■ Where practicable noisy equipment will be sited as far away as possible from receptors. ■ Where practicable noisy equipment will be orientated to face away from the receptors at which **moderate** or **major** noise impacts are predicted. ■ Alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric-controlled units, will be used, where practicable. ■ Where practicable, stationary equipment will be located in an acoustically treated enclosure. ■ Throttle settings will be reduced, and equipment and plant turned off, when not being used. ■ Onsite chutes and bins will be lined with damping material. ■ Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or

Type of Impact	Mitigation Measures
	repair would address the annoying character of noise identified. ■ Use of compressors, generators and pumps fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use, and positioning of all ancillary plant (e.g. generators, compressors) so as to cause minimum noise disturbance. ■ Fitting of mufflers or silencers of the type recommended by manufacturers. ■ For machines with fitted enclosures, doors and door seals will be checked to ensure they are in good working order; also that the doors close properly against the seals. ■ Shutting down of machines in intermittent use in the intervening periods between works.
Construction Noise derived from Construction Materials	■ Storage of excavated material between the construction site and the sensitive receptor to form a natural noise barrier (with cover to avoid dust erosion) or installation of other (temporary) noise barriers. ■ Minimizing drop height of materials. ■ Taking advantage of the natural topography for noise shielding.
Construction Noise derived from Construction Traffic	■ Implementation of speed limits (50 km/h) for trucks while travelling to and from construction sites (within buildings and on village roads of poor condition: 30 km/h). ■ Slow driving rules in villages (e.g. 30km/h), particularly near sensitive use areas which will be identified (at least one month) prior to start of construction related activities; ■ Reducing Project traffic routing through community areas wherever possible. ■ Use of the motorway alignment for transportation whenever possible. ■ Use of dedicated site access roads that avoid routing through villages. ■ If necessary to avoid narrow areas near receptors, consideration of construction of a new access road. ■ Limiting hours of operation for specific equipment or operations (*e.g.* trucks or machines operating in or passing through community areas). ■ Keep internal haul routes well maintained and avoiding steep gradients. ■ Restricting the noise at nearby buildings from construction to 70 dB Leq during the evening and 65 dB Leq at night as far as practicable for short term activities lasting not more than 10 days. ■ Noise levels from longer term construction activities (longer than 10 days) will be restricted to 55 dB LAeq during the evening, and 50 dB LAeq at night as far as is practicable, or to other standards that have been agreed with the local authority.

According to British Standard 5228[205], successful implementation of the noise control mitigation and management measures listed above, achieves an overall reduction of 5 dBA for impacts derived from construction activities. For a reduction of more than 5 dBA, noise shielding is required. Besides workers containers or noise screens, earth mounds or rock piles can provide a typical reduction up to 15 dBA.

Mitigation Measures for Quarries

The following measures for operation of quarries will be followed to mitigate adverse noise impacts:

- EPC Contractor will consider social issues in designing the transport routes to minimize the need to pass through populated areas.
- Development of a Quarry Management Plan which will include plans to retain rock structures as noise barrier between the quarrying area and any potentially affected village.
- Night-time operation and transportation will be minimized where villages are located close by and/or a transportation route passes through.
- At quarry or borrow pit sites, where Nakkaş Otoyol A.Ş. does not have the direct operational responsibility, supervision of the subcontractors who run the site will be performed to ensure that legislative requirements are complied with.

For quarry sites, measures will be taken to ascertain compliance with the Mining Activities Implementation Regulation (*Madencilik Faaliyetleri Uygulama Yönetmeliği*; Official Gazette Date/Number: 6.11.2010/27751) according to which a minimum (horizontal) distance of 300 m is required between a quarry and areas with approved zoning plan. The distance of 300 m also applies for cultural assets (1st degree archaeological sites) (Article 24).

Mitigation measures for hauling routes to quarries in order to reduce the noise impact on villages they are passing through are as follows:

- In general when hauling routes pass through villages or alongside residential areas the following will apply:
  - Speed limits of 30 km/h will be mandatory for trucks;
  - Empty trucks will have no loose chains or other noise-generating parts on the loading platform.

Residual Impacts for Construction Noise

Motorway construction will affect buildings along the route for a few weeks. Operation of main/satellite construction sites and the quarries that will supply construction works, will last for several months.

Noise impacts from the construction phase can be effectively mitigated through good management practices and provision of well-established technical solutions and limiting of noisy works to daytime. Implementation of mitigation measures will help to decrease residual impacts as a result of Project construction.

Summary of Impacts during Construction

Predicted construction noise impacts have been summarised in Table 6-66 and Table 6-67.

[205] https://www.soundplanning.co.uk/services/construction-noise/

Table 6-66 Noise Impacts from Construction Activities

Project Phase: *Construction Earthworks*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Within 50 m to 85 m* of construction activity	*Local*	Within 50 m to 85 m* of construction activity
Duration	*Medium-term*	Construction expected to last 30 months.	*Medium-term*	Construction expected to last 30 months.
Scale	*Major*	Construction expected to last 30 months and section by section however construction conditions and activities (unpaved roads, earthworks and materials handling) are likely to increase significantly the noise levels.	*Minor*	Construction expected to last 30 months and section by section however with embedded mitigation only expect scale to be minor at any one time.
Frequency	*Regular*	Impacts expected throughout the duration of construction.	*Regular*	Impacts expected throughout the duration of construction.
Likelihood	*Likely*	During construction phase	*Likely*	During construction phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			Small to Medium Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate to Minor Impact	

**The distance of 85 m refers to the area where earthworks plus crusher will take place (KM: 52+400 – 55+100).*

Table 6-67 Noise Impacts from Operation of Quarries

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Within 235m of construction activity	*Local*	Within 235m of construction activity
Duration	*Medium-term*	Construction expected to last 30 months.	*Medium-term*	Construction expected to last 30 months.
Scale	*Moderate*	Construction expected to last 30 months. Quarries operation is likely to increase noise levels.	*Minor*	Construction expected to last 30 months. However with embedded mitigation only expect scale to be negligible.
Frequency	*Regular*	Impacts expected throughout the duration of construction.	*Regular*	Impacts expected throughout the duration of construction.
Likelihood	*Likely*	During construction phase	*Likely*	During construction phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Minor Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate			Minor	

Note that for motorway construction projects, construction traffic is likely to cause major noise impacts, if proper mitigation measures are not undertaken. Therefore, an assessment of impacts should be carried out once construction traffic data become available and before the road becomes operational. Should significant impacts be identified, mitigation measures will be implemented where practicable.

6.1.7.3.2 Vibration

Typically, the main sources of vibration impacts from the motorway will solely be during the construction stage, making it the focus for the assessment in this chapter. Vibration impacts during construction arise from piling, operation of vibratory equipment (e.g. compaction) and blasting. Vibration has the potential to result in environmental impacts in the form of disturbance to the occupiers of dwellings and other noise sensitive buildings that are very close to the alignment, and in extreme situations risk of damage to the structure of adjacent properties.

Construction of the motorway itself includes operation of heavy machines including vibratory compaction of materials. These activities are likely to affect a particular location for a relatively short term basis. If driven piling is necessary for structures (e.g. bridges), these activities are likely to result in effects over longer periods of time. However, based on the meetings held between ESIA Team and Nakkaş Otoyol A.Ş. design team, the bored piling method will be preferred instead of driven piling method which would create disturbance and vibration on the ground. The produced piles will work as friction piles, and only drilling will be done on weak, loose ground without entering the solid rock which will avoid vibration.

Methodology

In order to assess the effects of vibration on receptors close to construction activities the following step-wise methodology was applied:

Step 1: Locations of key vibration sources were identified and particular focus was given to those areas that are close enough to major vibration sources;

Step 2: Predicted vibration values were estimated with reference to the empirical data base in BS 5228;

Step 3: For the shorter term impacts that are likely to result from motorway construction, a scoping distance within which the effects are likely to be experienced has been derived;

Step 4: These predicted vibration magnitudes have then been compared Turkish legislation and values above legislative limits have been extracted; and

Step 5: Respective locations of the above extracted values (step 4) have been identified and used to assess potential building damage.

The degree to which vibration propagates from the worksite depends on the kind of receptor material and the characteristics of the subsurface materials. Considering the planning stage in which the Project is (with further detail design to be performed in future by the contractors), the assessment in this chapter is based on typical vibration levels, rather than a detailed assessment with specific individual ground conditions. Nevertheless, it is believed that key vibration issues for the Project can be identified using this approach.

Vibration magnitudes in this assessment are based on Peak Particle Velocity (PPV) and refer to the velocity of the response of receptor materials to the impact. The unit used is millimetre (mm) per second.

Vibration impacts are classified as *moderate* if the Turkish standards are likely to be exceeded, and as *minor* if vibration is likely to exceed the disturbance criterion of 1 mm/s.

Building Damage

For general construction activities, the potential for building damage (usually only cosmetic damage) is likely to be limited to less than 50 m from the construction activity. Medium magnitude impacts may occur within this distance. Table 6-68 presents the areas and the kilometric points and estimated number of buildings which are located within this distance.

Table 6-68 Areas with buildings within 50 m from construction boundaries

District name	KM	Estimated Number of Buildings
Çatalca	36+300 – 36+800	4
Çatalca	4+750	
Arnavutköy	38+700 – 43+400	34
Başakşehir	4+200 – 5+000	46
Başakşehir	52+200 – 59+300	
Avcılar	3+400 – 5+000	13
Total	97	

The assessment indicates that in the absence of mitigation, building damage due to vibration impacts is possible, with higher impacts at buildings located closer to the motorway's construction areas. Consequently, further mitigation measures will need to be adopted to reduce these potential impacts.

In addition, a third party will be involved by Nakkaş Otoyol A.Ş. in analyses of those damage claims raised by the impacted community.

Disturbance to Building Occupants

Reference to the measurements in BS 5228 suggests that the vibration from general construction (piling and vibratory compaction) will fall to below the 1 mm/s assessment criterion for disturbance at between 50 m and 100 m of the construction site boundary. Beyond this distance vibration is not expected to result in significant effects in terms of disturbance.

In the absence of mitigation, short term vibration disturbance is therefore possible at up to 100 m from the alignment for closest buildings in each district named above plus in the number of building in each district:

Table 6-69 Areas with buildings within 50 m from construction boundaries

District name	KM
Çatalca	36+900
Arnavutköy	37+300 – 41+800
Arnavutköy	43+100 – 44+300
Arnavutköy	46+300
Başakşehir	2+650 – 3+400
Başakşehir	4+950
Başakşehir	51+600 – 51+900
Büyükçekmece	5+900
Büyükçekmece	7+200
Avcılar	3+300 – 3+500
Avcılar	4+600 – 5+000

Mitigation Measures

A range of mitigation measures are prescribed in the IFC EHS Guidelines – Construction Materials Extraction. In addition, the following Project-specific measures will be considered to avoid/mitigate vibration impacts related to Project construction.

Measures to control vibration from *general construction sites*:

- Identification of buildings located within 50 m of significant sources of vibration ahead of construction works. Evaluation of the sensitivity of the identified buildings and building occupants to vibration.
- A documentation will be prepared for each of the identified buildings which will include photographs of buildings sensitive to vibration and results of the sensitivity evaluation.
- Monitoring of vibration on commencement of relevant construction activities to ensure that the Turkish requirements are met. If the standards are exceeded additional measures will be taken such as altering the methods of working to use equipment that creates lower levels of vibration. It is assumed that the standards won't be exceeded considering that the bored piling method will be preferred instead of driven piling method which would create disturbance and vibration on the ground. The produced piles will work as friction piles, and only drilling will be done on weak, loose ground without entering the solid rock which will avoid vibration.

General construction of the Project is likely to result in short term disturbance from vibration impacts at buildings along the motorway (at distances of 50 m to 100 m from the alignment) which is expected to be not significant and rated minor.

Impacts of moderate significance (i.e. exceeding Turkish Regulatory limits) may be possible for buildings located within very short distances (below 50 m) to the road alignment. A number of buildings along the motorway are located within this distance and thus may be affected.

No building damage is likely as a result of the works, but in line with international best practise the existing conditions of all structures within 50 m of the alignment will be documented before and after the construction works to determine if any impacts have occurred.

Summary of Construction Vibration Impacts

Predicted construction impacts have been summarised in Table 6-70.

Table 6-70 Construction Vibration Impacts

Project Phase: *Construction*				
Type of Impact: Vibration				
Rating of Impacts: Direct Negative Impact				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Within 50 m from construction activity	*Local*	Within 50 m from construction activity
Duration	*Medium-term*	Construction expected to last 30 months.	*Medium-term*	Construction expected to last 30 months.
Scale	*Major*	Construction expected to last 30 months and section by section however construction conditions and activities (unpaved roads, earthworks and materials handling) are likely to increase significantly the vibration levels.	*Negligible to Minor*	Construction expected to last 30 months and section by section however with embedded mitigation only expect scale to be minor.
Frequency	*Regular*	Impacts expected throughout the duration of construction.	*Regular*	Impacts expected throughout the duration of construction.
Likelihood	*Likely*	During construction phase	*Likely*	During construction phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			Small Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor	

6.1.7.3.3 Blasting

Significance Criteria

Turkish regulations as well as international standards and guidelines for air blast and vibration have been reviewed to establish the criteria for assessment of impacts derived from blasting. Based on the information provided by Nakkaş Otoyol A.Ş., blasting activities will take place only during day time, therefore the assessment will be based on the day time criteria. The resulting criteria are set out in Table 6-71. No distinction is made between minor and moderate impacts because of the nature of impacts from blasting and the response of receptors.

Table 6-71 Criteria for Evaluation of Impacts from Blasting

Period	Airblast dB(Z) 95 percentile			Vibration PPV mm/s		
Significance	Not Significant	Moderate	Major	Not Significant	Moderate	Major
Daytime	<115	>115-125	> 125	<2	>2-5	> 5

Methodology

Generally, the prediction of blasting impacts, air blast and vibration involves the analysis of site blasting monitoring data. However, at the current stage, such data is not available for the Project site. This is why round vibration and air blast levels have been predicted using the methodology outlined in the ICI Blasting Guide (ICI 1995[206]) to provide an understanding of the potential of impacts from blasting.

According to Nakkaş Otoyol A.Ş., blasting will be subcontracted to a specialised company and modern blasting technique (with micro-delay) will be used. Blasting will take place within the five areas along the suggested alignment, and details of blasting at each area are presented in Table 6-72.

Table 6-72 Blasting Details

Blasting Location	Kilometric Point	Number of daily blastings	Blasting days in total	Number of holes per blasting event	MIC (kg)	Delay between holes (ms)
Blasting Area-01	54+340-54+900	1-2	100	30-100	5.8-41	17-25-42-67
Blasting Area-02	53+520-53+780	1-2	60	30-100	5.8-41	17-25-42-67
Blasting Area-03	52+440-53+060	1-2	140	30-100	5.8-41	17-25-42-67
Blasting Area-04	49+760-50+680	1	105	50-150	8-60.5	17-25-42-67
Blasting Area-05	48+200-49+400	1	40	50-150	8-60.5	17-25-42-67

[206] https://www.osmre.gov/resources/blasting/docs/USBM/IC8925BlastProceeduresManual1983.pdf

Airblast

The 95th percentile air blast site law, which may be exceeded up to 5 % of the total annual blasts is defined by the peak air blast level (SPL) measured in dB (Z) and is defined as:

Air blast OP (95 %) = 165.3– 24 log10(SD)

where scaled distance: $SD = \frac{d}{\sqrt[3]{MIC}}$

- MIC: is the maximum explosive charge mass (kilograms) detonated per delay at any 8 millisecond interval; and
- d: is the distance between the charge (blast location) and receptor.

Ground Vibration

Ground vibration levels depend on the maximum charge mass (effective charge per delay) and not the total charge weight, provided the effective delay interval is appropriate.

When blasting is to be carried out to a free face in average field conditions the following equation may be used to estimate the mean vector peak particle velocity.

PVV (mm/s) = $1140(SD)^{-1.6}$

where scaled distance: $SD = \frac{d}{\sqrt[2]{MIC}}$

- MIC: is the maximum explosive charge mass (kilograms) detonated per delay at any 8-millisecond interval; and
- d: is the distance between the charge (blast location) and receptor.

Impacts from Blasting

Acceptable Maximum Instantaneous Charges (MIC), at which the criteria will be met, have been predicted based on the minimum distances between receptors and each blasting location. Results of these calculations are presented in Table 6-73 (for airblast) and Table 6-74 (for ground vibration). Precise locations of the blasting activities were provided in a range, therefore the distances have been estimated using Google Earth, based on motorway's boundaries and the nearest receptor. It has to be noted that it is likely that the actual minimum distances between the blasting location and the receptors is significantly greater than the ones presented on the table below.

Table 6-73 Airblast Calculation

Blasting Location	Minimum Distance from receptors (m)	Airblast dB(Z) (min)*	MIC (kg) (min)*	Airblast dB(Z) (max)*	MIC (kg) (max)*
Blasting Area-01	40	115	0.03	125	0.6
Blasting Area-02	50	115	0.06	125	1.1
Blasting Area-03	110	115	0.7	125	12.2
Blasting Area-04	180	115	3.01	125	53.5
Blasting Area-05	100	115	0.5	125	9.2

**minimum and maximum values are based on airblast design criteria MIC in Table 6-72 where:*

- *for Blasting Area 01, 02, 03 – min. MIC 5.8 kg and max. MIC 41 kg*
- *for Blasting Area 04, 05 – min. MIC 8 kg and max. MIC 60.5 kg*

Results for Blasting Area 01 are used as reference, considering the shortest distance to the receptors and calculations indicate that the MIC value should be up to 0.06 kg to avoid any major impacts. Based

on the information above, impacts are anticipated to be major for Blasting Area 01 and 02 but moderate for Blasting Area 03. In order to avoid major impacts, the following distances to the nearest receptors are recommended:

- For MIC of 5.8 kg, a minimum distance of 85 meters; and
- For MIC of 41 kg, a minimum distance of 165 meters.

For Blasting Area 04 and 05, the following distances to the nearest receptors are recommended:

- For MIC of 8 kg, a minimum distance of 95 meters; and
- For MIC of 60.5 kg, a minimum distance of 190 meters.

Table 6-74 Ground Vibration Calculation

Blasting Location	Minimum Distance from receptors (m)	Ground Vibration PPV (mm/s)	MIC (kg) (min)*	Ground Vibration PPV (mm/s)	MIC (kg) (max)*
Blasting Area-01	40	2	0.57	5	1.8
Blasting Area-02	50	2	0.9	5	2.8
Blasting Area-03	110	2	4.34	5	13.7
Blasting Area-04	180	2	11.63	5	36.3
Blasting Area-05	100	2	3.59	5	11.3

**minimum and maximum values are based on air blast design criteria MIC in Table 6-72 where:*

- *for Blasting Area 01, 02, 03 - min. MIC 5.8 kg and max. MIC 41 kg*
- *for Blasting Area 04, 05 – min MIC 8 kg and max. MIC 60.5 kg*

Results for Blasting Area 01 are used as reference, considering the shortest distance to the receptors and calculations indicate that the MIC value should be up to 1.8 kg to avoid any major impacts.

For Blasting Area 01, 02 and 03, the following distances to the nearest receptors are recommended:

- For MIC of 5.8 kg, a minimum distance of 70 meters; and
- For MIC of 41 kg, a minimum distance of 200 meters.

For Blasting Area 04 and 05, the following distances to the nearest receptors are recommended:

- For MIC of 8 kg, a minimum distance of 85 meters; and
- For MIC of 60.5 kg, a minimum distance of 230 meters.

Mitigation Measures for Blasting

There are a number of blast control measures and technologies that can be applied to minimise blast impacts (including air blast and ground vibration) on the surrounding environment and enable blasts to be designed not to exceed relevant criteria.

For Airblast

The Maximum Instantaneous Charge (MIC) is the maximum mass of explosive detonated in any 8 ms period throughout the blast. A reduction in the MIC would correspondingly result in a reduction of the air blast level. The MIC may easily be reduced by reducing the number of holes fired at any one time, resulting in air blast levels lowered by 1 dB Linear to 3 dB Linear. In addition, a pre-blast assessment protocol plays an essential role in managing blast impacts. Therefore, it is very important to draw an appropriate and detailed protocol that minimises the impacts on the surrounding area.

For ground vibration

The following control measures should be applied:

- An appropriate and detailed protocol that minimises the impacts on the surrounding area will be drawn.
- The Maximum Instantaneous Charge (MIC) is the maximum mass of explosive detonated in any 8 ms period throughout the blast. A reduction in the MIC would correspondingly result in a reduction of the air blast level. The MIC may easily be reduced by reducing the number of holes fired at any one time, resulting in air blast levels lowered by 1 dB Linear to 3 dB Linear. In addition, a pre-blast assessment protocol plays an essential role in managing blast impacts.
- Use of an appropriate charge mass design and loading.
- Application of an appropriate initiation sequence for each blast to minimise the possibility of hole interaction, i.e. avoid reinforcing effect and aim for a single hole initiation.
- Undertake an alternative blast design around identified geological features to avoid face burst and excessive air blast emission;
- Use of an appropriate quality stemming material and stemming height to enable correct confinement of explosive charges and therefore minimise airblast emission; and
- Use of an appropriate pre-blast meteorological condition protocol to avoid blasting in unfavourable weather conditions.

Occupational and Community Health and Safety Measures

Blasting activities (including transportation and storage) may create unsafe working environment both for workers and for the community in case the necessary mitigations are not in place. Nakkaş Otoyol A.Ş., EPC Contractor and subcontractors shall follow the requirements of Turkish Regulation on Health and Safety for Mining Workplaces with regard to blasting activities and obtain all necessary permits from relevant authorities before blasting activities. In addition to the national legal requirements, the following measures listed in IFC EHS Guidelines on Construction Material Extraction and international best practises will be taken before, during and after blasting activities:

- Emergency Preparedness and Response Plan should be undertaken, including control of third-party access to blasting areas (including animal grazing activities); and
- Blasting should be conducted according to a consistent timetable agreed with the stakeholders who may be affected. If changes to the blasting timetable occur, nearby communities should be immediately informed of those changes;
- Residents of the local communities will receive a written notification at least 30 days in advance of a nearby blasting as well as two (2) more written reminders. This notification will include the blasting schedules, as well as the name, address and telephone number of the operator; an identification of the specific areas in which blasting will take place; the dates and time periods when explosives are to be detonated; the methods to be used to control access to the blasting areas; and the type of patterns of audible warning and all-clear signals to be used before and after blasting.
- Access within the blasting area will be controlled to prevent presence of livestock or unauthorized persons during blasting. Access will remain controlled until an authorized representative of the operator has reasonably determined that: no unusual hazards, such as imminent slides or undetonated charges, exist, and access to and travel within the blasting area can be safely resumed.
- Blasting schedules will be distributed to the users of the grazing areas, residents and local governments including the name, address and telephone number of the operator; an identification of the specific areas in which blasting will take place; the dates and time periods when explosives

are to be detonated; the methods to be used to control access to the blasting areas; and the type of patterns of audible warning and all-clear signals to be used before and after blasting;

- Specific warning devices (e.g. horn signals and flashing lights) and procedures should be implemented before each blasting activity to alert all workers and third parties in the surrounding areas (e.g. local communities). Warning procedures should include traffic limitation along local roadways and railways;
- Specific personnel training on explosives handling and safety management should be conducted;
- Blasting-permit procedures should be implemented for all personnel involved with explosives (e.g. handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives);
- Blasting sites should be checked post-blast by qualified personnel for malfunctions and unexploded blasting agents, prior to resumption of work;
- Particular attention should be given to all explosives handling phases to prevent theft/improper use;
- Blasting blankets are also recommended to prevent rock and stone fly.
- Blasting sings are to be conspicuously place along the edge of the blast site and area where flying debris may occur.

All the above listed measures will be included in Blasting Management Plan.

Summary of Blasting Impacts

Predicted Blasting Impacts are summarised in Table 6-75.

Table 6-75 Blasting Noise Impacts

Project Phase: *Construction*				
Type of Impact: Airblast and Ground vibration				
Rating of Impacts: Direct Negative Impact				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Up to 230 m from blasting activity	*Local*	Up to 230 m from blasting activity
Duration	*Medium-term*	During construction phase	*Medium-term*	During construction phase
Scale	*Major To Moderate*	During construction phase	*Moderate*	During construction phase
Frequency	*Regular*	Impacts expected from each blasting event	*Regular*	Impacts expected from each blasting event
Likelihood	*Likely*	During Blasting activities	*Likely*	During Blasting activities
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large to Medium Magnitude			Medium Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

6.1.7.4 Noise Assessment during Motorway Operation

Noise impacts caused by the operation of the motorway were assessed by using forecasted traffic flow data. The assessment considers absolute levels and the change in baseline noise, in order to establish where mitigation measures are necessary.

The road alignment passes through both open countryside and in the vicinity of buildings in numerous areas. Consequently, the Project has the potential to result in significant noise impacts at nearby receptors during its operation phase.

The impact assessment methodology, its results and proposed mitigation measures are discussed in the below chapters.

Significant Criteria

The assessment method draws on national Turkish, European/EU and World Bank/IFC guidance.

Whether or not the new motorway will create a noise impact in a given location will depend not only on the level of noise from the new road but also on the pre-existing baseline noise level. Noise baseline survey work has been completed as part of this study and a conservative approach to baseline noise levels is used at this stage (i.e. assuming the baseline is a low-noise rural setting). Subsequent site-specific surveys will be conducted where potential impacts are identified to inform the detailed design of mitigation measures. In general, for the motorway to create a significant noise impact, the noise it generates must be above the impact threshold levels as summarised in Table 6-76.

Table 6-76 Noise Impact Significance Criteria for the Motorway (Lden dBA)

Land Use Type (Receptor)	Minor Impact L_{den}	Moderate Impact L_{den}	Major Impact L_{den}
a) Industrial area (heavy industries)	-	67	72
b) Commercial area with noise-sensitive area where workplaces are predominant (commercial area)	55	65	70
c) Commercial area with noise-sensitive area where residential buildings are predominant (mixed commercial/residential area)	**55**	**63**	**68**
d) Noise-sensitive areas where educational, cultural, health institutes, or summer residential and camping areas are predominant (residential areas for recreational purpose, educational, hospitals)	55	60	65

Noise levels exceeding the regulations are considered of *moderate* impact. If exceeded by more than 5 dB, impacts are considered *major*.

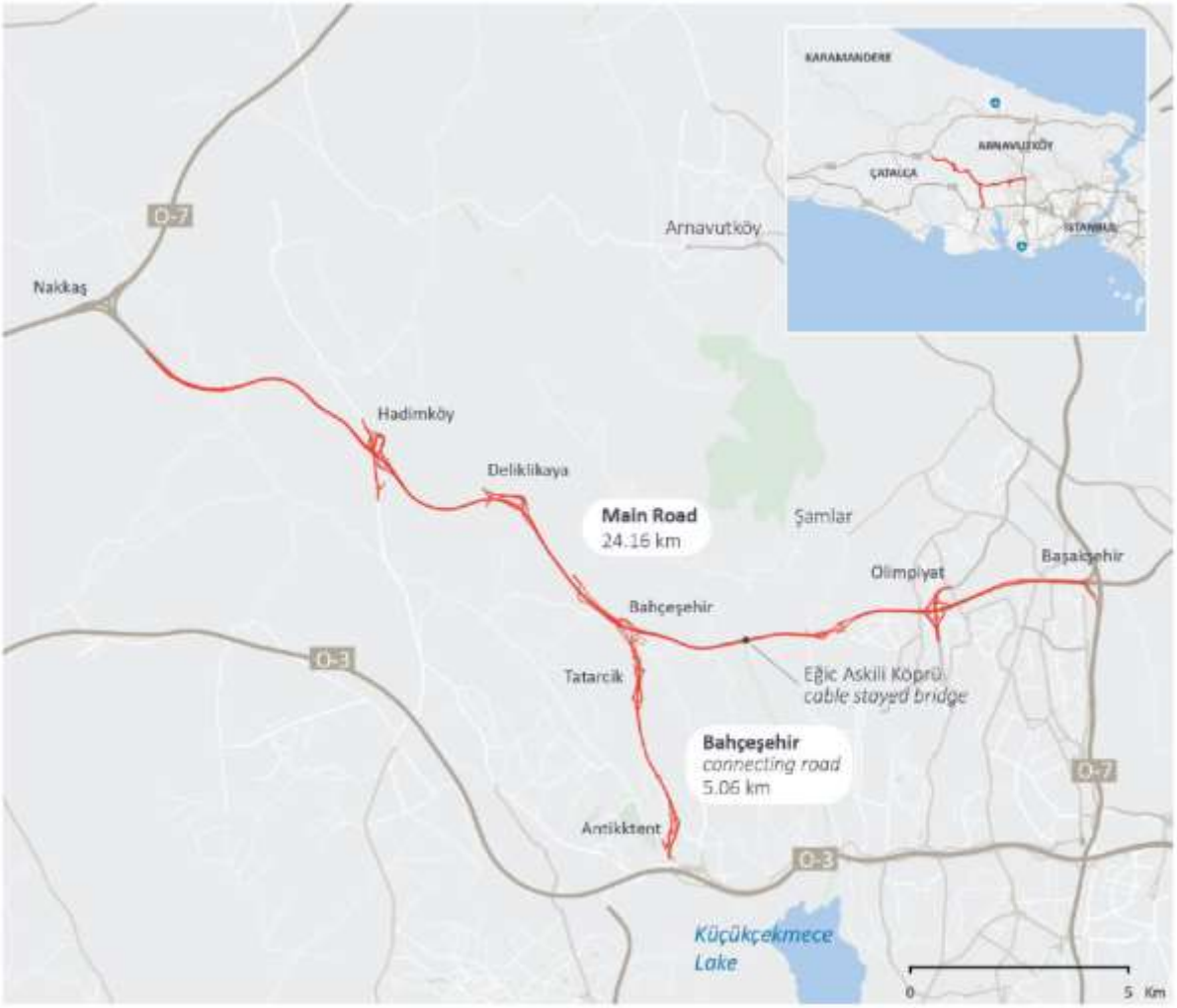
The noise assessment is based on the receptor type “c” as per table above where the most important standard is the threshold for significant impacts to residential buildings. This is the level used to assess the noise impacts to communities along the entire route. As per this table, for typical housing in built up areas, the moderate impact level is L_{den} 63 dBA and the major impact level is L_{den} 68 dBA. Minor impacts are not considered significant.

Methodology

Traffic noise emissions was predicted for each of section of the motorway, based on forecasted traffic flow information made available by Nakkaş Otoyol A.Ş. and speed and composition data from the Steer

reports[207][208]. The Predictor (Version 2020) noise software was used to model noise propagation to the surrounding area along the entire road alignment based on the CRTN TRL calculation method. Further details of this modelling approach and its limitations are given below.

The motorway's alignment is shown in Figure 6-8 and forecasted traffic flow for each section for year 2040 is presented in Table 6-77. The hourly profile of traffic flow on the motorway area is presented in Figure 6-9.



Source: Steer Report

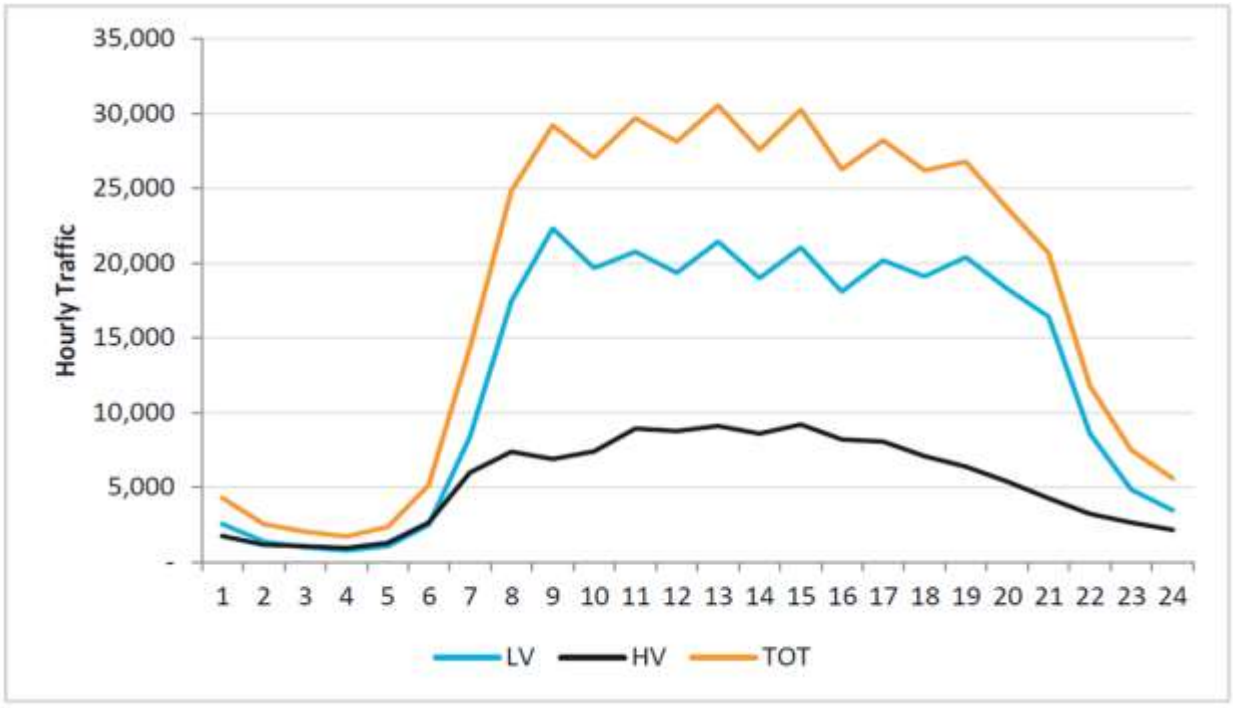
Figure 6-8 Motorway's Alignment

[207] Northern Marmara Motorway Project Nakkaş – Basaksehir Section, Traffic and Revenues Study – Preliminary results. March 2021

[208] Northern Marmara Motorway Project Nakkaş – Basaksehir Section, Traffic and Revenues Study – Draft Final. July 2021

Table 6-77 Annual Average Daily Traffic (AADT)

Location	Starting KM	End KM	Light Goods Vehicles (LGV)	Heavy Goods Vehicles (HGV)	Summary
Nakkaş-Yeşilbayır	35+300	36+541	73026	30378	103404
Yeşilbayır-Hadımköy	36+541	41+300	85960	39845	125805
Hadımköy-Deliklikaya	41+300	45+179	110352	51744	162096
Deliklikaya-Bahçeşehir	45+179	48+948	119334	53516	172850
Bahçeşehir-Olimpiyat	48+948	55+948	174510	58443	232953
Olimpiyat-K13 Başakşehir	55+948	59+466	140075	55403	195478
Bahçeşehir-Tatarcık	0+000	0+536	67256	10507	77763
Tatarcık-Antikkent	0+536	4+079	56418	10507	66925
Antikkent-Ispartakule	4+079	4+997	49373	8545	57918



Source: Steer Report

Figure 6-9 Traffic flow hourly profile

Based on Figure 6-9, hourly data of Light and Heavy Vehicles for each section have been estimated.

A uniform speed limit of 120 km/hr along the motorway and 100 km/hr along connection roads was considered.

Embedded Measures

As a result of the workshop held in June 2021 with the design team of Nakkaş Otoyol A.Ş., it was agreed that noise impacts derived from the operation of the motorway had to be mitigated as much as possible already during the design phase. Consequently, following also the IFC Guidelines on Toll Roads, the following were implemented:

- Use of stone-matrix asphalt that generates less pavement/tire noise for the whole motorway which is expected to achieve a 3-4 dB reduction in noise levels; and
- Use of cuts (landscape screening & bunding) in many areas along the RoW, especially those closer to residential areas. This design measure can have variable positive effects on noise reduction with values generally up to 10 dB for retained cuts.

Noise Impacts from Motorway

The noise modelling took in consideration the embedded noise reduction measures considered during design of the motorway and was based on the following assumptions:

- The vertical profile of the new motorway relative to the existing ground level has been modelled based at motorway's height information at the time of the assessment.
- Noise from junctions has not been incorporated; only straight-line moving traffic has been considered.
- The effect of screening from the closest buildings to the alignment has been included only for building data derived from OpenStreetMap[209].
- Results are based on nearest outlying buildings to the alignment.
- Noise levels have been calculated for the height of 4 m above ground level as per Turkish noise regulations and European directive.
- Heights of buildings have been assumed that all buildings have the same height of 6 m.

Note: A comparison with Google Earth showed that there are many buildings missing from the data derived from OpenStreetMap. Potential screening effect from these missing buildings has not been included in our impact modelling.

Predicted noise contours due to operation of the motorway are shown in Figure 6-10 to Figure 6-14

[209] Geofabrik Download Server

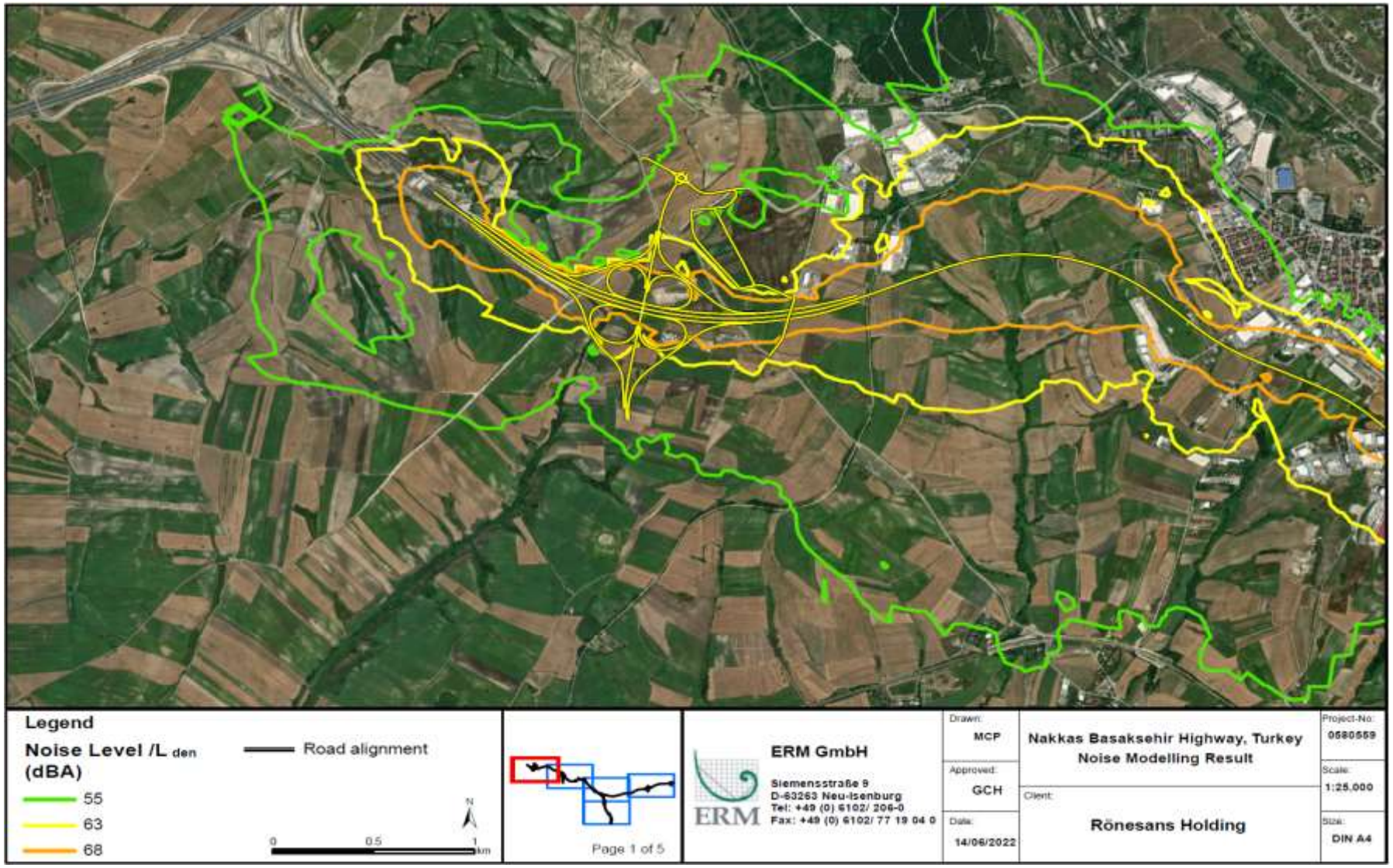


Figure 6-10 Predicted Noise Contours – KM 35+300 – KM 41+300

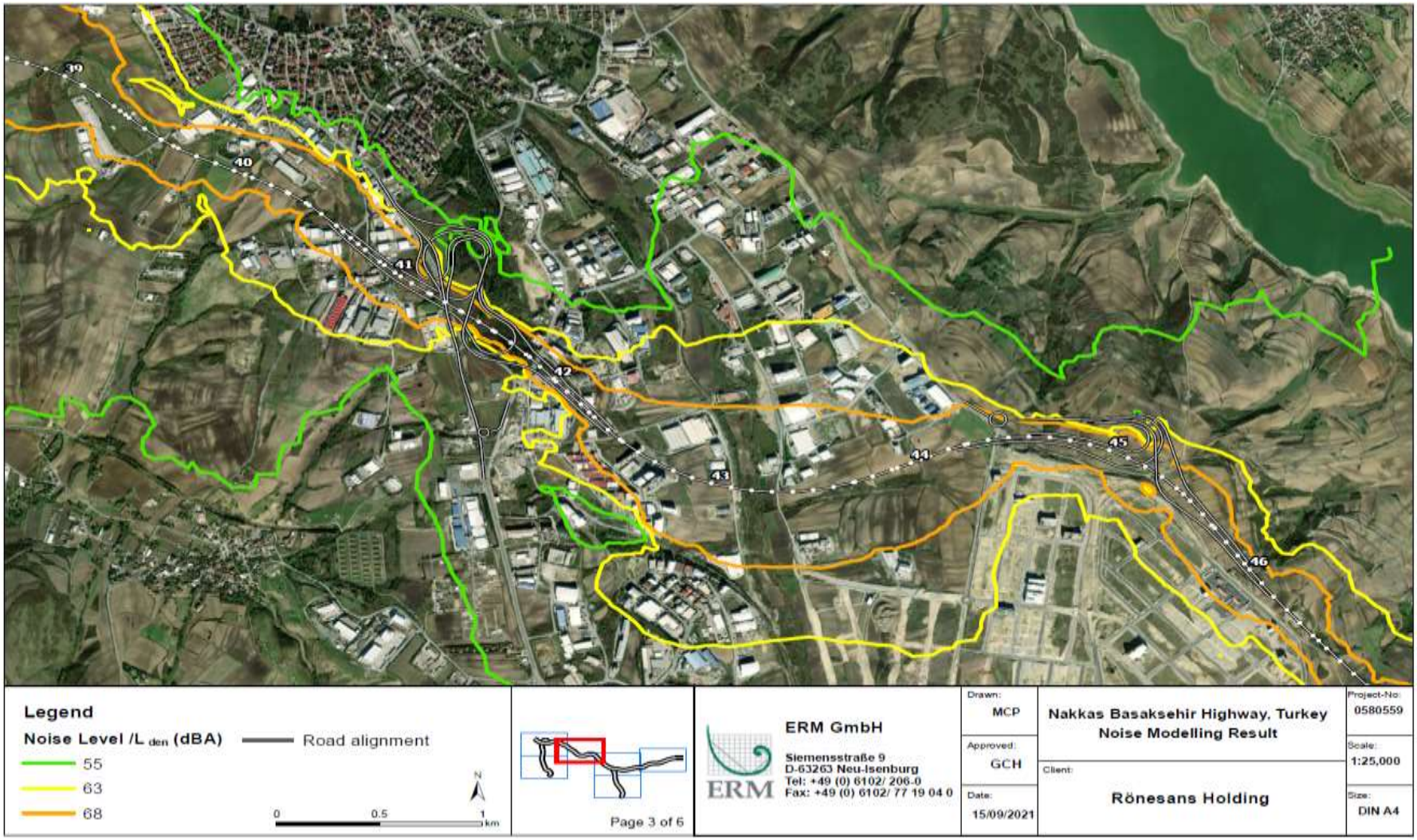


Figure 6-11 Predicted Noise Contours – KM 36+700 – KM 45+200

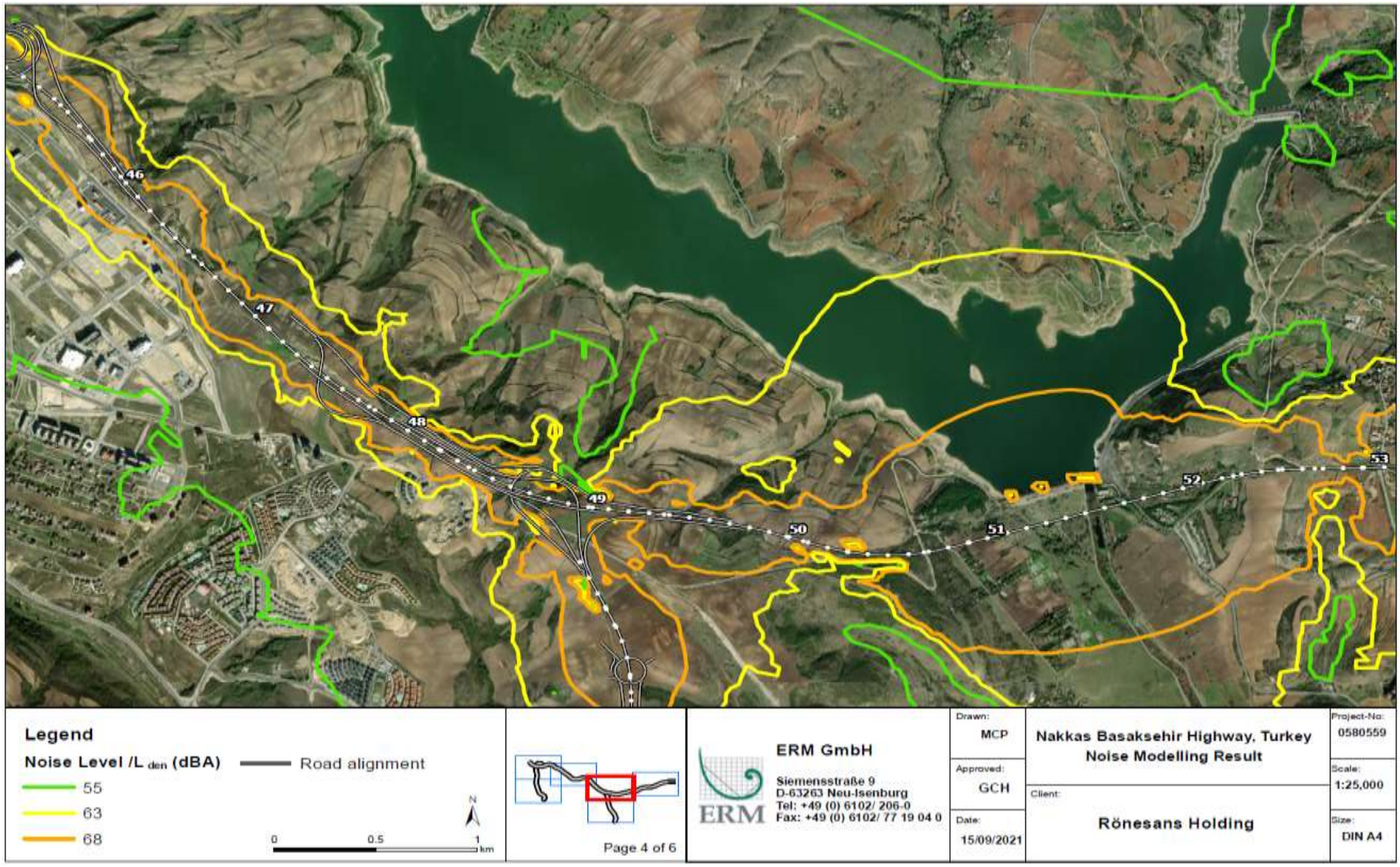


Figure 6-12 Predicted Noise Contours –KM 45+200 – KM 55+800 and KM 0+000 – KM 0+200

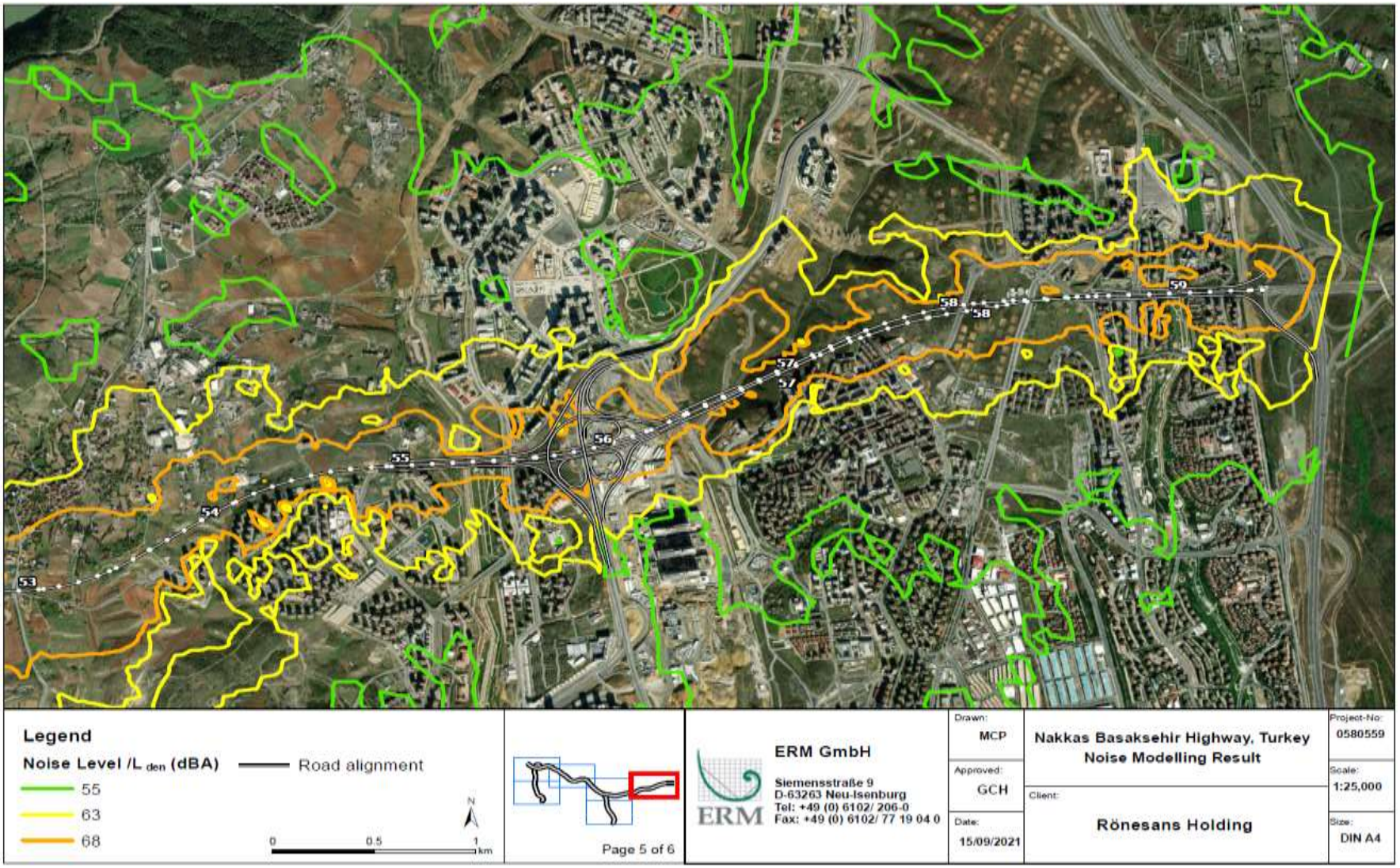


Figure 6-13 Predicted Noise Contours – KM 50+700 – KM 59+500

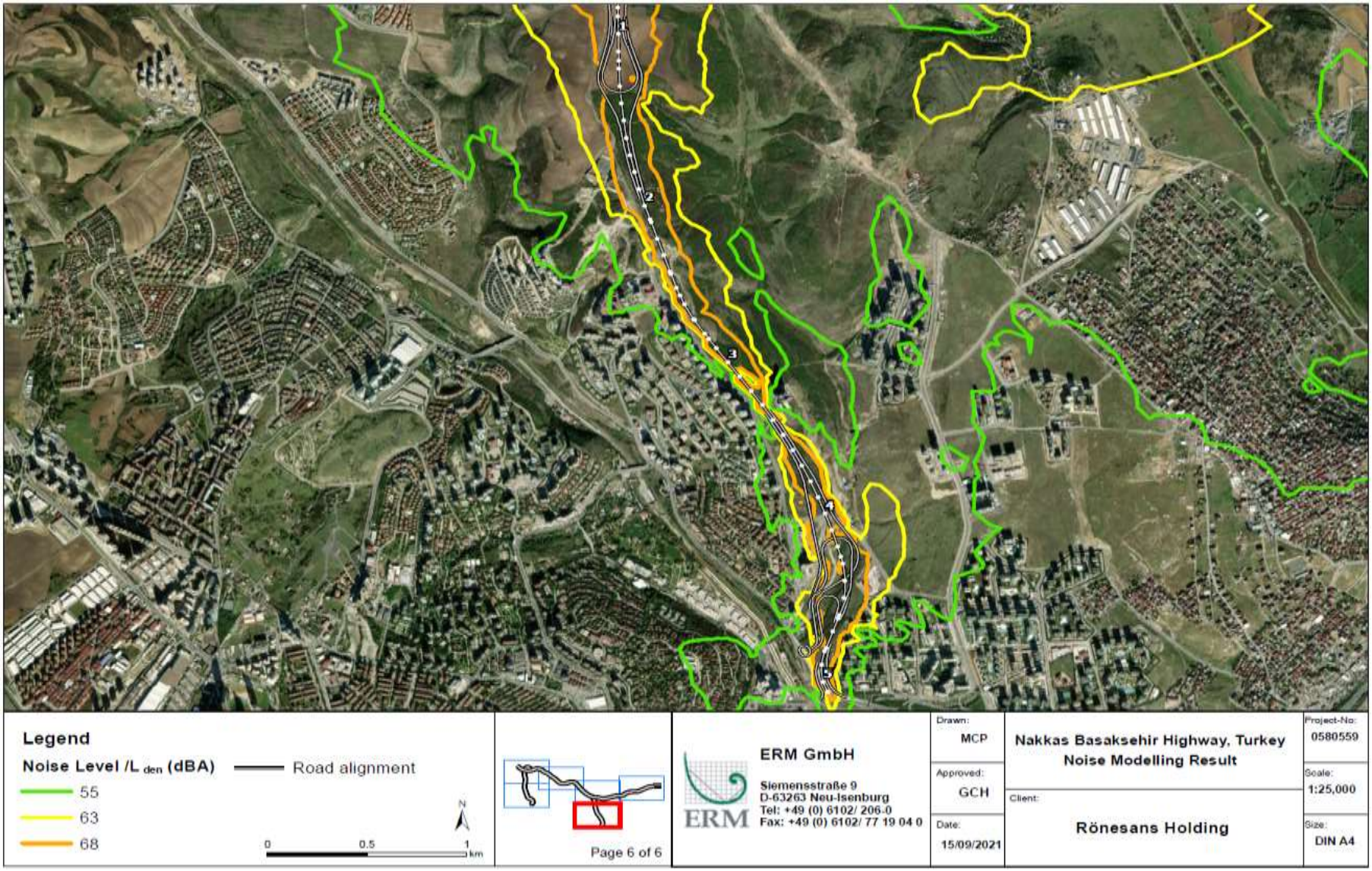


Figure 6-14 Predicted Noise Contours – Başakşehir Connecting Road KM 0+200 – KM 5+100

6.1.7.5 Significant Criteria

The assessment method draws on national Turkish, European/EU and World Bank/IFC guidance as discussed in Section 0. The L_{den} levels corresponding to compliance with the noise limits for day, evening and night periods in the Turkish standards are included in Table 6-78.

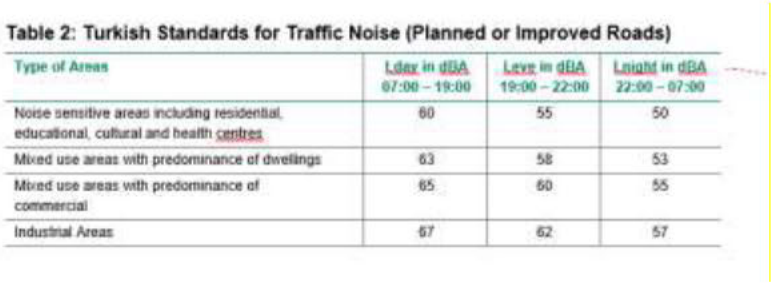


Table 2: Turkish Standards for Traffic Noise (Planned or Improved Roads)

Type of Areas	Lday in dBA 07:00 – 19:00	Leve in dBA 19:00 – 22:00	Lnight in dBA 22:00 – 07:00
Noise sensitive areas including residential, educational, cultural and health centres	60	55	50
Mixed use areas with predominance of dwellings	63	58	53
Mixed use areas with predominance of commercial	65	60	55
Industrial Areas	67	62	57

Table 6-78 Turkish Standards for Traffic Noise (Planned Roads)

Type of Areas	Lday in dBA 07:00 – 19:00	Leve in dBA 19:00 – 22:00	Lnight in dBA 22:00 – 07:00	LDen in dBA
Noise sensitive areas including residential, educational, cultural and health centres	60	55	50	60
Mixed use areas with predominance of dwellings	63	58	53	63
Mixed use areas with predominance of commercial	65	60	55	65
Industrial Areas	67	62	57	67

As shown in the table, the day, evening and night L_{eq} levels (L_{day}, L_{eve}, and L_{night}) are combined to yield the L_{den} values given. This study uses L_{den} levels to quantify noise impacts (this is the approach as applied in EU countries using one combined limit value which considers also the single limit values for day, evening and night).

Where a predicted L_{den} level from the new Motorway exactly meets the relevant L_{den} levels in this table, the L_{night} is generally 1-2 dB (A) above the night standard and the L_{day} is correspondingly 1-2 dB (A) below the standard (the combined limit value is met, whereby noise emissions at different times might be below or above single limit values for this specific period). This difference of 1-2 dB (A) is considered an insignificant deviation from the standard since 1-2 dB (A) are hardly perceptible by human beings.

As discussed above, neither the EU Directive nor the IFC Guidelines prescribe noise limits that are directly applicable for new or existing roads. Most guidelines apply to the relevant receptors and as such depend on local conditions and are more appropriately set at national or regional level.

In deriving noise impact assessment criteria for the new Motorway, a combination-approach is applied: the IFC guidance is used to indicate the onset of possible impacts, and the Turkish noise regulations are used to judge significant impacts (for which mitigation is subsequently considered).

Whether or not the new Motorway will create a noise impact in a given location will depend not only on the level of noise from the new road but also on the pre-existing baseline noise level. Noise baseline survey work has been completed as part of this study and a conservative approach to baseline noise

levels is used at this stage (i.e. assuming the baseline is a low-noise rural setting). Subsequent site-specific surveys will be conducted where potential impacts are identified to inform the detailed design of mitigation measures. In general, for the Motorway to create a significant noise impact, the noise it generates must be above the impact threshold levels as summarised in Table 6-79.

Table 6-79 Noise Impact Magnitude Criteria for the Motorway (Lden dBA)

Land Use Type (Receptor)	Small Impact L_{den}	Medium Impact L_{den}	Large Impact L_{den}
a) Industrial area (heavy industries)	-	67	72
b) Commercial area with noise-sensitive area where workplaces are predominant (commercial area)	55	65	70
c) Commercial area with noise-sensitive area where residential buildings are predominant (mixed commercial / residential area)	55	63	68
d) Noise-sensitive areas where educational, cultural, health institutes, or summer residential and camping areas are predominant (residential areas for recreational purpose, educational, hospitals)	55	60	65

The moderate impact level is taken from the Turkish standard CGDYY for new roads. The impacts would be significant and would therefore warrant consideration of mitigation by measures taken within the road corridor. As per this table, the moderate impact level for typical housing in built up areas is L_{den} 63 dBA.

The small impact level is taken as the Turkish standard CGDYY for existing roads, by which the large impact level for typical housing in built up areas is L_{den} 68 dBA. At this level impacts would be significant, and hence warrant consideration for mitigation, including indirect mitigation at the receptor. Minor impacts are not considered significant.

Hence, for the new road alignment, the most important noise assessment standard is L_{den} 63 dBA, the threshold for significant impacts at residential buildings. This is the noise level used to scope the impact at communities along the entire route.

There could be other “noise-sensitive areas” such as educational buildings or hospitals along the route, but they are unlikely to be the closest settlement buildings to the Motorway, and intervening buildings will tend to screen them from road traffic noise. If this is not the case, then mitigation could be applied to take account of their increased noise sensitivity during detailed design of the works.

Table 6-80 Noise Mitigation Results

Sampling Location No	KM Chainage	Receptors	Baseline Noise Level Average (Lden dBA)	Predicted Noise Level (Lden dBA)	Difference (Lden dBA)	Significance of Impact (Unmitigated)	Embedded Measures SMA: 3 dB reduction Cuts: 10 dB reduction	Additional Measures Noise Barriers: Up to 15 dB reduction (Assumed 8 dB reduction)	Expected Noise Level (Mitigated Lden dBA)	Residual Impact[210] (Will be subject to further Ground Truth Noise Measurements during operation)
1	59+300	■ High Density Residential Development ■ School ■ Mosque ■ Playground	54	70	+16	Major	SMA	Noise Barriers	59	Moderate
2	59+300	■ High Density Residential Development ■ Wedding Centre ■ Recreational Area (Sular Vadisi) ■ Public Park	56	72	+16	Major	SMA	Noise Barriers	61	Moderate
3	58+600	■ High Density Residential Development	60	67	+7	Major	SMA	■ Noise Barriers	49	Negligible
4	57+400	■ High Density Residential Development ■ School ■ Playground	66	76	+10	Major	SMA	Noise Barriers	55	Minor
5	57+000	■ City Hospital	61	55	-6	No Impact	SMA	Not needed	52	Negligible
6	55+600	■ High Density Residential Development ■ Public Park (Kayaşehir Millet Bahçesi)	63	71	+8	Major	SMA	Noise Barriers	60	Moderate
7	54+500	■ High Density Residential Development	54	66	+12	Major	SMA Cuts on both sides	Not needed	55	Minor
8	53+800	■ Residential Buildings ■ School	51	73	+22	Major	SMA Cut only on left side	■ Noise Barriers on right side ■ Noise Blocking Plantation	55	Minor
9	51+800	■ İSKİ Sazlıdere Facilities	51	80	+29	Major	SMA	■ Noise Barriers ■ Lower speed limits, ■ Noise reducing long tree plantation ■ Noise insulation at the receptor.	61	Moderate

[210] There may still be exceedence of noise limits after installation of noise barriers and Nakkaş Otoyol A.Ş. will implement additional mitigation measures such as insulation of nearby building structures (typically consisting of window replacements).

Sampling Location No	KM Chainage	Receptors	Baseline Noise Level Average (Lden dBA)	Predicted Noise Level (Lden dBA)	Difference (Lden dBA)	Significance of Impact (Unmitigated)	Embedded Measures SMA: 3 dB reduction Cuts: 10 dB reduction	Additional Measures Noise Barriers: Up to 15 dB reduction (Assumed 8 dB reduction)	Expected Noise Level (Mitigated Lden dBA)	Residual Impact[210] (Will be subject to further Ground Truth Noise Measurements during operation)
10	Bahçeşehir Connecting Road 2+700	■ High Density Residential Development	56	57	+1	Minor	SMA	Not needed	54	Minor
11	Bahçeşehir Connecting Road 3+800	■ Schools ■ High Density Residential Development	62	63	+1	Moderate	SMA Cuts on both sides	Not needed	50	Minor
12	Bahçeşehir Connecting Road 4+400	■ School ■ High Density Residential Development ■ Mosque	54	72	+18	Major	SMA	Noise Barriers	61	Moderate
13	Bahçeşehir Connecting Road 3+400	■ High Density Residential Development	55	56	+1	Minor	SMA Cuts on both sides	Not needed	43	Minor
14	47+700	■ Commercial Facilities	56	63	+7	Moderate	SMA Cuts on both sides	Not needed	50	Minor
15	40+800	■ Commercial Facilities	55	56	+1	Minor	SMA Cuts on both sides	Not needed	43	Minor
16	39+500	■ Commercial Facilities	49	63	+14	Moderate	SMA Cuts on both sides	Not needed	53	Minor

Mitigation Measures

This chapter describes the range of additional mitigation measures that are applicable for motorways.

It has to be noted that the following noise impacts were based on a modelling approach and for locations with resulting *major* noise impacts, ground-truthing of the data and regular noise monitoring has to be conducted.

The IFC Toll Road Guidance sets out a range of other mitigation measures as listed below.

- Construction of the road below the level of the surrounding land;
- Noise barriers along the border of the right-of way (e.g. earthen mounds walls and vegetation);
- Insulation of nearby building structures (typically consisting of window replacements); and

It is also possible to locate noise barriers outside the road corridor and closer to buildings. However such barriers must be high enough to provide useful noise benefits, may cause visual impacts, present other issues (such as road safety graffiti, severance etc.) and may not available to the Project. For these reasons, noise barriers outside the road corridor are generally not a preferred noise mitigation measure.

In general, for all significant impacts (i.e. Moderate and Major) the hierarchy of mitigation measures will be considered within the new road corridor (**direct measures**) depending on their practicability and benefit in each area of potential impact.

The hierarchy of noise mitigation measures for our Project is thus as follows:

- In general, the route has been selected so as to avoid passing close to some settlements for a variety of beneficial reasons, and where unavoidable, to maximise the distance to nearby receptors as far as feasible.
- A low noise road surface has been preferred as a priority mitigation because it has only minor dis-benefits.
- Landscape bunding has been implemented during the design to address significant impacts, in selected locations close to sensitive receptor and without compromising road safety.
- Frequent noise monitoring will be conducted in locations where noise modelling resulted in *major* impacts.
- Noise related grievances will be closely monitored, assessed and adaptive mitigations will be implemented.
- Noise barriers (landscaped as necessary) within the road corridor will be considered to address significant impacts where noise sensitive receptors are very close to the road and other mitigation measures are not effective at reducing impacts. For each location, benefits of such a measure will be weighted and road safety will be considered of priority.
- Noise barriers outside the road corridor will be considered only where significant impacts are predicted and it is judged that the benefit can outweigh the dis-benefits in that particular location, without compromising road safety.

It is unlikely noise insulation would prove to be an effective noise control solution however where the above mitigation measures are not adequate a voluntary scheme for noise insulation may be considered for major noise impacts where it is likely to be effective.

Noise mitigation for specific sensitive locations will be designed as part of the motorway planning, as the level of detail of the design progresses. Opportunities for further landscape bunding or noise barriers will be explored to provide noise screening where appropriate to address significant noise impacts. It is early to understand the type, height, length of the barriers to be constructed since noise monitoring during the operation will be the basis of the barrier length and design.

Nakkaş Otoyol A.Ş. has already considered adequate barrier space at identified locations to be installed when the operation starts. Relevant noise barrier suppliers will need to confirm the actual design based on the actual noise measurements during operation phase.

There may still be exceedance of noise limits after installation of noise barriers and Nakkaş Otoyol A.Ş. will implement additional mitigation measures such as insulation of nearby building structures (typically consisting of window replacements).

Summary of Operational Noise Impacts

Predicted operation Impacts are summarised in Table 6-81.

Table 6-81 Operation Noise Impacts

Project Phase: *Operational Traffic*				
Type of Impact: Noise				
Rating of Impacts: Direct Negative Impact				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Large project covers many areas of sensitive receptors	*Regional*	Large project covers many areas of sensitive receptors
Duration	*Long-term*	During operational phase	*Long-term*	During operational phase
Scale	*Major To Moderate*	During operational phase	*Moderate*	During operational phase with the implementation of suggested mitigation measures.
Frequency	*Regular*	Impacts expected throughout the duration of operation.	*Regular*	Impacts expected throughout the duration of operation.
Likelihood	*Likely*	During operational phase	*Likely*	During operational phase
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large to Medium Magnitude			Medium Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High Sensitivity				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

6.1.8 Landscape and Visual Impacts

6.1.8.1 Impact Assessment

This chapter presents the results of the assessment of landscape and visual impacts of the Nakkaş-Başakşehir Motorway (the Project). The chapter considers the effects the proposed Project on:

- landscape character and resources, including effects on the aesthetic values of the landscape, caused by changes in the elements, characteristics, character and qualities of the landscape; and
- visual amenity, including effects upon potential viewers and viewing groups caused by change in the appearance of the landscape as a result of the development.

Landscape character and resources are considered to be of importance in their own right and are valued for their intrinsic qualities regardless of whether they are seen by people. Impacts on visual amenity as

perceived by people are therefore clearly distinguished from, although closely linked to, impacts on landscape character and resources. Landscape and visual assessments are therefore separate, although linked processes.

6.1.8.2 Information Sources

The assessment process has been conducted with reference to IFC Performance Standards (PS) specifically PS 1: Social and Environmental Assessment and Management Systems and EU EIA Directives which require consideration of landscape and visual impacts, therefore applicable to EBRD funded projects requiring an ESIA. While these standards do not require consideration of either landscape or visual impacts, the assessment for the Project has used the following principles based on PS 1:

- Identification of both adverse and beneficial landscape and visual impacts;
- Engagement of affected communities; and
- Avoidance of impacts where possible (key routing factors of the motorway have been to avoid populated areas and areas under ecological protection) and mitigation of unavoidable impacts.

Best practice guidelines used to undertake the assessment include the following references:

- Guidelines for Landscape and Visual Impact Assessment, Second Edition, UK Landscape Institute and Institute of Environmental Management and Assessment, 2002; and
- A Guide to Landscape Treatments for National Road Schemes in Ireland, National Roads Authority, Ireland.

6.1.8.3 Assessment Methodology and Criteria

The approach to the assessment takes account the impacts for both construction and operation stages of the Project as stipulated in IFC guidelines and EU EIA Directives.

The assessment will include mitigation measures recommended for the purpose of integrating the proposed motorway into the wider landscape.

6.1.8.3.1 Overview, including Scope of Study and Sensitive Receptors

The study area for the Project covers the immediate landscape of the Project site and the wider landscape from which the Project components are expected to be visible. The assessment includes the primary Project site and including engineering structures viaducts and Sazlıdere Cable Stayed Bridge crossing.

The extent of the study area will vary along the route corridor in accordance with local landscapes across the Motorway route. The Motorway itself is likely to have a significant effect only on the local landscape extending 500 m on either side of the centreline of the Motorway.

The sensitive receptors addressed in this assessment include the receiving landscape which will be directly affected by the change arising as a result of the introduction of the Project and which will also be affected by the visibility of the Motorway. Viewers likely to be affected by the Motorway will also be considered.

6.1.8.3.2 Construction Phase

The Motorway and bridge crossing are expected to cause temporary, short term significant impacts on the local landscape and on visual amenity. The sources of construction impacts will be outlined, and an assessment of the construction effects on landscape and on visual amenity will be conducted using the same significance criteria as applied for the operational phase and set out below.

6.1.8.3.3 Operational Phase

The Motorway and bridge crossing are expected to cause permanent, and long term significant impacts especially between the following locations:

- KM 36+000 – KM 40+000 due to the presence of the vacant agricultural lands
- KM 45+000 – KM 54+000 due to the presence of Sazlıdere Dam Reservoir and the vacant agricultural lands
- KM 56+000 – KM 58+000 – Residential areas including Kayaşehir Millet Bahçesi (public park)
- KM 58+000 – KM 59+000 – Residential areas including Sular Valley (Sular Vadisi – public park)

6.1.8.3.4 Significance Criteria

Significance of impacts was arrived at by considering both the sensitivity of the landscape or visual receptor and the magnitude of change in the landscape of each character area and in the visual amenity of each viewpoint in accordance with the table below.

Some key definitions used to guide the assessment process are outlined below as quoted from the above-referenced best practice guidance:

- Landscape value is the relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special features including perceptual aspects such as scenic beauty, tranquillity or wildness, cultural associations or other conservation issues.
- Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people.
- Landscape quality (or condition) is based upon judgements by the assessor about the physical state of the landscape and its intactness from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.
- Landscape sensitivity is defined in relation to the specific type of change envisaged (the motorway and bridge crossing) and depends on landscape character and how vulnerable this is to change. Landscapes which are highly sensitive are at risk of having their key characteristics fundamentally altered, leading to a different landscape character. Sensitivity is assessed by considering the physical characteristics and the perceptual characteristics of landscapes in light of particular forms of development

Sensitivity of Landscape and Visual Receptors

The sensitivity of a landscape is judged by the assessor based on the extent to which it can accept change of a particular type and scale without adverse effects on its character. Sensitivity varies according to the type of development proposed and the nature of the landscape: its individual elements, key characteristics (land use, pattern and scale of landscape, enclosure/openness), inherent quality, condition, presence of detracting elements (e.g. pylons), value and capacity to accommodate change, and any specific values such as designations that apply. The capacity of a landscape to accommodate change refers to the ability of a landscape to absorb a proposed development without significant adverse alteration to its character.

Settlements, road routes and areas of farmed landscape were identified as being relevant to the visual impact assessment because of the potential for viewers to be affected by the Project. Viewer sensitivity depends on a number of factors including the context of the viewpoint, the current occupation (residents, recreational visitors, passers-by, and workers) and viewing opportunity of the groups of people being considered, and the number of people affected. The sensitivity of a viewpoint depends upon the extent to which the viewers it represents are affected by changes in their view together with the quality of the

existing view. The baseline visual amenity and visual impact assessment was undertaken with reference to general settlements and place-names in which a range of viewer types would be likely to be affected as opposed to specific viewpoint locations.

Based on the current guidance, the conservative assumption is made that viewer types, namely residents of dwellings, recreational users, road users (commuters) and workers will have varying degrees of sensitivity by virtue of their occupation and interest in their surroundings. Thus residents of dwellings, with a prolonged and proprietary interest in their surroundings, will have a higher sensitivity to the proposed change than commuters who have a passing interest in their surroundings.

In this assessment, landscape and visual sensitivity is described as low, medium or high as defined and illustrated in the two tables below.

Magnitude of Change

The magnitude of change affecting landscape or visual receptors depends on the nature, scale and duration of the particular change that is envisaged in the landscape and the overall effect on a particular view. In a landscape, this will require consideration of the loss of or change in any important characteristic or feature of the landscape, the proportion of the landscape that is affected, and any change in the backdrop to, or outlook from, the landscape that affects its character.

The magnitude of change in views will depend on the scale of the development and the distance from the viewpoint, the angle of view occupied by the development, the extent of shielding by intervening features, the degree of obstruction of existing features, the degree of contrast with the existing view, and the frequency or duration of visibility.

It is also acknowledged that visibility will vary with weather conditions, season and time of day.

In this assessment, magnitude of change is described as being imperceptible, small, medium or large as defined and illustrated in the tables below (Table 6-82 and Table 6-83).

Significance of Impacts

No established, measurable technical thresholds of significance exist for landscape and visual impacts, unlike some other EIA disciplines such as air quality or noise). Significance is therefore determined by considering the sensitivity of the landscape or visual receptor and the magnitude of change expected as a result of the development. Professional judgement of the ERM Team is applied on a case by case basis in order to identify broad levels of significance for each receptor. Each case is assessed on its own merits as factors unique to each circumstance need to be considered.

There are, however, general principles which can be used as a guide to this process and these are set out in Table 6-82 and Table 6-83. Following these, the level of significance of impact is described as being not significant, minor, moderate, or major. This is, however, recognised as a continuum and, where impacts lie on the borderline, impacts may be described as minor to moderate for example.

Impacts which are graded as being major are those which ought to be given greatest weight in decision making. They usually concern immediate landscapes around the site and close views from sensitive visual receptors. Moderate levels of impact are also considered significant, but they are of progressively reducing importance.

Table 6-82 Levels of Significance of Landscape Impacts

Sensitivity of Landscape		Magnitude of Change in Landscape caused by Proposed Development			
		Imperceptible	Small	Medium	Large
		An imperceptible, barely or rarely perceptible change in landscape characteristics	A small change in landscape characteristics over a wide area or a moderate change either over a restricted area or infrequently perceived.	A moderate change in landscape characteristics, frequent or continuous and over a wide area or a clearly evident change either over a restricted area or infrequently perceived.	A clearly evident and frequent /continuous change in landscape characteristics affecting an extensive area.
Low	A low valued landscape, perhaps a locally important landscape, or where its character, land use, pattern and scale may have the capacity to accommodate a degree of the type of change envisaged.	Not significant	Not significant	Minor	Minor to Moderate
Medium	A landscape protected by a regional (structure plan) or national designation and/or widely acknowledged for its quality and value; a landscape with distinctive character and medium capacity to accommodate the type of change envisaged.	Not significant	Minor	Moderate	Moderate to Major
High	A landscape protected by a regional (structure plan) or national designation and/or widely acknowledged for its quality and value; a landscape with distinctive character and high capacity to accommodate the type of change envisaged.	Not significant	Minor to Moderate	Moderate to Major	Major

Table 6-83 Levels of Significance of Visual Impacts

Sensitivity of Viewpoint		Magnitude of Change in View caused by Proposed Development			
		Imperceptible	Small	Medium	Large
		Change which is barely visible, at very long distances, or visible for a very short duration, perhaps at an oblique angle, or which blends with the existing view.	Minor changes in views, at long distances, or visible for a short duration, perhaps at an oblique angle, or which blends to an extent with the existing view.	Clearly perceptible changes in views at intermediate distances, resulting in either a distinct new element in a significant part of the view, or a wider ranging, less concentrated change across a wider area.	Major changes in view at close distances, affecting a substantial part of the view, continuously visible for a long duration, or obstructing a substantial part or important elements of view.
Low	Small numbers of visitors with interest in their surroundings. Viewers with a passing interest not specifically focussed on the landscape e.g. workers, commuters. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being low	Not significant	Not significant	Minor	Minor to Moderate
Medium	Moderate numbers of residents and moderate numbers of visitors with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being medium.	Not significant	Minor	Moderate	Moderate to Major
High	Large numbers of residents and large numbers of visitors with an interest in their environment. Larger numbers of recreational road users. The quality of the existing view, as likely to be perceived by the viewer, is assessed as being high.	Not significant	Minor to Moderate	Moderate to Major	Major

6.1.8.4 Impact Assessment

The impact of the Project on landscape and visual amenity is outlined in the following sections for the construction phase and the operational phase of the Project.

6.1.8.4.1 Construction Phase Landscape and Visual Impacts

Sources of Impacts

There will be disruption to the local landscapes in the immediate vicinity of the Motorway due to construction activities. This will result from the use of vehicles and machinery, excavation processes, earthworks activities, bridge and viaduct construction works, as well as the erection of temporary fences.

Construction impacts would also arise from lighting required for work during hours of darkness and high visibility cones or concrete blocks delineating temporary lanes.

Temporary adverse landscape impacts will be confined to the construction period and the period taken for the vegetation to become established (approximately 7-10 years for shrubs and 15 years for trees).

Temporary visual impacts during construction would usually affect viewers located close to the Motorway. These include mainly residents at the edges of settlements who would experience disruption to their visual surroundings due to construction activities referred to above. The scale of the impact would vary depending on the precise nature of the Project at specific locations where viewers (at nearby settlements) are visually exposed.

The impact significance of the construction phase are presented in Summary Impact Table 6-85 prepared for specific locations.

6.1.8.4.2 Construction Phase Mitigation Measures

During the period of construction, the following measures will be taken to reduce impacts of the works on the landscape and on viewers (Note: notwithstanding the recommended measures below regarding visual impacts, the relevant measures to address health and safety aspects of construction will always take priority on case-by-case basis).

- Sensitive vegetation to be retained will be fenced or sign-posted before work commences on site, and as much vegetation as possible will be retained to maintain the integrity of the landscape and the visual screening already present.
- Temporary Working areas will be as small as practicable and areas chosen for the storage of materials will avoid areas of high visual impact to nearby residents/viewers. The areas outside of the Project's expropriated construction borders will not be occupied.
- The construction site will be kept tidy and free of litter and debris as far as possible.
- The construction site will only be floodlit when health and safety requires and during night Works, so the impacts of temporary lighting upon the night time landscape and upon views are kept to a minimum.
- Site compounds and other large areas required for construction will be sited in locations where effects on the local landscape and on viewers can be minimised to the extent possible.
- Temporary hoardings (site fences) will be introduced to visually screen areas of intense construction activity in close vicinity of visually sensitive areas where moving plant, machinery and vehicles may be a source of visual impact.

6.1.8.4.3 Operational Phase Landscape and Visual Impacts

Significant and long term impacts are likely to be experienced by viewers at the following locations:

Table 6-84 Summary of Visual Impacts during Operations

KM Chainage	Impacts
36+000 – 40+000 Vacant Land and Agricultural Areas	Sources of Impact: ■ Motorway alignment ■ Cuts and Fills ■ Junction between KM 36+000 – KM 37+000 Impact on landscape This is a vacant area with agricultural lands with few settlements. The RoW passes via gentle sweeping valleys between hills. The impact of the Motorway on the wider landscape will be limited owing to the visual screening provided by the hill and mountain topography. At a localised level, within the valley setting, the Motorway will significantly alter the rural character of these areas. This will result in vegetation losses. Impact on viewers Viewers, namely residents of dwellings and farm workers located within this open flat farmed setting.
40+000 – 45+000 Industrial areas	Sources of Impact: ■ Motorway alignment ■ Cuts and Fills ■ Viaduct pass between KM 42+800 – KM 43+800 ■ Junction between Km 41+000 – Km 42+000 Impact on landscape Given the location of the Motorway, South and West of the RoW is surrounded by industrial areas (Deliklikaya Industrial Zone). Impacts on the landscape will be limited since these locations are already highly industrialized. Impact on viewers Viewers, namely residents of dwellings.
45+000 – 54+000 Vacant land and agricultural areas	Sources of Impact: ■ Sazlıdere Cable Stayed Bridge between KM 50+742 – KM 52+359. ■ Motorway alignment ■ Valley filling ■ Lighting Impact on landscape The biggest change to the character of the landscape will be derived from the Sazlıdere Cable Stayed

KM Chainage	Impacts
	Bridge will be constructed between KM 50+742 – KM 52+359. The character of the flat landscapes overlooking the Sazlidere Dam Reservoir will be affected by the visibility of the Motorway in this open setting. At a localised level, within the valley setting, the Motorway will significantly alter the rural character of these areas as illustrated in the photo montages presented in *Source: Nakkas Otoyol A.S* Figure 6-15 Sazlıdere Cable Stayed Bridge*Source: Nakkas Otoyol A.S* Figure 6-16 Sazlıdere Cable Stayed Bridge. Impact on viewers Viewers, namely residents of dwellings.
54+000 – 56+000 Mass housing	Sources of Impact: ■ Motorway alignment ■ Viaduct pass between KM 55+130 – KM 55+670 ■ Valley filling Impact on landscape Given the location of the Motorway, the RoW is surrounded by mass housing and there are upcoming mass housing projects in the area. Impacts on the landscape will be limited since these locations are already highly urbanized. Impact on viewers Viewers, namely residents of dwellings.
54+000 – 59+000 Mass housing	Sources of Impact: OHTL displacement works. Impact on landscape Given the location of the new route didn't have any OHTLs in place, displacement works will bring negative impacts on landscape and visual. Impact on viewers Viewers, namely residents of dwellings.
56+000 – 58+000 Mass housing with public parks	Sources of Impact: ■ Motorway alignment ■ Viaduct pass between KM 56+310 – KM 56+920 ■ Cuts and Fills Impact on landscape Given the location of the Motorway, the RoW is surrounded by mass housing, public parks, and recreational areas. The RoW passes through Kayaşehir Millet Bahçesi (Public Park) is located at KM 55+300 – KM 55+600 which is highly important for the nearby community.

KM Chainage	Impacts
	Impact on viewers Viewers, namely residents of dwellings and the users of Millet Bahçesi.
58+000 – 59+000 Mass housing with public parks ■ Mainly consisted of mass housing, public parks, recreational areas ■ The RoW passes through Sular Valley (a public park consisting wedding centre and shopping mall) ■ One viaduct will be constructed between KM 58+810 – KM 59+280	Sources of Impact: ■ Motorway alignment ■ Viaduct pass between KM 58+810 – KM 59+280 ■ Cuts and Fills Impact on landscape Given the location of the Motorway, the RoW is surrounded by mass housing, public parks, and recreational areas. The RoW passes through Sular Valley (a public park consisting wedding centre and shopping mall) which is highly important for the nearby community. Impact on viewers Viewers, namely residents of dwellings and the users of Sular Valley will be significantly impacted as illustrated in the photo montages presented in *Source: Nakkas Otoyol A.S* Figure 6-17 Viaduct at Sular Valley *Source: Nakkas Otoyol A.S* Figure 6-18 Viaduct at Sular Valley.

Source: Nakkas Otoyol A.S

Figure 6-15 Sazlıdere Cable Stayed Bridge

Source: Nakkas Otoyol A.S

Figure 6-16 Sazlıdere Cable Stayed Bridge

Source: Nakkas Otoyol A.S

Figure 6-17 Viaduct at Sular Valley

Source: Nakkas Otoyol A.S

Figure 6-18 Viaduct at Sular Valley

6.1.8.4.4 Operational Phase Mitigation Measures

Mitigation measures for landscape and visual amenity during Motorway operations will be achieved through implementation of a landscape design scheme that will serve to integrate the Motorway into the receiving local landscape and provide visual screening where required for nearby viewers.

The character of the flat farmland will be changed by the visibility of the Motorway, lighting and moving vehicles.

The mitigation landscape design will include earthworks and also planting for visual screening to fit with the local character of the Motorway landscape.

General mitigation measures that apply to the long term operation of the Motorway are outlined below as follows:

(Note: In some cases the preferred planting will not be feasible due to local soil, rock or slope conditions in which such growth is not applicable.)

- Planting mixes will be selected using native species and planting will be set out to establish new and enhance existing native habitats. The use of native species is important so that the Motorway planting will, over time, become almost indistinguishable from the vegetation naturally occurring in the surrounding area. Non-native species should only be used in locations where their presence is of local relevance, for example in urban areas to match any existing non-native planting;
- Planting will be introduced to restore or compensate for lost habitats;
- Planting will be introduced to reconnect hedgerows or areas of planting formerly severed as a result of the construction works in order to reinstate local landscape character;
- Landscape design treatment will seek to restore regional identity where possible by enhancing landscape character;
- Opportunities to provide views out from the Motorway to the surrounding landscape will be taken into account in the landscape design. Breaks in Motorway planting will provide for views out whilst mitigating nearby residents of settlements from adverse visual impacts;

- Planting treatments will be designed to visually screen road structures and earthworks from nearby residential dwellings and settlements; and
- Planting treatments will be interrupted to open up key views and vistas for motorists to reinforce local identity.
- Flood-lights will be used to illuminate cable-stayed portions of the bridge at night;
- The under surface of the bridge will be be lit to increase visibility of the piers and deck under surface to birds that fly beneath the bridge at night, subject to detailed design;
- Lighting will increase visibility of the top of the deck to birds that fly over the bridge at night; and
- Lighting design to consider the exclusion of non-flashing / steady lights at night and opting for special lighting, such as red-coloured strobe lighting, particularly during inclement weather periods when cloud cover is low over the valley.

In locations where noise mitigation barriers are to be installed, this will ideally be introduced as plantation or earthworks structures designed to fit or match the topography of the surrounding landscape. Narrow steep-sided bunds for noise mitigation will be avoided where possible as these become a source of adverse visual impact and are not suitable to implement planting mitigation successfully. Noise barriers in the form of fences will be avoided where possible. In locations where these must be introduced, screen planting will be implemented to visually hide these from the wider landscape.

Operational phase impacts on landscape and visual amenity are outlined in the tables below for each Phase and Section of the Project. These impacts are outlined for the post-construction phase or early operation phase of the Project when mitigation planting will have just been implemented. As the mitigation planting will be in the early stages of growth, the operation impacts at this point in time will represent the worst case scenario. The significance of impacts is assumed to be adverse unless otherwise stated. The impact significance of the operation phase are presented in Summary Impact Table 6-84 prepared for specific locations.

6.1.8.5 Summary Impact Table (Pre and Post-mitigation – Residual)

6.1.8.5.1 Construction

Table 6-85 Rating of Construction Impacts Related to Landscape and Visual

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Impacts will be limited with Motorway Alignment	*Regional*	Impacts will be limited with Motorway Alignment
Duration	*Medium-term*	Impacts are expected throughout the duration of construction.	*Medium-term*	Impacts are expected throughout the duration of construction.
Scale	*Moderate*	Impacts are expected throughout the RoW.	*Low*	Implementation of suggested mitigation measures.
Frequency	*Regular*	Impacts are expected throughout construction.	*Regular*	Impacts are expected throughout construction.
Likelihood	*Likely*	Very Likely	*Likely*	Very Likely
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	

High Magnitude	Medium Magnitude
Sensitivity/Vulnerability/Importance of the Resource/Receptor:	
Sensitive receptors: ■ Sazlıdere Dam Reservoir ■ Kayaşehir Millet Bahçesi (Public Park) between KM 55+300 – KM 55+600 ■ Sular Valley (a public park consisting wedding centre and shopping mall) between KM 58+000 – KM 59+000	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Moderate to Major

6.1.8.5.2 Operation

Table 6-86 Rating of Operational Impacts Related to Landscape and Visual

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Regional*	Impacts will be limited with Motorway Alignment	*Regional*	Impacts will be limited with Motorway Alignment
Duration	*Long Term*	Impacts are expected throughout the duration of operation	*Long Term*	Impacts are expected throughout the duration of operation
Scale	*Moderate*	Impacts are expected throughout the RoW.	*Moderate*	Implementation of suggested mitigation measures.
Frequency	*Regular*	Impacts are expected throughout operation	*Regular*	Impacts are expected throughout operation
Likelihood	*Likely*	Very Likely	*Likely*	Very Likely
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
High Magnitude			High Magnitude	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitive receptors: ■ Kayaşehir Millet Bahçesi (Public Park) between KM 55+300 – KM 55+600 ■ Sular Valley (a public park consisting wedding centre and shopping mall) between KM 58+000 – KM 59+000 ■ Residents of dwellings between KM 54+000 – KM 59+000 due to new OHTL displacement works.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Major Impact	

6.2 Biological Environment

6.2.1 Impact Assessment

The Nakkas-Basaksehir Highway consists of a number of both linear and area-based impacts in relation to biodiversity. These are primarily associated with the construction and operation of the motorway, the

connecting roads and the cable-stayed bridge. Additional impacts are associated with the quarries, concrete plants and asphalt plants that are required for the construction of the motorway. As the project will emit to air and water there are potential impacts on biodiversity at the wider landscape scale.

The effects on biodiversity from the Project are identified by laying the Project design over the baseline resources and considering the effects of the Project activities within its AOI during construction and operation.

Direct and indirect impacts arising from the Project, both positive and negative, are considered and the likely significant effects described. Following the Mitigation Hierarchy, design mitigation and measures to reduce likely significant effects are described. The residual significant effects, both positive and negative are then reported.

The assessment and resulting identification of residual effects was undertaken on the basis of the project being at the pre-construction stage. The full suite of mitigation measures proposed should be applied to all sites where works have not proceeded. The Construction Environmental and Social Management Plan (CESMP) takes account of the impacts of the construction that has already taken place and disturbance already happened at the time of the site inspection by ERM in May 2022. It will advise on what mitigation can still be implemented at these areas.

The assessment of significance follows a matrix approach which takes account of the value / sensitivity of the biodiversity feature as established in the baseline (defined as low, medium or high), and considers the anticipated magnitude of the effect (defined as negligible, small, medium or large) on that feature. Table 6-87 and Table 6-88 include definitions of how each of these categories are determined and the resulting significance of effects. Under certain circumstances, the value of a habitat, or species, may be upgraded (e.g. from medium to high if especially large numbers of a high value species could be impacted).

A full Critical Habitat Assessment (Annex 11) and a Biodiversity Action Plan have been developed as standalone documents.

Importantly, a separate Biodiversity Management Plan (BMP) has not been compiled for this Project, rather taking the form of a Construction Environmental and Social Management Plan (CESMP) (see Annex 17) which contains the detail regarding mitigation and management measures to address and minimise the various biodiversity impacts and risks identified.

Table 6-87 Significance of Effects on Habitats

Habitat Sensitivity/Value		Magnitude of Effect			
		Negligible	Small	Medium	Large
Low	Habitats with no or local designation/recognition; habitats of significance for species of Least Concern; habitats which are common and widespread within the region.	Negligible	Negligible	Minor	Moderate
Medium	Habitats that are either Annex 1 Habitats Directive habitats or Resolution 4 Bern convention. Habitats that support IUCN NT or VU species and/or Annex II Habitat directive, Annex 1 Birds Directive or Bern Resolution 6 species. Areas important for supporting significant concentrations of migratory or congregatory species.	Negligible	Minor	Moderate	Major
High	Habitats within nationally protected or internationally designated or recognised areas. Habitat Directive Annex 1 priority habitats. Habitats supporting Critically Endangered or Endangered species; populations of Annex IV Habitats Directive species; habitats of importance to endemic and/or globally restricted-range species; habitats supporting globally significant concentrations of migratory species and/or congregatory species; highly threatened and/or unique ecosystems, areas associated with key evolutionary processes.	Negligible	Moderate	Major	Critical

Magnitude of Effect Definition	
Negligible	Effect is within the normal range of natural variation
Small	Affects only a small area of habitat, but without the loss of viability/function of the habitat
Medium	Affects a sufficient proportion of the habitat that the viability/function of part of the habitat or the entire habitat is reduced, but does not threaten the long-term viability of the habitat or species dependent on it.
Large	Affects the entire habitat or a significant proportion of the habitat to the extent that the viability/function of the entire habitat is reduced and the long-term viability of the habitat and the species dependent on it are threatened.

Table 6-88 Significance of Effects on Species

Species Sensitivity/Value		Magnitude of Effect			
		Negligible	Small	Medium	Large
Low	Species which are included on the IUCN Red List of Threatened Species as Least Concern (LC).	Negligible	Negligible	Minor	Moderate
Medium	Species included on the IUCN Red List of Threatened Species as Vulnerable (VU), Near Threatened (NT) or Data Deficient (DD). Species protected under national legislation or IUCN NT or VU species and/or Annex II Habitat directive, Annex 1 Birds Directive or Bern Resolution 6 species. Nationally important numbers of migratory or congregatory species.	Negligible	Minor	Moderate	Major
High	Species included on the IUCN Red List of Threatened Species as Critically Endangered (CR) or Endangered (EN). Populations of Annex IV Habitats Directive species'. Restricted ranges species having a globally Restricted Range (having a distribution range less than 50,000 km^2.) Globally important concentrations of migratory and/or congregatory species.	Negligible	Moderate	Major	Critical

Magnitude of Effect Definition	
Negligible	Effect is within the normal range of variation for the population of the species.
Small	Affects a small proportion of a population, but does not substantially affect other species dependent on it, or the populations of the species itself
Medium	Affects a sufficient proportion of a species population that it may bring about a substantial change in abundance and/or reduction in distribution over one or more generations, but does not threaten the long-term viability of that population or any population dependent on it.
Large	Affects an entire population or species at sufficient scale to cause a substantial decline in abundance and/or change in distribution beyond with natural recruitment (reproduction, immigration from unaffected areas) may not return that population or species, or any population or species dependent upon it, to its former level within several generations, or when there is no possibility of recovery.

6.2.2 Potential Impacts

The impacts assessed for biodiversity are as follows:

6.2.2.1 Construction

- Habitat loss, degradation and fragmentation within the Project Area;
- Species loss – flora mortality from vegetation clearance;
- Species loss – fauna mortality due to direct loss or injury;
- Disturbance and displacement of fauna;
- Alteration of hydrological regime and pollution; and
- Invasive species.

6.2.2.2 Operation

- Collision mortality;
- Disturbance and displacement of fauna species;
- Air pollution (including dust);
- Water pollution; and
- Severance and barrier effects.

6.2.3 Approach to Assessment

The main elements of the impact assessment are described in the section above. The judgements on the significance of impacts are determined by the sensitivity of the ecological receptor and the magnitude of the impact.

The project's area of influence, i.e. the area over which direct and indirect effects could occur as a result of the project, are provided in Table 6-89 and Table 6-90. Construction effects are expected for the duration of the works for 22 months.

Table 6-89 Area of Influence associated with construction

Component of Project	Habitats	Plants	Terrestrial fauna	Aquatics	Notes
Project footprint and Batch plant areas	350m	350m	500m	1000m The Project passes several streams including the Sazlıdere approx. 5km upstream of the Küçükçekmece Lake.	■ Based on dust emissions (350m) and likely disturbance distance of most sensitive species ■ The site sits in an area of existing light and noise pollution associated with the urban area. Plant noise and light creates disturbance to terrestrial fauna up to 500m for most sensitive species. ■ Based on potential for pollution or works to affect watercourses
Blasting	350m	350m	500m	N/A	■ Based on dust emissions (350m) and likely disturbance distance of most sensitive species ■ The site sits in an area of existing light and noise pollution associated with the urban area. Plant noise and light creates disturbance to terrestrial fauna up to 500m for most sensitive species. ■

Table 6-90 Area of Influence associated with operation

Operation	Habitats	Plants	Terrestrial fauna	Aquatics	Notes
Project footprint	350m	350m	1000	500m The Project passes several streams including the Sazlıdere approx. 5km upstream of the Küçükçekmece Lake.	■ Noise and disturbance out to 1000m for the most sensitive species. ■ Assumes any pollution from motorway out to 2000m for the most sensitive species.

6.2.4 Assessment of Effects Arising from the Project

Habitats and Flora

The baseline identified the following number of significant (of Medium or High sensitivity value) ecological receptors taken forward for assessment based on the criteria set out in Table 6-87 and Table 6-88;

- The route of the motorway will pass through two internationally recognised areas; Küçükçekmece Basin IBA and KBA, and West Istanbul Grasslands IPA.
- The three habitats water-fringing reedbeds and tall helophytes other than canes (C3.2), moeso-Thracian mesophile hay meadows (E2.252), and Mediterranean riparian woodland (G1.3) are not considered to be in suitable condition or representative, natural examples which would designate them as Resolution 4 habitats of the Bern Convention. Terrestrial habitats are considered to be secondary in nature (early successional types adapted from former clearing of forests) and aquatic habitats are considered to be largely modified habitats formed artificially as a result of the excavation and straightening/canalization of sections of the previous natural watercourses and the replacement of typical native species by invasive species and weeds typical of cultivation (streams/creeks) present. However, as regionally endemic and CR flora are recorded on site, the overall habitat sensitivity was categorized as High as per the matric in Table 6-87;
- Three endemic plant species *Cirsium polycephalum* (CR)*; Euphorbia amygdaloides var. robbiae* (NT); and *Galanthus x valentinei* (VU) of High value. One rare species *Ferulago confus* (VU) of Medium value.

Fauna

Significant fauna receptors are listed in in Annex 11. The annex includes a description of those receptors which meet Medium or High sensitivity taken forward to assessment, based on the criteria set out in Table 6-87 and Table 6-88. Such ecological receptors are;

- Birds - 33 species of Medium value recorded within the AoI which are listed on the Revised Annex I of Resolution 6 of the BERN Convention and including the Eurasian Turtle Dove (Global IUCN VU) and Lapwing (Global IUCN NT);
- Amphibians – six species of High value. All of which are Least Concern but are included on the Revised Annex I of Resolution 6 of the Bern Convention or Annex II and/or IV of the Habitats Directive;
- Reptiles - 19 species (18 High value and one Medium value). Including the European pond turtle (Global IUCN NT) and Mediterranean Spur-thighed Tortoise (Global IUCN VU);
- Mammals - 36 species (34 High value and two Medium value). Including 30 bat species (nine of which were directly observed) , the European souslik (Global IUCN EN), Eurasian otter (Global IUCN NT) and marbled polecat (Global IUCN VU);
- Fish - two species of Medium value, including the common carp, considered to be Vulnerable by the IUCN Global Red List.

Significant fauna receptors are listed in in Annex 11.

6.2.4.2 Recommended Mitigation

To minimise the impacts on terrestrial flora and fauna, a Construction Environmental and Social Management Plan (CESMP) will be prepared with inter alia the following measures in place:

- The CESMP addresses the following key mitigation for flora, fauna and habitats:
  - Section 7.8 addresses endemic/rare plant species management and includes the procedure for plant species rescue, translocation and replanting (species-specific), management, maintenance and monitoring, which is in lines also with the requirements in the BAP and CHA.

- Section 7.9 addresses specific requirements in terms of wildlife (fauna) management and includes general controls as well as specific requirements for implementing wildlife corridors at strategic locations and the protocols for pre-construction fauna searches.
- Section 7.10 outlines pest control procedures.
- Section 7.24 provides a management protocol with measures for controlling invasive alien plants.
- Section 7.25 outlines the requirements for habitat reinstatement to meet the requirements of the BAP, particularly around the need to rehabilitate habitat associated with temporary works and infrastructure and to address biodiversity offset requirement to meet No Net Loss/Net Gain objectives for residual habitat/flora impacts. This will be addressed through habitat recreation within the road reserve/corridor, which will be detailed in a separate and detailed 'Habitat Restoration and Recreation Plan'.
- The CESMP also detailed additional management measures (including Access Control, Blasting Management, Pollution Prevention, Waste/ Hazardous Materials Management, Quarry Management, Batching Plant Management and Water Use) which also contain specific measures to protect flora, fauna and natural habitats from unnecessary impacts and to reduce the magnitude of unavoidable impacts as far as possible.

- Phased development and restoration of the construction areas. The Project area is suitable for Mediterranean and European Siberian origin plants. After the activity is completed, areas of previously natural habitat shall be restored and planted with plants suitable for the region's habitat. The most important tree species that can be used for landscaping are determined as Turkey oak, sessile oak and hazel. In areas with high groundwater table level, the tree species field elm, ash and willow shall be planted. To cover the slopes on the roadside, tree heath, *Erica manipuliflora*, pink rock rose and sage-leaved rock rose shall be used for ground cover. If afforestation is to be made with coniferous species, stone pine *(Pinus pinea*) is preferred.
- The CESMP will outline preconstruction surveys to be undertaken before clearing areas and relocate animals where possible.
- Habitat will be restored and recreated where possible to mitigate habitat loss and degradation, including the replacement of pond/ditch habitats for amphibians. Rehabilitated habitats must be designed to support a self-sustaining, diverse vegetation community.
- Conduct activities such that the risk of landslides, debris, or mudflows and bank destabilisation is minimised;
  - Implementing soil conservation measures such as:
  - Segregation of contaminated and non-contaminated soil; and
  - Soil management following good construction practice guidance (such as the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[211]) including processes whereby topsoils are stored separately from subsoil and regularly irrigated during dry weather.
- Ensuring that growth medium is sufficient to support native plant species appropriate for the local climate and consistent with proposed future land uses. The overall thickness of the growth medium shall be consistent with surrounding undisturbed areas and future land use.

The project effects, taking into account the embedded mitigation outlined above, is detailed in Table 6-91 and Table 6-92. As different ecological receptors differ in their sensitivity, both in terms of conservation status and capacity to respond to the impacts, the table identifies the significant effects for each main receptor.

[211] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716510/pb13298-code-of-practice-090910.pdf

Table 6-91 Construction Impacts

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
INTERNATIONALLY RECOGNISED AREAS				
C1	Habitat loss/degradation/fragmentation Alteration of hydrological regime and pollution Sensitivity/Value: High Magnitude of Effect: Small Küçükçekmece Basin IBA and KBA: With a total area of 11,819 ha. this IBA is designated for the natural brackish lagoon which holds significant numbers of wintering waterbirds including the great cormorant and passage populations of pygmy cormorant. Direct habitat loss or degradation will occur. Approximately 1.75% (207.86ha) of the IBA is overlapped by the Proposal Development expropriation corridor and Batch areas. Some of these areas are already subject to disturbance from existing roads and severance, and existing quarry operations. The main area of the IBA/KBA expected to be impacted by the Project is the Sazlıdere creek. This area is considered largely to consist of modified habitat and therefore there is considered to be a Small Magnitude of Effect as any construction impacts would not result in the loss of viability/function of the qualifying habitat of the IBA/KBA. Much of the effect of the Project is away from the natural brackish lagoon which supports main qualifying features of the IBA and therefore unlikely to have significant effect on those features. The main area of the IBA expected to be	Moderate	Application of the mitigation measures outlined in the CESMP (including mitigation relating to potential bird collision with moving vehicles and habitat reinstatement within the road reserve/corridor to offset residual habitat impacts under Section 7.9 and Section 7.25 of the CESMP, respectively). Aim to reduce footprint. A robust mitigation strategy is outlined in Chapter 6.1.6 with a focus on good construction practice, avoidance of working in water, avoiding use of box culverts, silt traps, testing for pollutants and availability of spill kits and trained personnel. Sympathetic timing of works as outlined in the CESMP. Biodiversity education will be given to all field workers. Important biodiversity species and important areas will be highlighted. Advice on best practice patterns of work to minimise harm to local biodiversity will be given. An Ecological Clerk of Works (ECoW) appointed by the EPC Contractor will provide such training about wildlife and critical species to workers at project site.	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	impacted by the Project is the Sazlıdere creek area (approx. 5km upstream of the Küçükçekmece Lake) which will be spanned by a cable-stayed bridge. This area of the AoI is considered largely to consist of modified habitat. Habitat mapping identified within this section of the AOI identified that it was dominated by intensive unmixed crops, garrigue, urban and industrial areas. and water bodies. At Sazlıdere reservoir there is minor breeding activity of water birds, mostly Common Tern (Sterna hirundo) and small groups of shorebirds on the islands in the reservoir. The movement of waterfowl and shorebirds is commonly between the bodies of water in Sazlıdere and Küçükçekmece. Groups of cormorants, herons and gulls have been observed to fly in a north-south direction. The collision with moving vehicles is a possibility for some commuting water birds.		Consultation with Birdlife International (and any other relevant NGOs or conservation groups) is to be undertaken to discuss potential project impacts on the IBA and mitigation strategy (see Section 5.3.1 of the BAP and Section 4.2 of the CHA). Evaluate the status of existing natural habitat areas that may harbour IPA trigger species (see Table 7-1 of the BAP).	
C2	Disturbance – including noise / vibration and visual disturbance. Blasting is expected to impact species up to a distance of 2km. This disturbance will overlap with a large part of the southern area of the reservoir. Blasting will take place between 40 and 140 days at five locations and will occur 1-2 times a day. This is likely to disturb wintering species and may lead to temporary displacement of the wintering bird population (a qualifying feature of the IBA) or disturbance of breeding birds.	Major	If necessary, areas in close proximity to the IBA will have appropriate sound boarding installed. Application of the mitigation measures outlined in the CESMP, specifically Section 7.2 ‘Lighting’, Section 7.12 ‘Noise and Vibration Controls’ and Section 7.14 ‘Blasting Management’..	Minor

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
C3	Habitat loss/degradation/fragmentation Disturbance – including noise / vibration and visual disturbance. Sensitivity/Value: High Magnitude of Effect: Small West Istanbul Grasslands IPA: With an area of approximately 8,516ha. The IPA comprises the remaining fragments of limestone grassland, rock outcrops and dry acid heath grassland, situated on the low hills north-west of Istanbul. The site hosts 19 threatened flora species, seven of which are endemic to the area. Direct habitat loss or degradation will occur. Approximately 0.16% (13.87ha) of the westernmost area of the IPA is overlapped by the Proposal Development expropriation corridor and Batch areas. This area of the AOI is already considered largely to consist of modified habitat as it is located by the previous portion of the constructed "Northern Marmara Motorway" (NMM) and adjacent residential area. The habitat mapping identified that this area of the AOI is dominated by urban and industrial areas and transitional weeds. Dust deposition, without mitigation, could reduce the ability of the plants within the IPA to photosynthesis up to 200m from the road. The construction of the road may also affect seed dispersal, reducing population viability. However as the area of the IPA affected by the Project is already degraded by urbanisation and existing roadworks resulting in the qualifying features it was designated for and the biodiversity value of the site in this area being already degraded.	Moderate	Aim to reduce footprint. ECoW. Sympathetic timing of works as outlined in the CESMP. Construction waste generated due to project activities will first be stored at designated storage areas and then disposed. Solid waste will not be allowed to be left at natural habitats. Regular irrigation will be made at construction sites to prevent dust formation. Vegetation clearance will be performed in winter where possible. The removal of or disturbance to soils will be minimised, particularly if they are habitats of species of conservation concern. Rapid establishment of soil cover and vegetation at site and use of covered wagons to reduce dust drift. Application of the mitigation measures outlined in the CESMP , specifically Section 7.12 'Noise and Vibration Controls', Section 7.14 'Blasting Management' and Section 7.13 'Dust and Air Quality Management'. .	Minor

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
C4	Pollution (IBA/IPA) Sensitivity/Value: High Magnitude of Effect: Small Air quality data indicates that there are negligible to minor impacts from NO2 and PM10/PM2.5 emissions identified for construction traffic and construction dust impacts are negligible, or at worst minor, as mitigation will be applied throughout the duration of the construction program.	Moderate	Rapid establishment of soil cover and vegetation at site and use of covered wagons to reduce dust drift. Application of the mitigation measures outlined in the Air Quality Chapter 6.1.2 and the CESMP (specifically Section 7.13 'Dust and Air Quality Management'). Monitoring of pre-selected areas of the IPA to take place to verify changes in diversity associated to pollutant deposition (see Table 8-1 of the BAP)..	Negligible
TERRESTRIAL HABITATS				
C5	Habitat loss/degradation/fragmentation Disturbance including noise / vibration and visual disturbance Sensitivity/Value: High Magnitude of Effect: Medium The majority of habitat across the AoI is of modified, fragmented habitat such as non-irrigated arable land or discontinuous urban fabric. It is largely modified (secondary or artificial in nature) through human influence and consequently of reduced conservation interest (degraded and not representative of natural reference types). Other semi-natural habitat is highly fragmented and comprised of mainly short shrubland and open grassland patches wher there had been formed forest which are now maintained by drivers such as livestock overgrazing,	Major	Aim to reduce footprint. Locate infrastructure in areas to reduce the risk of habitat loss, particularly forests. Study areas will be clearly defined before vegetation clearance where construction activities will take place. Project construction sites will be separated from other areas with appropriate signboards, signs and fences. Staff and vehicle access to the area will be limited to the construction site. Construction waste generated due to project activities will first be stored at designated storage	Minor

<table>
<tr><th>No</th><th>Impact Description</th><th>Impact Assessment</th><th>Mitigation Measures</th><th>Residual Impact</th></tr>
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<td>disturbance and fire. The three habitats water-fringing reedbeds and tall helophytes other than canes (C3.2), moeso-Thracian mesophile hay meadows (E2.252), and mediterranean riparian woodland (G1.3) are not considered to be in suitable condition or representative, natural examples which would designate them as Resolution 4 habitats. These habitats are secondary or degraded in nature and not representative of the natural reference habitat types of the natural forest types of region.

However, as regionally endemic and CR flora are recorded on site, the overall habitat sensitivity was categorized as relatively High.

The precise areas of habitats estimated to be lost during construction is contained in the BAP (see Section 5.3.5 ‘Calculation of Habitat Liability’ and is summarised as follows:

<table>
<tr><th>Habitat Type</th><th>Habitat Loss (ha)</th></tr>
<tr><td>Maquis</td><td>0.11</td></tr>
<tr><td>Spartium junceum fields</td><td>7.01</td></tr>
<tr><td>Black Sea Garrigue</td><td>76.46</td></tr>
<tr><td>Coniferous Plantations</td><td>1.54</td></tr>
</table>
</td>
<td></td>
<td>areas and then disposed. Solid waste will not be allowed to be left at natural habitats.

Regular irrigation will be made at construction sites to prevent dust formation.

Vegetation clearance will be performed in winter where possible. Woodland clearance and the removal of other ecosystems and the disturbance to soils will be minimised, particularly if they are habitats of species of conservation concern.

Nest boxes and other alternative breeding habitats will be provided for bird populations.

Application of the mitigation measures outlined in the CESMP , specifically Section 7.25 which outlines the requirements for habitat reinstatement to meet the key actions in the BAP to meet No Net Loss/Net Gain objectives for residual habitat/flora impacts. This will be addressed through habitat recreation within the road reserve/corridor, which will be detailed in a separate and detailed ‘Habitat Restoration and Recreation Plan’. This aligns also with the requirements in the BAP (see Table 6-1 of the BAP) and the CHA (Section 4.3).</td>
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No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
C6	Pollution Sensitivity/Value: High Magnitude of Effect: Small Air quality data indicates that there are negligible to minor impacts from NO2 and PM10/PM2.5 emissions identified for construction traffic and construction dust impacts are negligible, or at worst minor, as mitigation will be applied throughout the duration of the construction program.	Moderate	Rapid establishment of soil cover and vegetation at site and use of covered wagons to reduce dust drift. Application of the mitigation measures outlined in the Air Quality Chapter 6.1.2 and the CESMP (specifically Section 7.13 'Dust and Air Quality Management', Section 7.15 'Pollution Prevention' and Section 7.18 'Waste Management')..	Negligible
AQUATIC HABITATS				
C7	Habitat loss/degradation/fragmentation Alteration of hydrological regime and pollution Sensitivity/Value: Low Magnitude of Effect: Medium Aquatic habitats comprise of four watercourses, all of low value (none of which were considered to be of Medium or High Value). 'Mediterranean Riparian Woodland' is listed as a Resolution 4 habitat. However, this habitat is not considered representative of natural riparian woodland given the location of the majority of these watercourses in agricultural areas where a high level of modification that has taken place as a result of historical channel straightening and excavation and the replacement of typical native species by invasive species and weeds typical of cultivation. Within the urbanised areas, the riparian vegetative zone was confined found to a very small area due to the proximity of agricultural areas. Overall, the characteristics of aquatic	Minor	Apply the mitigation highlighted in chapter 6.1.6. Standard aquatic ecology mitigation measures including pollution prevention, minimising noise, vibration and lighting to be set out in a CESMP (most important being Section 7.4 'Access Control', Section 7.15 'Pollution Prevention', Section 7.18 'Waste Management', Section 7.19 'Batching Plant Management', Section 7.21 'Erosion and Sediment Control' and Section 7.23 ' Water Conservation and Management'). Providing good water crossing design that aims to minimise erosion, mass wasting, and degradation of water channels. Mixing any chemical substances, that is used in the construction area, in waterbed and/or aquatic ecosystems will be prevented.	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	habitats in urban areas typically showed unfavourable conditions and the existing negative impact of agricultural lands and some domestic pollution sources and previous interventions which had modified the stream beds and banks. The receptor sensitivity of aquatic habitats is regarded as Low as a result. Some channels/streams may need to be re-routed, deviated or channelized but the overall hydraulic/hydrological functionality will be retained. The two species of Medium value Common carp (IUCN VU) and European bitterling (Annex II Habitats Directive) were recorded in Sampling point 3, the Sazlıdere Stream where no disturbance in alteration and reduction of streambed diameter is anticipated.		Excavation materials will not be dumped onto riverbed. Any contamination of water resources will be avoided through pollution control measures and pollution response measures including training in use of and deployment of spill kits. During the construction and operation phases, no water shall be used from the natural water resources within the project site, prior receiving permit from the relevant authority. The use of sediment traps to reduce sedimentation yields minimize the effects of downstream aquatic shall be considered. Ensuring the maintenance of water quality at controlled discharge points. All freshwater resources such as small ponds, water channels, creeks, etc. will be protected as much as possible during construction. Attenuating surface runoff from high precipitation events using on-site storage and water management infrastructure (e.g. storage ponds, sumps, low gradient ditches, clean water diversions). Minimising construction activities, uncontrolled removal of vegetation, forming of waste dumps;	

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			and deposition any material, including temporary stores within the riparian buffer zone (50m) along the banks of water courses. Application of the mitigation measures outlined in the CESMP , specifically Section 7.25 which outlines the requirements for habitat reinstatement to meet the key actions in the BAP to meet No Net Loss/Net Gain objectives for residual habitat/flora impacts. Monitoring of water quality within watercourses downstream of key activities (i.e. crossings of watercourses and where there will be planned discharges from wastewater treatment plants, oil water seperators, batching plants) as per the CESMP contained in Chapter 10 and more specifically Table 10.1 of the CESMP.	
C8	Pollution Sensitivity/Value: Medium Magnitude of Effect: Small Air quality data indicates that there are negligible to minor impacts from NO2 and PM10/PM2.5 emissions identified for construction traffic and construction dust impacts are negligible, or at worst minor, as mitigation will be applied throughout the duration of the construction program.	Minor	Standard aquatic ecology mitigation measures including pollution prevention, minimising noise, vibration and lighting to be set out in a CESMP (most important being Section 7.15 ‘Pollution Prevention’, Section 7.17 ‘Spill Response’, Section 7.18 ‘Waste Management’, Section 7.19 ‘Batching Plant Management’, Section 7.21 ‘Erosion and Sediment Control’ and Section 7.23 ‘ Water Conservation and Management’). A robust mitigation strategy is outlined in Chapter 6.1.6. with a focus on good construction practice, avoidance of working in water, avoiding use of	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			box culverts, silt traps, testing for pollutants and availability of spill kits and trained personnel. Application of the mitigation measures outlined in the Air Quality Chapter 6.1.2 and the CESMP (specifically Section 7.13 'Dust and Air Quality Management').. Rapid establishment of soil cover and vegetation at site and use of covered wagons to reduce dust drift. Mixing any chemical substances, that is used in the construction area, in waterbed and/or aquatic ecosystems will be prevented. Any contamination of water resources will be avoided through pollution control measures and pollution response measures including training in use of and deployment of spill kits. Ensuring the maintenance of water quality at controlled discharge points. Attenuating surface runoff from high precipitation events using on-site storage and water management infrastructure (e.g. storage ponds, sumps, low gradient ditches, clean water diversions).	

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
FLORA				
C9	Habitat loss/degradation/fragmentation Species loss – flora mortality from vegetation clearance Sensitivity/Value: High Magnitude of Effect: Small Direct and indirect loss due to site clearance and dust deposition will occur in relation to all components of the project. Most flora is common and widespread with the exception of Cirsium polycephalum, Euphorbia amygdaloides var. robbiae, and Galanthus x valentinei. and Ferulago confusa. These species are either endemic or rare within the region or listed as either VU or CR. Direct habitat loss or degradation will occur. Habitat loss and construction activities may result in the loss of small proportion (a peak of 0.4-0.6%) of the national population of these species. All the individuals of the species located within the footprint of the project will be lost during the vegetation clearance process in the construction phase, and the supporting habitat in those areas will be lost. The habitat area supporting this species to be impacted is estimated to be 85.12 ha (Maquis - 0.11 ha, *Spartium junceum* fields -7.01 ha-, Black Sea garrigues -76.46 ha- and Coniferous plantations – 1.54 ha). The habitat area supporting *Galanthus x valentinei* to be impacted is estimated to be 5,21 ha (Mediterranean riparian woodland). All the individuals of the species located within the footprint of the project will be lost during the vegetation	Moderate	Aim to reduce footprint. ECoW. During the preconstruction phase seeds and/or bulbs of the endemic and rare species (except for Euphorbia amygdaloides var. robbiae which is considered common in the local area) shall be collected and delivered to the Turkish Seed Gene Bank. With this action in place it is considered that there is no need to take measures within the scope of this project for ex-situ conservation. In application of the mitigation hierarchy, in order to obtain non-residual impact, plant rescue and translocation of *Galanthus x valentinei* is proposed (see Section 5.3.4 and Table 6-1 of the BAP and Section 4.3 of the CHA). In application of the mitigation hierarchy, in order to obtain non-residual impact, on-site restoration of at least a similar area of lost *Cirsium polycephalum* habitat is proposed. Seed collection and replacement planting through propagation of plants is proposed here with restored habitats (see Section 5.3.3 and Table 6-1 of the BAP and Section 4.3 of the CHA).	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	clearance process in the construction phase, and the supporting habitat in those areas will be lost.		Application of the mitigation measures outlined in the CESMP , specifically Section 7.8 which addresses endemic/rare plant species management and includes the procedure for plant species rescue, translocation and replanting (species-specific), management, maintenance and monitoring, which is in line also with the requirements in the BAP (see Table 6-1 of the BAP) and the CHA. (see Section 4.3) Also important will be implementing invasive alien species/plant management controls, as per the protocols and approach/methods set out in Section 7.24 'Invasive alien species management' in the CESMP..	
C10	Pollution Sensitivity/Value: High Magnitude of Effect: Small Air quality data indicates that there are negligible to minor impacts from NO2 and PM10/PM2.5 emissions identified for construction traffic and construction dust impacts are negligible, or at worst minor, as mitigation will be applied throughout the duration of the construction program.	Moderate	Rapid establishment of soil cover and vegetation at site and use of covered wagons to reduce dust drift. Application of the mitigation measures outlined in the Air Quality Chapter 6.1.2 and the CEMSP (most important being Section 7.15 'Pollution Prevention', Section 7.18 'Waste Management' and Section 7.13 'Dust and Air Quality Management'). Providing protection against animal entry on the overflow lines, drains, and vents on tanks and vessels.	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
MAMMALS				
C11	Habitat loss/degradation/fragmentation Species loss – fauna mortality due to direct loss or injury Disturbance and displacement of fauna Sensitivity/Value: High Magnitude of Effect: Medium A total of 36 mammal species of Medium and High value were identified as potentially present within the AoI. Excluding bats, seven species were identified as potentially present within the AoI: the European souslisk (EN), marbled polecat (VU) Eurasian otter (NT) forest dormouse (LC), caucasian squirrel (LC) and lesser mole rat (DD). Nine species of bats were recorded during surveys including one Vulnerable species. Overall bat diversity was low and activity generally low except for common pipistrelle. A number of bat species are potentially present, but many of these are forest specialists requiring good quality intact forest. Construction would lead to permanent habitat loss supporting a range of mammals including those listed under the Revised Annex I of Resolution 6 of the BERN Convention and Annex II and/or IV of the Habitats Directive. Disturbance during construction, and fragmentation associated with that disturbance could affect populations up to 1km distance. Areas of blasting activities could affect populations up to 2km distance.	Major	Application of the mitigation measures outlined in the CESMP specifically Section 7.9 addresses specific requirements in terms of wildlife (fauna) management and includes general controls and the protocols for pre-construction fauna searches. Pre-construction surveys and population counts for European Souslik and Marbled polecat to take place and where identified, enhancements to the existing habitats to be planned and implemented (see Table 6-1 of the BAP) and Section 4.3 of the CHA). Section 7.25 of the CESMP outlines the requirements for habitat reinstatement to meet the requirements of the BAP, particularly around the need to rehabilitate habitat associated with temporary works and infrastructure and to address biodiversity offset requirement to meet No Net Loss/Net Gain objectives for residual habitat/flora/fauna impacts. This will be addressed through habitat recreation within the road reserve/corridor, which will be detailed in a separate and detailed 'Habitat Restoration and Recreation Plan'. Controls on lighting and noise, specifically CESMP Section 7.2 'Lighting', Section 7.12 'Noise and Vibration Controls' and Section 7.14 'Blasting Management'.	Minor Dependent on integration of wildlife crossings into road design.

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	There is also loss of roosting and resting sites, including direct mortality if these are occupied at the time. Vehicle movements also have the potential to lead to direct mortality through increased risks of collision. Indirect effects from disturbance could include loss of commuting and feeding areas, and fragmentation preventing animals from moving across the landscape to complete important cyclical events or forage effectively..		Controls on lighting and noise. Prevent egress by wildlife to construction areas e.g. capping pipes at night, fencing off ditches. Maintain connectivity around or across construction areas, particularly linear infrastructure (e.g. through use of animal crossings). Controls such as speed bumps and awareness training to reduce wildlife collisions. Protocols for capture or herding mammals found in construction areas where these unable to exit by themselves. Development of mitigation areas in advance of construction to replace lost habitat. To mitigate barrier effect, specific requirements for implementing wildlife corridors at strategic locations are included in Section 7.9 of the CESMP. Minimise light and noise during construction and operations near any identified bat roosting and foraging areas; ECoW.	

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
BIRDS				
C12	Habitat Loss/degradation/fragmentation Sensitivity/Value: Medium Magnitude of Effect: Medium Loss of habitat for 33 Revised Annex I of Resolution 6 of the BERN Convention species including globally VU Turtle dove and the NT lapwing. Disturbance effects up to 1km for sensitive species, 2km in areas of blasting. Much of the existing route is heavily degraded and impacts would be insignificant, particularly in urbanised areas. The highest risks of impacts on significant bird populations are during works in proximity to the dam and to the north west where disturbance and blasting may cause temporary displacement of wintering and passage birds. Blasting will take place between 40 and 140 days at five locations near the dam and will occur 1-2 times a day. OHTL displacement has been carried out between Km 54+000 and Km 59+000 in the eastern section of the Project area associated with the heavily built-up residential area of Istanbul. Here biodiversity impacts (specifically, impacts to avifauna as a result of potential collision/electrocution of birds/bats) are expected to be minimal, as the rerouting of lines does not differ significantly from the original alignment. Towards the west of Sazlidere dam, several of the existing transmission lines will be raised in height to elevate these above the road, with pylons raised and the overhead lines	Moderate	Reduce noise and visual disturbance. Creation of suitable alternative habitats or enhancement of existing ones to support displaced species (e.g. nest sites if these are a limiting factor). Section 7.25 of the CESMP outlines the requirements for habitat reinstatement to meet the requirements of the BAP, particularly around the need to rehabilitate habitat associated with temporary works and infrastructure and to address biodiversity offset requirement to meet No Net Loss/Net Gain objectives for residual habitat/flora/fauna impacts. Sympathetic timing of works outlined in the CESMP. Vegetation removal in winter where possible. Application of the mitigation measures outlined in the CESMP (specifically CESMP Section 7.2 'Lighting', Section 7.12 'Noise and Vibration Controls' and Section 7.14 'Blasting Management', Section 7.9 Wildlife Management, Section 7.19 Waste Management'. .	Minor

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	also raised by approximately 10m in the process. This very minor change in height is unlikely to present a material change in risk to avifauna from the original transmission lines, as the height difference is very minor and unlikely to significantly modify collision risk and the route alignment remains unchanged.			
C13	Direct mortality Destruction of nests and young during breeding season. Potentially affecting globally VU turtle dove and the NT lapwing.	Moderate	Where possible avoid site clearance during the breeding season. Where not, use ECoW to identify nests and avoid till young have fledged. Specifically refer to Section 7.9 of the CESMP on 'Wildlife Management', which contains protocols for pre-construction wildlife searches. Application of the mitigation measures outlined in the CESMP, To mitigate barrier effect, specific requirements for implementing wildlife corridors at strategic locations are included in Section 7.9 of the CESMP. Application of the mitigation measures outlined in the CESMP.	Minor
HERPTILES				
C14	Habitat loss/degradation/fragmentation Species loss – fauna mortality due to direct loss or injury Disturbance and displacement of fauna Sensitivity/Value: High Magnitude of Effect: Small Six species of Medium and High value amphibians were identified as potentially present within the AoI although none	Moderate	Retain waterbodies and associated features and terrestrial habitat wherever possible. Ensure good construction practice near water is enforced e.g. gpp-5-works-and-maintenance-in-or-near-water.pdf (netregs.org.uk).	Minor This will only be achieved if properly organized pre-construction reptile and amphibian collection under suitable expert direction undertaken. Together with creation of suitable mitigation

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	were directly observed. All of which are Least Concern but are included on the Revised Annex I of Resolution 6 of the Bern Convention or Annex II and/or IV of the Habitats Directive. 20 species of Medium and High value reptiles were identified as potentially present within the AoI (with nine species directly observed) including the Mediterranean Spur-thighed Tortoise (VU) and European pond turtle (NT). Impacts to the Herptiles in the AoI may also result from damage to the watercourses and ponds from silt and pollution during works and interruption of seasonal movements between watercourses and waterbodies, prevention completion of life cycle.		Maintain connectivity across construction areas, particularly infrastructure e.g. through provision of pipes under construction roads. Restoration and rehabilitation of temporary land take. Protection of terrestrial zones with natural vegetation around amphibian reproduction centres, to enable the necessary flow of genetic material between local habitats. Creation of suitable mitigation habitats pre-construction. Section 7.25 of the CESMP outlines the requirements for habitat reinstatement to meet the requirements of the BAP, particularly around the need to rehabilitate habitat associated with temporary works and infrastructure and to address biodiversity offset requirement to meet No Net Loss/Net Gain objectives for residual habitat/flora/fauna impacts. Collection of reptiles and amphibians prior to construction and move to mitigation areas by suitably trained and experience staff. Specifically refer to Section 7.9 of the CESMP on 'Wildlife Management', which contains protocols for pre-construction wildlife searches. Maintain high hygiene levels and check for fungi (Chytridiomycetes), viral infections e.g. Ranavirus.	sites in advance of construction. Otherwise remains Moderate.

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			Where the motorway will cross this watercourse, a suitable underpass such as a large culvert shall be established over the channel that allow amphibians to survive inside the channel. Culverts or underpass structures shall be large enough to keep soil ground stripes along both side of the channel so that amphibians in water and some other animals such as reptiles and mammals can cross the motorway by using these land stripes along the channel. Application of the mitigation measures outlined in the CESMP, for example to mitigate barrier effect, specific requirements for implementing wildlife corridors at strategic locations are included in Section 7.9 of the CESMP. Application of the mitigation measures outlined in the CESMP.	
FISH				
C15	Habitat loss/degradation/fragmentation Species loss – fauna mortality due to direct loss or injury Disturbance and displacement of fauna Pollution Sensitivity/Value: High Magnitude of Effect: Small Medium (carp, VU) Magnitude of Effect: Small	Moderate	Ensure good construction practice near water is enforced e.g. gpp-5-works-and-maintenance-in-or-near-water.pdf (netregs.org.uk) In April, May and June, which is the breeding season for fish, the least possible interference shall be made in the areas where aquatic sampling was carried out within the scope of this study. The risk of pollution, mostly from cementitious products associated with the concrete batching	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	Two species of Medium value [Common carp (IUCN VU) and European bitterling (Annex II Habitats Directive)] were recorded at Sampling point 3, the Sazlıdere Stream where no disturbance in alteration and reduction of streambed diameter is anticipated. Common carp (IUCN: VU) European bitterling (Annex II of the Habitats Directive) Silt and pollution affects arising during excavations, construction, poor culvert design, and poor working in or near water can all lead to significant declines in river quality however the bridge will be suspended above the canal and support piers placed either side, so there will be no direct impact or alteration of flows or connectivity between the upstream and downstream areas.		plant located at the main campsite at the bridge construction site below Sazlidere dam, will be managed through onsite mitigation to reduce risk of product moving towards watercourses amongst other mitigation measures outlined in the CESMP. (specifically Section 7.15 'Pollution Prevention', Section 7.18 'Waste Management', Section 7.19 'Batching Plant Management', Section 7.21 'Erosion and Sediment Control' and Section 7.23 ' Water Conservation and Management'). Monitoring of water quality within watercourses downstream of key activities (i.e. crossings of watercourses and where there will be planned discharges from wastewater treatment plants, oil water separators, batching plants) as per the Construction Monitoring Plan contained in Chapter 10 and more specifically Table 10.1 of the CESMP.	

Table 6-92 Operational Impacts

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
INTERNATIONALLY RECOGNISED AREAS				
O1	Habitat loss/degradation/fragmentation Sensitivity/Value: High Magnitude of Effect: Small The Project area lies within the African-Eurasian flyway of international importance, but within the AoI resting, feeding and roosting numbers of birds in this flyway are below the levels that are nationally or internationally important. The operation of the infrastructure corridor is unlikely to significantly affect the Küçükçekmece Basin IBA given the area already contains existing infrastructure including major roads.	Moderate	Adapted fencing to divert flying birds. Application of the mitigation measures outlined in the CESMP.	Minor
O2	Pollution Sensitivity/Value: High Magnitude of Effect: Medium Air quality data indicates that operational traffic impacts from pollutants (NO2 and PM10/PM2.5) will be moderate to major. It should be noted that much of the immediate area surrounding the IPA is already heavily modified and urbanised and currently affected by poor air quality and pollution. An increase in NOx and acid deposition is known to damage sensitive plants and promote changes in species composition	Major	Mitigation measures outlined in the 6.1.2 Air Quality Chapter will be applied however it has been noted that these measures cannot be guaranteed to meet air quality standards at sensitive receptors. Application of the mitigation measures outlined in the CESMP.	Moderate

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	to more nitrogen hungry plant communities. This is primarily an issue for the IPA, as the IBA plant communities are considered to be eutrophic. A precautionary approach is taken when considering air quality impacts and the distance from the motorway such pollution may affect. NOx and acid deposition may affect habitats up to 2km from the motorway depending on their sensitivity. The key issue for the IPA is that potentially relatively intact habitats within this 2km range could be damaged by declines in air quality resulting in the decline of the IPA's plant communities. The IPA is noted, amongst other receptors, for its limestone grassland. Such Calcareous grassland supports species which may be highly sensitive to Nitrogen deposition effect and Nitrogen enrichment can lead to changes in the composition of the species in this habitat212 .			
HABITATS				
O3	Habitat loss/degradation/ fragmentation Sensitivity/Value: High Magnitude of Effect: Small Most of the direct habitat loss occurs during construction. The main effects on habitats during operation therefore relate to impacts of pollution and fragmentation. Incidental pollution, such as regular exposure to cake dust or unplanned events such as floods creating pollution remain a risk.	Moderate	Rigorous control on pollution, including spill kit provision and training. During the construction and operation phases, no water shall be used from the natural water resources within the project site, prior receiving permit from the relevant authority. Application of the mitigation measures outlined in the CESMP.	Minor

212 Air Pollution Information System: Nitrogen deposition: Calcareous grassland. Available from: https://www.apis.ac.uk/node/966

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
O4	Pollution Sensitivity/Value: High Magnitude of Effect: Medium It should be noted that much of the habitat in this area is already heavily modified and urbanised and currently affected by poor air quality and pollution. Air quality data indicates that operational traffic impacts from pollutants (NO2 and PM10/PM2.5) will be moderate to major. A precautionary approach is taken when considering air quality impacts and the distance from the motorway such pollution may affect. NOx and acid deposition may affect habitats up to 2km from the motorway depending on their sensitivity. No Medium or High value habitats have been identified within the AoI.	Major	Mitigation measures outlined in the 6.1.2 Air Quality Chapter will be applied however it has been noted that these measures cannot be guaranteed to meet air quality standards at sensitive receptors. Contamination of water resources will be avoided through pollution control measures and pollution response measures including training in use of and deployment of spill kits. Application of the mitigation measures outlined in the CESMP.	Moderate
FLORA				
O5	Pollution Sensitivity/Value: High Magnitude of Effect: Medium It should be noted that much of the habitat in this area is already heavily modified and urbanised and currently affected by poor air quality and pollution. Air quality data indicates that operational traffic impacts from pollutants (NO2 and PM10/PM2.5) will be moderate to major. A precautionary approach is taken when considering air quality impacts and the distance from the motorway such pollution	Major	Mitigation measures outlined in the 6.1.2 Air Quality Chapter will be applied however it has been noted that these measures cannot be guaranteed to meet air quality standards at sensitive receptors. Application of the mitigation measures outlined in the CESMP specifically Section 7.8 ‘Endemic/Rare Plant Species Management’ and Section 7.24 ‘Invasive Alien Species Management’.	Moderate

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	may affect. NOx and acid deposition may affect habitats up to 2km from the motorway depending on their sensitivity. Habitats within this 2km range could be damaged by declines in air quality resulting in the decline of the plant communities including endemic/rare species.			
MAMMALS				
O6	Fragmentation and habitat degradation The infrastructure corridor will pose continued risks of direct collision mortality, and fragmentation of populations and opportunities to complete life cycles. Pollution of water courses will reduce food resource for species, further depressing populations.	Moderate	Implement crossings strategy ahead of construction to provide suitable crossing points over or under infrastructure. Regular monitoring of pollutants. Minimise light and noise during construction and operations near any identified bat roosting and foraging areas. Application of the mitigation measures outlined in the CESMP specifically to mitigate barrier effect, specific requirements for implementing wildlife corridors at strategic locations are included in Section 7.9 of the CESMP..	Minor
BIRDS				
O7	Additional loss of fauna Displacement of fauna species Sensitivity/Value: Medium Magnitude of Effect: Small	Minor	Maintenance of mitigation sites. Adapted fencing to divert flying birds. Application of the mitigation measures outlined in the CESMP.	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	Given that the survey findings indicate that most species were recorded at flight heights that correspond with the planned bridge height, a potential collision risk for bird species could be involved. Most bird species in the study area are small and agile, and therefore highly adaptable regarding their flight height and maneuverability and are therefore likely to avoid collision with the bridge infrastructure on the majority of occasions. Key species that may be at risk of collision include the larger, less maneuverable species that are also nocturnal migrants and species or locally active and dispersive at night and those where the period of migration may coincide with the winter/autumn seasons conducive to inclement weather associated with poor visibility. These include the following species of Least Concern (LC) (PBF species indicated by an asterix*): ■ **Grey Heron** Ardea cinerea* ■ **Pygmy cormorant** Microcarbo pygmaeus ■ **Great cormorant** Phalacrocorax carbo ■ **Eurasian Honey-buzzard** Pernis apivorus* ■ **Mediterranean gull** Larus melanocephalus* There will still be sufficient room for birds to fly around, over or under the bridge structure and the bridge length will be sufficient to provide for effective bird movement beneath the structure over a relatively broad area. Taking into consideration the bridge design mitigation recommended in this document, in ERM's opinion the overall operational impact should be considered 'Minor' for bird impacts and should not change for the residual impact rating, to reflect the potential uncertainty regarding bridge collision risks in general in light of: (i) a general lack of rigorous studies and scientific literature on the subject, with key arguments being largely unsupported in the literature; and (ii) certain unknowns as to how effective bridge design mitigation will be in reducing potential collision risk. Refer to Annex 11 for the detailed statement on 'Stayed Cable Bridge Risk of Collision Impact to Birds'.		The following mitigation measures are to be implemented taking into account the risk of collision of birds with the bridge. ■ Bridge cables and support structures should be flood-lit to increase their visibility at night ■ No power lines should be suspended above the bridge deck ■ Standard highway lighting will increase visibility of the top of the deck to birds that fly over the bridge at night ■ Undersurface of the bridge should be lit to increase visibility of the piers and deck undersurface to birds that fly beneath the bridge at night ■ Bridge management and maintenance personnel should be required to collect and report all cases of bird mortality on the bridge, shall it this events happen.	

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
HERPTILES				
O8	Habitat loss/degradation/fragmentation Sensitivity/Value: High Magnitude of Effect: Small Most losses occur due to construction and conversion of habitat. Pollution to watercourses could potentially worsen habitat loss by continuing to degrade amphibian and reptile habitat. Mortality due to interaction with busy roads and rail in operation.	Moderate	Provide appropriate underground passages and other crossing designs particularly between waterbodies/ watercourses. Application of the mitigation measures outlined in the CESMP specifically to mitigate barrier effect, specific requirements for implementing wildlife corridors at strategic locations are included in Section 7.9 of the CESMP. Continued development and monitoring of mitigation areas. Application of the mitigation measures outlined in the CESMP.	Minor
FISH				
O9	Pollution and hydrological change Sensitivity/Value: High Magnitude of Effect: Small Potential risks from low level pollution from the road and low potential for a large-scale incident such as a lorry shedding a toxic load.	Moderate	Pollution monitoring as per the monitoring plan in Chapter 10 of the CESMP... Regular spill kit and pollution management training. Availability of spill kits. Emergency translocation plan. Drainage design to reduce direct discharge to watercourse (e.g. through vegetated bunds or detention ponds).	Negligible

No	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			Application of the mitigation measures outlined in the CESMP .	
INVASIVE SPECIES				
O10	Invasive species Sensitivity/Value: High Magnitude of Effect: Small Introduction of invasive species can put pressure on remaining species, particularly within aquatic environment. Two species of fish were identified as invasive during electrofishing surveys: Prussian carp (Carassius gibelio) and pike-perch (Sander lucioperca).	Moderate	Early identification of threats and have treatment plans in place. Vehicles used for vegetation clearance and/or plant transfer will be checked and disinfected when moving between sites. Project workers will not be allowed to bring plants into the construction site to avoid the risk of pest/invasive species establishing in the Project Area. Implement programs to eliminate non-native and invasive species. In areas where invasive plants are removed, replanting will be performed with native species. Biological, mechanical, and thermal methods of vegetation control are preferred. Application of the mitigation measures outlined in the CESMP specifically Section 7.24 'Invasive Alien Species Management'. .	Minor

6.2.5 Summary of residual impacts

The mitigation applied will reduce most impacts to minor or negligible. The remaining moderate residual effects are summarised here.

During the operation of the Project a Moderate residual impact from pollution is predicted to affect the West Istanbul Grasslands IPA and endemic and rare flora. Air quality data indicates that operational traffic impacts from pollutants (NO2 and PM10/PM2.5) will be moderate to major. Mitigation measures outlined in Chapter 6.1.2 Air Quality will be applied however it has been noted that these measures cannot be guaranteed to meet air quality standards at sensitive receptors. It is possible that these impacts may reduce over time if there is a change in vehicle fleet composition due to an increase in electric vehicles and the development of hydrogen technology.

The reduction in significant effects to minor in most cases relies on the presence of an ECoW on site to oversee works in ecologically sensitive areas and the application of the mitigation outlined in the CESMP. Sympathetic timing of works where possible outside of the breeding bird season and collecting seeds/bulbs of endemic/rare species and translocation of plants where possible.

For infrastructure significant effects rely on a crossings strategy to allow wildlife to continue to move through the landscape.

Strict pollution controls are required to avoid significant effects. These are largely embedded in the project design but monitoring and emergency response capacity is required to complement these in case of an unplanned release or detection of chronic low level pollution.

Major projects are known to be present or planned within the region and a range of major residential projects. Such development will likely significantly affect the region in a short space of time. A cumulative impact Chapter has been prepared including Canal Istanbul to present the potential cumulative impacts of these projects.

The Critical Habitat Assessment discusses residual effects on Critical Habitats and Priority Biodiversity Features. The Critical Habitat Assessment methodology followed EBRD Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (v. January 1, 2020 – unpublished). The full Critical Habitat Assessment is detailed in Annex 11 and includes mapping of the relevant Ecologically Appropriate Area of Analysis (EAAA) for candidate Critical Habitat or Priority Biodiversity Features.

A Biodiversity Action Plan (BAP) has been developed which addresses residual impacts through the following key actions:

- Translocation and/or replacement of plant species of conservation importance from the RoW;
- Restoration / Recreation of habitats supporting *Cirsium polycephalum* (Maquis, Black Sea Garrigues); and
- Restoration / Recreation of PBF qualifying habitats.

This is carried forward into the CESMP which includes in Section 7.8, the protocol and key measures pertaining to the rescue, translocation and, or replacement planting of endemic/rare plant species likely to be impacted as well as Section 7.25 which considers the habitat reinstatement requirements and need for a detailed ‘Habitat Restoration and Recreation Plan’ to address residual habitat impacts through restoration activities that count towards the offsetting of residual impacts to achieve No Net Loss / Net Gain objectives for critical habitat and priority biodiversity features, respectively.

6.3 Social Resources and Receptors

The impact assessment for the Project is presented in the next subsections. On all aspects covered, the same structure in terms of analysis was used, as follows:

- **Potential Impacts Synopsis:** summarized enumeration of the potential impacts;
- **Baseline Conditions:** highlight of the most relevant considered baseline conditions for the impact assessment;
- **Embedded Measures:** list of the most relevant embedded measures that were considered in the Project design, which will help to avoid/minimize the impacts;
- **Impact Assessment:** focused on both the construction and operation phases;
- **Mitigation Measures:** list and summarized description of the applicable mitigation measures to be considered; and
- **Summary Impact Table:** Tabular impact assessment summary (pre- and post-mitigation – residual).

6.3.1 Economy and Employment

6.3.1.1 Potential Impacts

At the macro level, the Project is intended to result in increased circulation throughout Turkey, and İstanbul in particular, which is expected to have positive effects on the national and regional economy. Beyond this, the Project is expected to generate positive impacts on local economic and employment conditions at the regional level throughout its life cycle. Primary impacts are expected to take place during the construction phase through the creation of temporary employment opportunities and the creation of long-term benefits associated with capacity enhancement of local labour through on-the-job training.

Opportunities for economic development and diversification may also result from the use of local goods and services during the construction phase, in particular through sourcing of significant quantities of construction materials and expenditures associated with the running costs of vehicles (i.e. fuel, lubricants, and additives).

To a lesser extent, the operation phase will generate some limited longer-term local employment opportunities mainly for toll collection, maintenance and monitoring activities.

Impacts related to labour rights including employment contracts, working hours, child labour and forced labour are discussed separately in Chapter 6.3.3.

Table 6-93 summarises the potentially significant impacts on economy and employment during the construction and operation phases of the Project.

Table 6-93 Potential Impacts on Economy and Employment

Construction Phase	Operation Phase
■ Temporary direct and indirect employment opportunities (primarily unskilled); ■ Temporary economic impacts from taxes and fees, procurement, and worker spending; and ■ Long-term benefits from capacity enhancement of local labour through on-the-job and formal training opportunities. ■ Influx of Workers	■ Temporary direct and indirect employment opportunities (primarily unskilled); and ■ Benefits from improvements to infrastructure services including road improvements.

6.3.1.2 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

- The construction sector is a major contributor to Turkey's Gross Domestic Product (GDP) and one of the major employers in the economy. In 2019, İstanbul province contributed to about 35.6 % of total construction activities in Turkey, and the construction sector represents 6.3 % of its GDP[213].
- High levels of informal employment remain in the country, being the main form of employment for a large share of the population[214].
- One of the biggest areas of risk in the construction sector is linked to labour rights issues, as they are known for widespread informal workers. Many of these informal workers are Turkish natives, as well as refugees and other vulnerable populations, such as ethnic minorities and migrants. With the arrival of refugees in 2011, Syrian influx led to higher competition in informal job market that replaced Turkish informal workers with Syrians. Informal workers are more vulnerable to abuse, due to the fact that they often work under precarious conditions, have no benefits, insurance nor protections (for accidents, sickness, etc.).
- The labour force in Turkey is characterized by a significant gender gap with low female participation and low employment opportunities for women, considering that women constitute half of the country's population.
- Informal employment also shows higher rates among women (46 % of women compared to 28 % of men), as women are more likely to work in low-paid jobs or the informal sector without social security[215].
- The unemployment rate in the different districts in the AoI settlements varies greatly, going from 7 % to 13 %.
- The field survey showed economic activities in the districts of the AoI are as diverse as dry farming and animal husbandry to services, trade, freight and cargo hubs and industrial production hosting couple of organised industrial zones. Along the AoI there are many small scale businesses and shops in retail goods, food and services. Industrial areas are mostly located on the western areas and internal urban areas in Başakşehir district as well as in Arnavutköy district. These are as diverse as manufacturing (plastic, metal machinery, automotive etc.), international freight, waste recycling facilities and cargo services to storages and food production. The districts of Başakşehir and Avcılar also accommodate professional and highly skilled workers in new residential areas.
- İstanbul's literacy rate was 97.56 as of 2019. That same year, schooling rate for both primary and middle school was of 98.12 %. It is estimated that 59 % of the population have attended primary and middle school, 22 % have attended high school and 19 % have tertiary education.
- Some settlements reported the presence of illiterate persons in the AoI.

6.3.1.3 Embedded Measures

Nakkaş Otoyol A.Ş. intends to contribute to the development of local companies through local sourcing of supplies including construction materials, equipment, water sourcing, medical equipment, fuel, engineering tools as well as services.

Embedded measures supporting benefits to the local economy and local employment include Nakkaş Otoyol A.Ş.'s contractual commitments to meeting specific local employment targets as well as its collaboration with local unemployment agencies (İŞKUR). In this regard Nakkaş Otoyol A.Ş. has

[213] TUIK, 2019. Gross Domestic Product by Provinces, 2019. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Gross-Domestic-Product-by-Provinces-2019-33663&dil=2

[214] Registered Employment. 2016. Report. Available from: http://kayitlicalisiyorum.com/kayit-disi-istihdam-nedir

[215] Registered Employment. 2016. Report. Available from: http://kayitlicalisiyorum.com/kayit-disi-istihdam-nedir

committed to creating around 3000 new employment opportunities for the construction phase including EPC Contractor and subcontractors.

It is expected that 70% of the workforce will be resourced from Istanbul and 30% from outside the city. Muhtars will be informed for the employment of local people living along the road and prioritization will be made in local employment. Gender equality will be taken into account in recruitment processes.

Safety risk analyses are carried out according to local legislation and international standards and also assess the risks that vulnerable people may experience (women, disabled, etc.). Related target has been revised as recruitment of vulnerable workers as 5%.

Detailed actions and key performance indicators with regard to employment will be defined in Local Recruitment Plan.

6.3.1.4 Feedback from Stakeholders

As indicated previously in Chapter 4.4.8.1, stakeholder feedback related to employment and economy includes the following:

- Unemployment and low income were both flagged as moderate to severe issues in all the settlements of the AoI;
- Access to employment opportunities for populations from the local area and especially the youth was a key issue identified in the settlements in the AoI together with the importance of providing specialized training opportunities, especially for vulnerable groups (such as women), as part of livelihood enhancement; and
- Stakeholders raised their concerns regarding the transparency and the equal access of opportunities through the recruitment process.

6.3.1.5 Impact Assessment

6.3.1.5.1 Construction and Operation Phases

Temporary Direct and Indirect Employment Opportunities (Primarily Unskilled)

It is estimated that an average of 2,032 personnel will be employed throughout the duration of the Project, with a peak of 2,875 workers in one month. The total number of workers engaged by Nakkas Otoyolu for the project will be 23 for construction.

Typical construction activities will include site clearance works, excavation and movement of soil, embankment construction, construction of the various elements of the road (main road, access roads, viaducts, bridge, tunnels, culverts etc.) and their associated sub-elements (e.g. sub-base, road surface, pavements, concrete and steel works, retaining walls, drainage infrastructure and features etc.), soft and hard landscaping features, and finish works (lighting, signs, road markings, etc.).

There are two construction camps (Olimpiyat and Sazlidere Campsites) in place and both are operational at the moment as detailed in Chapter 3.4.3.1.

Sazlidere campsite is also used for EPC Contractor and subcontractor's workers accommodation purposes with a maximum capacity of 750 persons, and Olimpiyat campsite was designed in such way that they can accommodate a workforce of approximately 1,100 persons.

There are no female employees accommodating at both campsites since there is rental assistance provided by EPC Contractor to the female employees. Access to the camps is tightly controlled and restricted to the Project workforce and approved visitors.

Facilities for accommodation, meals, sanitation and welfare will be provided in campsites in accordance with local requirements and in line with Workers' Accommodation Processes and Standards IFC & EBRD Guidance Note (considering Covid-19 requirements as well) as committed by Nakkaş Otoyol A.Ş. Furthermore, Nakkaş Otoyol A.Ş. will consider gender aspects at campsites such as employment

of security staff of both genders, separate gender sanitary and toilet facilities with adequate privacy, including ceiling to floor partitions and lockable doors. All these requirements will also be applicable for the EPC Contractor and subcontractors, and relevant clauses will be integrated into contracts.

The anticipated impacts are **positive** and local in extent due to the high number of primarily unskilled positions available during construction. In addition to direct employment, the Project will result in the indirect employment of workers through procurement of select local goods and services.

These impacts are only expected in the short to medium term as the projected workforce will be significantly reduced as the Project moves into operation.

Temporary Economic Impacts from Taxes and Fees, Procurement and Worker Spending

In general, construction and operation activities associated with the Project will likely generate economic benefits from the purchase of goods and services during construction and even in the operational phase, which will generate benefits at national, regional and where possible, local level.

Significant quantities of various types of construction materials will be needed such as concrete, prefabricated segments, aggregates, and asphalt, together with construction plant, vehicles and machinery. In accordance with international good practice, environmental and social implications will need to be considered in the selection, sourcing and transport of materials from quarries. The main principle is to source the materials locally where possible and feasible.

As with Project employment, anticipated impacts are **positive** however will be limited to the construction period.

Long-term benefits of capacity enhancement (on-the-job and formal training opportunities)

Training of all employees will be carried out in accordance Local Recruitment Plan.

Those who are able to secure employment on the Project during construction will likely have the opportunity to improve their skills, gain experience and thereby improve their opportunities for future employment within the construction and other sectors. The Project will provide necessary training programs to workers in line with Nakkaş Otoyol A.Ş.'s environmental and social responsibilities and support the development of women and young people.

In addition to on–the-job experience at the level of individual workers, the Project will also represent an opportunity for Turkish companies to tender for work on different Project-related components and basic services such as food supply and maintenance, which will result in a capacity enhancement and reputational benefits from working on a major project with international standards to the highest safety and E&S performance standards. Furthermore, capacity enhancement for women will aim to promote gender equality and reduce gender gaps at work in the context of the Project.

For those companies that meet the eligibility criteria and enter the supply chain, there will be short-term benefits to the businesses and their employees through increased experience, capacity and training opportunities.

Impacts to individuals and businesses is anticipated to result in long-term **positive** impacts at the local, regional, and national level.

Temporary Direct and Indirect Employment Opportunities

The primary impact associated with the Project during the operation phase is expected to be the long-term employment of local workforce for toll collection, road maintenance, and environmental health and safety staff such as the Emergency Response Team (ERT). Although the exact size of the workforce needed for operation is not clear at this stage, recruitment is not expected to be extensive. Operational employment will be under the responsibility of Operation and Maintenance Contractor to be appointed by Nakkaş Otoyol A.Ş. operate the road.

One of the main objectives of the Project is to connect the industrial zones of Hadımköy, Deliklikaya, and Başakşehir, which are all located on the proposed route. The Project will increase connectivity and

integration between buyers and suppliers, reduce supply chain costs for local businesses, and save time spent in logistics by improving traffic flow and facilitating commutes. The enhancement of business in the industrial zones will contribute to local economic development, attracting further investments, and bringing in new businesses.

Investment in transport infrastructure such as this Project generally improves city interconnectivity, helping to address differential socioeconomic attainment by offering access to employment opportunities and facilitating trade. Furthermore, these investments could boost economic activity and regional integration by increasing exports and domestic trade across its cities and regions. Remote and economically disadvantaged areas of the country will become more integrated and more economically developed, as new local job opportunities will be created, attracting workers.

Considering the above, the impact is expected to remain **positive**, however of a relatively negligible significance.

Temporary disruptions for local businesses

Through the construction phase, some accesses will be compromised whilst the works are taking place. This can be an issue for local businesses (e.g. shops and hotels), for which customers find difficult access and therefore decrease their income.

The difficulty of access might not be the only issue reducing the revenue of the local businesses; indeed, the effects of noise and dust during the construction phase could also hinder them and have a negative impact.

Finally, some businesses, as explained in the RAP, will have to be resettled – if not done properly, the impact on the business can be irreparable. Their workers will also be affected (total number of workers is 243 including informal and migrant workers).. The RAP states this could be an issue especially for Syrians and women workers, who may permanently lose their jobs after physical resettlement if some of those businesses are settled far from their current homes.

Anticipated impacts are **negative during** construction period.

6.3.1.6 Mitigation/Enhancement Measures

6.3.1.6.1 Construction Phase

Temporary Direct and Indirect Employment Opportunities (primarily unskilled)

A Local Recruitment Plan is developed by Nakkaş Otoyol A.Ş. which will define the process to be followed for the recruitment, training, and development of local personnel, concretely:

- Nakkaş Otoyol A.Ş. will work with local authorities (such as İŞKUR) and employment organisations to ensure that all positions are advertised in a manner that is accessible to the communities in the AoI;
- Nakkaş Otoyol A.Ş. will ensure that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender; and
- Nakkaş Otoyol A.Ş. will comply with the national standards as well as international ILO standards. These include the protection of worker's wages, working time, work organization and conditions of work, arrangements to balance working life and the demands of family and life outside work, non-discrimination and protection from harassment and violence at work[216].

Nakkaş Otoyol A.Ş. will develop the following specific measures to facilitate access to employment for vulnerable people, including women and youth:

- Include gender quota to ensure women are represented in the pool of candidates or workers;

[216] ILO. Decent Work for Sustainable Development. 13- Working conditions. Available from: 23. Working Conditions (Decent work for sustainable development (DW4SD) Resource Platform) (ilo.org)

- Use inclusive vocabulary in job descriptions in order to encourage women to apply;
- Collaborate with local unemployment agencies.

Stakeholder Engagement Plan will be implemented to outline how Nakkaş Otoyol A.Ş. will ensure regular, open and transparent communication with all stakeholders, concretely:

- To provide clear information on the number and time framework of employment opportunities;
- To ensure information about employment opportunities and procurement strategies is disclosed in all the settlements within the AoI;
- To plan stakeholder engagement at an early stage of the Project, using inclusive dialogue to build a shared understanding of the potential positive and negative impacts of workers influx, and discuss the associated risks and opportunities;
- Continuing to communicate through a Grievance Mechanism with local stakeholders in a transparent manner about employment opportunities, and work with suppliers to enable capacity building, procurement, employment and contracting opportunities at a settlement-level, as part of maximizing the positive benefits.
- Stakeholders will also be able to report directly to the Project about their expectations and concerns related to the local economy and employment.

EBRD PR2 includes a clause on non-discrimination and equal opportunity. Nakkaş Otoyol A.Ş., in accordance with the PR 2, will:

- Ensure the employment of its workers is not made on the basis of personal characteristics such as gender, race, nationality, political opinion, affiliation to a union, ethnic, social or indigenous origin, religion or belief, marital or family status, disability, age, sexual orientation or gender identity, unrelated to inherent job requirements;
- Employ on the basis of equal opportunity and fair treatment;
- Implement measures to prevent and address harassment.

Furthermore, Nakkaş Otoyol A.Ş. is committed to employ 5% of people from vulnerable groups such as low-income households, refugees, young people, and ethnic minorities (as per the Labor Management Plan). Women and men will be evaluated according to the same standards, and employment priority will be given to female employees if they meet the expected qualifications. SPV and EPC Contractor also committed to employ in minimum 5% women during construction period.

Temporary Economic Impacts from Taxes and Fees, Procurement and Worker Spending

Supply Chain Management Plan is in placeto inform the Project's in-country value planning, specifically, with respect to the employment potential for multiple positions and the local provisioning potential through local suppliers from the area, concretely:

- As part of the tendering process, Nakkaş Otoyol A.Ş. and EPC Contractors will be required to develop a purchasing strategy that stipulates how national and local purchase of goods will be optimised. The purchasing strategy will be required to adhere to all Nakkaş Otoyol A.Ş. ESHS policies, procedures and Project ESIA report. Agreed measures will be monitored and reported by Nakkaş Otoyol A.Ş..
- Nakkaş Otoyol A.Ş. will engage with the local government, and other organisations to determine opportunities for targeted training;
- Any selected potential suppliers will have to meet health, safety and quality standards;
- Following selection of primary contractors, and prior to the start of construction, Nakkaş Otoyol A.Ş. will carry out trainings for contractors focused on the Project's E&S requirements including ESHS, socioeconomic and health policies.

Long-term benefits of capacity enhancement (on-the-job and formal training opportunities)

Supply Chain Management Plan includes the following:

- Nakkaş Otoyol A.Ş. will carry out training of contractors on Project Health and Safety Requirements (aligned with internal Nakkaş Otoyol A.Ş. H&S Plan) and socioeconomic policies prior to the start of construction activities and during operation when needed, training staff for emergency situations which include ERT trainings;
- To maximise capacity enhancement and transfer of knowledge to local contractors and their employees, Nakkaş Otoyol A.Ş. will develop formal training programs and formalise on-the-job trainings to the extent possible, including learning targets and performance monitoring.

Temporary disruptions for local businesses

In order to ensure all economic losses caused by the Project are duly compensated, the Project has developed Livelihood Restoration, Improvement and Assistance Measures as part of the RAP and these measures will be implemented as part of the RAP Implementation progresses

6.3.1.6.2 Operation Phase

Permanent and Temporary Direct and Indirect Employment Opportunities (primarily unskilled)

Nakkaş Otoyol A.Ş. will update its Local Recruitment Plan prior to operations specifying the exact needs for operations.

Local Recruitment Plan will ensure the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender. This plan will include internal measures within the hiring and on boarding processes in order to promote safe and fair female participation. Establishing a recruitment system that considers all applicants equally, in addition to conducting gender awareness workshops and incorporating gender sensitivity in the Code of Conduct are crucial to promoting a safe work environment for female workers, as well as combatting Gender Based Violence (GBV) for the women of Turkey.

A Stakeholder Engagement Plan will be implemented to outline how Nakkaş Otoyol A.Ş. will ensure regular, open and transparent communication with all stakeholders, concretely:

- To provide clear information on the number and limited timescales of employment opportunities.
- To advertise all openings in ways that are accessible to local communities

The Grievance Mechanism will ensure that individuals who have concerns or complaints about the Project or wish to report their potential expectations or concerns related to local economy and employment can communicate directly with the Project.

6.3.1.7 Summary Impact Table (Pre- and Post-mitigation – Residual)

6.3.1.7.1 Construction Phase

The table below includes a summary of the impact assessment on both Project phases, pre- and post-mitigation(s).

Table 6-94 Rating of Impacts Related to Employment Opportunities (Construction)

Project Phase: *Construction*				
Type of Impact: Direct and Indirect Positive Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Employment related impacts primarily at the local level.	*Local*	Employment related impacts primarily at the local level.
Duration	*Short/Medium-term (temporary)*	Majority of employment opportunities will be during the construction period (36 months).	*Short/Medium-term (temporary)*	Majority of employment opportunities will be during the construction period (36 months).
Scale	*High*	Approximately an average of 1,959 workers will be working in the Project per month. Other workers may benefit indirectly.	*High*	Approximately an average of 1,959 workers will be working in the Project per month. Other workers may benefit indirectly.
Frequency	*Intermittent*	Labour requirements will fluctuate during construction phase.	*Intermittent*	Labour requirements will fluctuate during operation phase.
Likelihood	*Likely*	Direct and Indirect employment opportunities are likely.	*Likely*	Direct and Indirect employment opportunities are likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Large Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Local expectations around Project employment is high.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Positive Impact			Positive Impact	

Table 6-95 Rating of Impacts on Local Businesses (Construction)

Project Phase: *Construction*				
Type of Impact: Positive and Negative Impacts				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local, Regional*	Local and regional profit generation from taxes/fees, procurement and worker spending Local businesses (e.g. shops and hotels), for which customers find difficult access and therefore decrease their income. The difficulty of access might not be the only issue reducing the revenue of the local businesses; indeed, the effects of noise and dust during the construction phase could also hinder them.	*Local, Regional*	Local and regional profit generation from taxes/fees, procurement and worker spending. The effects of noise and dust during the construction phase could also hinder them.
Duration	*Short/Medium Term (temporary)*	Short-term during the construction phase.	*Short/Medium Term (temporary)*	Short-term during the construction phase.
Scale	*Medium*	Medium impact on in-country and local profit generation from taxes/fees, procurement and worker spending. Major impact on local businesses if accessibility, noise and dust is nor managed in line with Project standards.	*Medium*	Medium impact on in-country and local profit generation from taxes/fees, procurement and worker spending. Moderate impact on local businesses due to dust and noise impacts.
Frequency	*Intermittent*	Throughout construction	*Intermittent*	Throughout construction
Likelihood	*Likely*		*Likely*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Along the AoI there are many small scale businesses and shops in retail goods, food and services which cab be affected in anegative way by construction nuisance (dust, noise, severance, etc.)				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-96 Rating of Impacts Related to Capacity Enhancement (Construction)

Project Phase: *Construction*				
Type of Impact: Direct and Indirect Positive Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local, Regional, National*	Impact on capacity enhancement of local, regional or national individuals and businesses.	*Local, Regional, National*	Impact on capacity enhancement of local, regional or national individuals and businesses.
Duration	*Permanent*	Benefits of capacity enhancement will be permanent.	*Permanent*	Benefits of capacity enhancement will be permanent.
Scale	*High*	The number of individuals benefiting from enhanced capacity development both directly and indirectly is high as well as the potential to source local contracts.	*High*	Targeted training programs implemented by the Project will further enhance the scale of impact which remains high.
Frequency	*Continuous*	Long-term benefits will be capitalized on by individuals/individual businesses.	*Continuous*	Long-term benefits will be capitalized on by individuals/individual businesses.
Likelihood	*Likely*	Capacity enhancement through on the job training is likely.	*Likely*	Capacity enhancement through on the job training is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Low Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity of long-term capacity enhancement is considered medium as primary benefits will be during the construction phase with long-term benefits capitalized on by individuals and businesses on their own initiative once construction is complete.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Positive Impact			Positive Impact	

6.3.1.7.2 Operation Phase

The table below includes a summary of the impact assessment on both Project phases, pre and post mitigation(s).

Table 6-97 Rating of Impacts Related to Employment Opportunities (Operation)

Project Phase: Operation				
Type of Impact: Direct Positive Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Employment related impacts primarily at the local level.	*Local*	Employment related impacts primarily at the local level.
Duration	*Long-term (temporary)*	Local employment opportunities will be long-term throughout operation.	*Long-term (temporary)*	Local employment opportunities will be long-term throughout operation.
Scale	*Low*	Workforce will be significantly reduced during operation.	*Low*	Workforce will be significantly reduced during operation.
Frequency	*Continuous*	Continuous throughout operation.	*Continuous*	Continuous throughout operation.
Likelihood	*Likely*	Operation employment benefits are likely.	*Likely*	Operation employment benefits are likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Small Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Job creation is considered of high importance to local communities although it is noted that scale is significantly reduced from construction.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Positive Impact			Positive Impact	

6.3.2 Land and Livelihoods

6.3.2.1 Potential Impacts

This chapter addresses the likely physical and economic displacement impacts caused by land acquisition including classifying the types and extent of displacement, income and land-based livelihood impacts based on the data collection that has been undertaken to date.

Table 6-98 summarises the potentially significant impacts on land and livelihoods during the construction and operation phases of the Project. The minimisation of severance impacts is one of the main issues that will be addressed by appropriate design of the Project.

Table 6-98 Potential Impacts on Land and Livelihoods

Construction Phase	Operation Phase
■ Impact on physical resources and related livelihoods (resettlement and economic displacement); and ■ Impact on natural resources and related livelihoods (resettlement and economic displacement).	■ Permanent loss of livelihoods and household income due to permanent land restrictions (safety zones) and resettlement; and ■ Changes in land values post construction in peri-urban and rural areas due to building restrictions.

To avoid, minimize and reduce environmental and social impacts, the Project will avoid any residential structure through the detailed design phase to the greatest extent practicable. Wherever possible, Nakkaş Otoyol A.Ş. will make sure that existing utilities remain in place or are incorporated into the new works. In locations where this is not possible, the utilities shall be diverted. Utilities that are not scheduled to be relocated, will be protected from possible damage.

The Project-related land acquisition process will be executed by the KGM as per the Expropriation Law and the Lenders standards. The Project-related land acquisition includes[217]:

- Expropriation of the privately-owned parcels;

Allocation of the state-owned parcels (e.g. parcels owned by the related municipalities, State Hydraulic Works – DSI, Housing Development Administration of Turkey – TOKI) including treasury parcels, pasture parcels, etc. to the Project (for permanent use by the Project or temporary use by the Company during construction period);Coordinating the process of identification of affected infrastructure and above ground facilities of other institutions overlapping with the Project and executing official correspondence with all relevant institutions – requiring Nakkaş Otoyol A.Ş. to conduct any follow up correspondence or communication as required. The General Directorate of Motorways Turkey (KGM), the Project owner, has confirmed that the expropriation of privately-owned parcels has started as per the Expropriation Law of Turkey (No. 2942, 1983) in June 2021. In total (affected and non-affected private parcels), consent agreements have been reached for 373 parcels (176 parcels acquired in 2021-2022 based on November 2021 Valuation and 197 parcels acquired in 2023 based on December 2022 Valuation).

The Public Benefit Decision for the Project was declared by the MoTI on 19 August 2016. On the basis of this Decision, Presidential Decrees were issued for the Project in November 2020 and September 2021[218] for accelerated expropriation in line with the Art. 27 of the Expropriation Law and expropriation decisions were taken by KGM in 2022. Following this, Project expropriation works in line with the Expropriation Law has started and conducted as below:

- **Past Expropriation Process** was undertaken by KGM in 2021-2022 based on the initial Valuation Study approved by KGM in November 2021.
- **Current Expropriation Process** has started by KGM in February 2023 based on **Updated** Valuation Study approved by KGM in December 2022.

Based on the Accelerated Expropriation Decisions, KGM has the right to initiate court cases in line with the construction schedule and depending on the current expropriation budget available for payment to right holders – prioritizing the parcels that are required for construction relatively earlier than other parcels.

On the other hand, in this Project, **KGM has prioritized negotiated settlements through Art. 8 process** (purchasing method) under the Expropriation Law.

As part of the Past Expropriation Process, Art. 27 process has been applied by KGM to 11 parcels, for which all legal procedures have been completed in line with the Expropriation Law.

For Ongoing/Future Expropriation Process of the remaining parcels, KGM has started inviting all owners/shareholders (including heirs identified by KGM and Nakkaş Otoyol A.Ş) to Art. 8 negotiations and conducting negotiation meetings in February 2023 (will progress lot by lot). Parcels that have been entered to date has been prioritized in the expropriation program agreed between KGM and Nakkaş Otoyol A.Ş. Expropriation of parcels that have been entered (stripped parcels) has been prioritized by KGM. Full expropriation process (including expropriation payments as per Art. 8 and deposition of land

[217] RAP, GEM 2022

[218] Presidential Decree of 2021 was issued to cover the additional parcels required to be acquired in line with the latest Project design.

seizure fees as per Art. 27 as applicable) will be completed by KGM in line with the expropriation programme presented in Project RAP.

In this process, **Art 27. will be a last resort** and will not be initiated by KGM until all owners/shareholders/heirs/users are identified; all of the affected PAPs are consulted; all right holders are invited for negotiations as per Art.8; and only if the negotiated settlements fail.

Current status of land acquisition/expropriation of **privately-owned parcels** according to their land entry status is presented in details in Project RAP (GEM, 2023).

Site mobilisation and land entry by the Nakkaş Otoyol A.ŞEngineering Procurement Construction (EPC) Contractor has started for the Project in 2021 for parcels that had priority in terms of topsoil stripping and/or construction. All construction works that started in 2021-2022 have been suspended by the Nakkaş Otoyol A.Ş/EPC in 2022. To avoid land entry without completion of expropriation or execution of mutual agreements, the Nakkaş Otoyol A.Ş has incorporated the completion status of expropriation as a pre-requirement to their work permit system in June 2022 and prepared templates for land entry protocols that shall be executed prior to land entry on each parcel (after completion of payments required under Turkish Expropriation Law and/or in line with the RAP as applicable).

Table 6-99 provides a summary of the general status of land acquisition/expropriation for privately-owned parcels, state-owned parcels and parcels-owned by legal entities.

Table 6-99. Summary of Acquisition/Expropriation Status of Private and Public Parcels per Land Entry Status (as of end March 2023)

Expropriation Status	Private Parcels		Public Parcels		Total (Private + Public)		
	1,239		284		1,523		
	Entered	Not Entered	Entered	Not Entered	Entered	Not Entered	Total
Art. 8	**188**	**185**	**134**	**150**	**322**	**335**	**657**
Expropriated	*91*	*116*	*100*	*99*	*191*	*215*	*406*
Expropriation Started, Under Progress	*97*	*69*	*34*	*51*	*131*	*120*	*251*
Art. 27	**11**	**0**	**0**	**0**	**11**	**0**	**11**
Expropriated	*11*	*0*	*0*	*0*	*11*	*0*	*11*
Expropriation Started, Under Progress	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Expropriation Completed (Art. 8 *Expropriated* + Art. 27 *Expropriated*)	**102**	**116**	**100**	**99**	**202**	**215**	**417**
Expropriation Not Started Yet	**173**	**682**	**0**	**0**	**173**	**682**	**855**

Source: RAP, GEM 2023

Status of land acquisition/expropriation of privately-owned parcels according to their land entry status is presented in Table 6-100.

Table 6-100. Expropriation Status of Privately-owned Parcels (as of 31 March 2023

Impact Status of Lands	Category of Land Entry	Total Number of Parcels	[Category A] Parcels acquired through consent agreements (Art. 8 as per Exp. Law) 2021- 2022 (Past Land Acquisition)	[Category A] Parcels acquired through consent agreements (Art. 8 as per Exp. Law) 2023	[Category B] Parcels acquired through court (Accelerated expropriation process – Art. 27 as per Exp. Law	[Category C] No formal land acquisition process completed yet
"Affected Private Lands"	**Parcels Entered to Date – No Active Work (Topsoil Stripped)**	353	61	119	0	173[219]
	Parcels Entered to Date – Active Work	19	8	0	11	0
"Non-affected Private Lands"	**Parcels not Entered to Date**	867	107	78	0	682
Total – Private Parcels		**1,239**	**176**	**197** **373**	**11**	**855**
Status of Title Deed Transfers			**176**	**179** **355**		

Source: RAP, GEM 2023

[219] Official Art. 8 notifications based on Updated Valuation have been sent by KGM and the expropriation process is ongoing as per the Law.

Table 6-101 Summary of restrictions to physical structures along the RoW during construction and operation

Component	Construction Restrictions	Operation Restrictions
Road Footprint (43 m) and safety buffers (7 m) – Expropriation Corridor		
60 m	■ Permanent removal of all houses and structures. ■ Land clearance and removal of all crops and vegetation. No new trees or crops. ■ No pedestrian access during construction and operation.	■ No pedestrian access. ■ No houses/structures, or crops and permanent plantations (except the landscaping work within Project scope).

Source: ERM, 2021

6.3.2.2 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

- A total of 15 settlements have been identified in the Area of Influence (AoI). Settlements are typically located around the existing road;
- The road alignment crosses predominantly urban and commercial areas with high to medium population densities and semi-urban/rural areas with lower population densities;
- The type of land ownership varies in the different districts and neighbourhoods. In some of the neighbourhoods of Başakşehir and Arnavutköy (especially those located more on the eastern side of the route), *Muhtars* reported not knowing the official land owners as they (the landowners) were not official residents of these districts;
- For almost all villages, agricultural land is rented out for farming purposes. Some people also rent treasury land through payment (*ecrimisil*). Some of the rural and remote areas in the northwest and southwest parts also accommodate informal users without any formal contracts hosting activities such as small-scale barns and small-scale greenhouses;
- The majority of livelihood activities within the rural areas of the AoI are highly dependent on agriculture with other activities including animal husbandry, commerce and trade, and beekeeping;
- Although most of the AoI has historically been rural, the expansion of İstanbul city, its suburbs and the surrounding districts has caused loss of forest and agricultural area in the region. Subsequently, animal husbandry has been restricted in some neighbourhoods due to the increasing production costs and decreasing area for grazing. Scale of flocks and animal numbers have decreased quite remarkably in the recent 20 years according to the stakeholders of Arnavutköy;
- Over 90.15 % of the Road Footprint/Expropriation Corridor is categorised as greenfield, 5.79 % is arable land used for pasture and animal grazing, 3.53 % is agricultural land;
- Physical structures found along the AoI include a mix of commercial structures, residential structures, and non-residential structures such as farms, animal shelters, factories, and commercial buildings/markets;
- There are many sensitive facilities (schools, mosques, residential buildings, hospitals and leisure infrastructures such as malls and parks) located near the road within the Project's AoI. According to the GEM RAP 2022, there are parcels registered as parks within the Expropriation Corridor, more specifically three (3) in Başak, thirty-eight (38) in Başakşehir, one (1) in Şahintepe and thirteen (13) in Kayabaşı, all located in the district of Başakşehir. In terms of total area to be expropriated, it will be 3.89 hectares in Başak, 10.06 hectares in Başakşehir, 1.34 hectares in Şahintepe and 17.98 in Kayabaşı. Furthermore, there are wedding halls within the Expropriation Corridor located in Başak (Başakşehir district) and in Ömerli (Arnavutköy district);

- There is a grand total of 1,523 parcels affected within the Expropriation Corridor. Private parcels will be the most affected with a total of 1,367 (1,239 privately owned and 128 owned by legal entities), and a total of 156 public parcels will be affected (39 treasury parcels and 117 non-registered public parcels).Table 6-99 provides a summary of the general status of land acquisition/expropriation for privately-owned parcels, parcels-owned by legal entities.
- Information on the Past Land Acquisition Audit conducted by the Lenders' independent E&S consultant (IESC) and the Corrective Action Plan developed to ensure compliance of previous/ongoing construction activities with the standards and requirements of the lending institutions (i.e. EBRD PR5) is provided in Section 6.3.2.6.10.
- The land expropriation process will also affect business and structures contributing to the well-being and cohesion of the communities in the AoI, by enriching the local economy and employment offer, offering leisure and recreation services, and providing education services;
- The land expropriation process will aim to have the most beneficial impact, but some small and medium businesses will need to be resettled because of the Project. These businesses may lose oose significant income if resettlement process is not managed well and if they cannot reach agreements as court process can take a long time. Additionally, some of the workers of these businesses might lose their jobs;
- Vulnerable groups include households with particularly low incomes and high land dependency for subsistence and income generation. These households can be found throughout the AoI and are prevalent in the rural settlements where agriculture is the primary livelihood activity. Households with disabled and elderly household members as well as female or child-headed household are also particularly vulnerable to potential loss of livelihoods related to land access restrictions. Finally, rural areas the majority of women work informally in the agriculture sector as an unpaid family worker in agriculture or in minimum wage-jobs;
- The biggest issues in the AoI that enhance the vulnerability of the population are the rising of prices, decline in agricultural production or income obtained from the trade of agricultural products due to the rapid urbanization of some districts. Indeed, prices are currently rapidly increasing in some districts of the AoI. This is due to the planned development of megaprojects in İstanbul, which interacts with the Project and passes through three districts of the AoI: Başakşehir, Arnavutköy, and Avcılar, which all reported the rise of prices as a severe issue.
- The Project requires relocation and re-design of the existing Overhead Head Transmission Lines (OHTLs) as summarized below[220]:

  KM 54+000 – KM 59+000 – OHTL Displacement Works: Displacement of 5 km OHTL (Habipler Energy Transmission Line displacement works), previously consisting of 3 transmission lines (2 x 154 kV + 1 x 380 kV) has been completed in August 2022. The works were conducted in line with the protocol executed between KGM and Turkish Electricity Transmission Corporation (TEIAS) on 18 January 2022.

  As part of displacement, number of transmission lines has been reduced to 2 (1 x 154 kV + 1 x 380 km) and the OHTL towers have been heightened up to 65 to 86 meters (initial height of the towers was on average 30 meters). There were 35 OHTL towers (pylons) along the previous OHTL route which have been dismantled and replaced with 31 new OHTL towers (pylons) built along the new OHTL route. Out of the 31 new OHTL towers, 9 of the pylons require additional expropriation and 22 of the pylons are located in the expropriation corridor of the previous OHTL route or expropriation corridor of the Motorway, thus does not require additional expropriation.

  The parcels corresponding to the OHTL tower locations and that require additional expropriation will be expropriated and easement rights (servitude or "*irtifak*" in Turkish) for the underwire alignment will be established by KGM in line with the Expropriation Law.

[220] RAP, GEM 2022

To this end, Updated Valuation Study conducted for the Motorway Expropriation Corridor in 2022 covered the additional parcels to be expropriated on the OHTL displacement route. Expropriation of the OHTL tower locations and constitution of easement rights along the OHTL displacement route are prioritised within the Expropriation Programme of KGM (along with the stripped parcels).

The expropriation plan for the 5 km OHTL displacement between Kayabasi, Ikitelli-1 (Basak) and Ikitelli-2 (Basaksehir) neighbourhoods of Basaksehir district has been prepared and submitted by KGM to Turkish Electricity Transmission Company (TEIAS) in March 2023 and TEIAS's approval is received for the submitted plan. The expropriation plan has been submitted to the related Cadastre Directorate.

Upon review and approval of the expropriation plan by the related Cadastre Directorate, expropriation processes are planned to be undertaken and completed by KGM within Q3 2023.

As required, the Nakkaş Otoyol A.Ş, will provide the applicable entitlements to affected people as described in the Entitlements Matrix of this RAP to ensure compliance of the OHTL expropriation works with Lenders' requirements for land acquisition and resettlement.

As such, in total, 18 parcels are subject to expropriation and/or easement rights as summarised below:

- Land take through expropriation only: 3 parcels (1 private + 2 legal entity)
- Land take through easement right only (for underwire align.): 9 parcels (7 private + 1 legal entity + 1 treasury)
- Land take through both expropriation and easement rights: 6 parcels (3 private + 3 treasury)

Among the 18 affected parcels (by expropriation or easement rights of both), only 4 private parcels will be expropriated. The parcels to be expropriated (4 parcels) are owned by multi-storey housing complexes. On these 4 parcels, there are 4 new OHTL towers (with 2 transmission lines) erected in the gardens of the multi-storey housing complexes (private ownership) located in Basak neighbourhood near Sular Valley. The gardens of these multi-storey housing complexes were already housing 3 of the previous OHTL towers (with 3 transmission lines). These previous 3 OHTL towers were dismantled and removed, foundations of them have been rehabilitated and handed over to the housing complexes as part of the OHTL displacement works. As reported by Nakkaş Otoyol A.Ş, the pylon locations for the new OHTL route within the gardens of the housing complexes has been decided in consultation with their management in a way to minimise the land use within their gardens.

The underwire alignment for which easement rights are constituted is not restricted for use; tree planting is not allowed and construction is permitted with certain health and safety conditions set by TEIAS.

Expropriation of the ETL tower (pylon) locations and constitution of easement rights along the OHTL displacement route will be prioritised and conducted by KGM in line with the Expropriation Law based on the Updated Valuation Study completed in November 2022 and in accordance with the principles of this RAP that will be implemented by Nakkaş Otoyol A.Ş in collaboration with KGM.

In case of future land acquisition/expropriation and resettlement requirements for any works that are not foreseen at this stage, RAP Addendum will be prepared and implemented by Nakkaş Otoyol A.Ş in accordance with the principles of this RAP in collaboration with KGM.

The EPC Contractor has already engaged with the affected communities between Km 54+000 – Km 59+000 between January 2022 and July 2022 as presented in Chapter 4.4.8.2 "*Engagements during the ESIA and Construction Phase*".

Based on the information received from Nakkaş Otoyol A.Ş., the community didn't have concerns on relocation of the overhead transmission lines except Head of Özkaymak Residences located at Km 58+700. Head of Özkaymak Residences expressed that the new route of the overhead

transmission line was close to the residents and the residents were concerned about exposure to radiation.

- **KM 49+500 – OHTL Re-design and Heightening Works:** Existing OHTL, consisting of 3 transmission lines (2 x 380 kV + 1 x 154 kV) will be re-designed by heightening up to 10 meters. The new tower (pylon) locations will be next to the existing tower locations, ensuring sufficient distance in terms of occupational health and safety of the works who will be engaged in heightening works.

  Nakkaş Otoyol A.Ş. is currently working on the detailed design of the planned works.

- **Bahcesehir Connection Road – OHTL Re-design and Heightening Works:** Existing OHTL (single transmission line: 1 x 154) will be re-designed by heightening up to 10 meters. The new tower (pylon) locations will be next to the existing tower locations, ensuring sufficient distance in terms of occupational health and safety of the works who will be engaged in heightening works.

6.3.2.3 Embedded Measures

As a first step in the process for managing displacement impacts, Nakkaş Otoyol A.Ş. has commissioned the development of RAP. The finalized RAP will outline the Project's commitment to mitigate adverse socioeconomic impacts from land acquisition or restrictions on affected persons' use of or access to land. It will provide the foundation for the resettlement process including an entitlement matrix that will ensure adequate compensation, resettlement and livelihood restoration options are provided to the Project's affected people.

In line with the national requirements as well as the applicable EBRD's performance requirements, there are several key elements to this mitigation approach including:

- Providing compensation for loss of assets at replacement cost;
- Ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and informed participation with those affected;
- Improving or, at a minimum, restoring the livelihoods and standards of living of displaced persons to pre-Project levels, so as to facilitate sustainable improvements to socio-economic status;
- Considering informal users in terms of economic displacement;
- Paying particular attention to the needs of vulnerable groups;
- There are 15 agricultural parcels that will be fragmented by the Motorway along the full alignment. This is a concern as it can increase transportation costs, and be a safety issue; and
- Construction phase impacts and crops were also raised as key concern.

6.3.2.4 Feedback from Stakeholders

Stakeholders that participated in the consultation activities (conversations with *Muhtars* and the RAP, refer to Chapter 4.2 of the RAP for more details) expressed their concerns regarding displacement and compensation matters as listed below:

- Some agricultural land was already lost to other infrastructure Projects;
- Almost all *Muhtars* stated that the few meadows/grazing areas present in the Project area are not used anymore and cattle are mostly kept in barns and fed with fodder. On the other hand, sheepherders prefer to graze their flocks over empty lands. A couple of the *Muhtars* interviewed claimed that they received letters requesting change of status of the meadows present in their village and stated that they would provide their consent to the requests;
- The formal and informal users of the affected parcels were consulted as part of the RAP surveys to receive their feedback on Projects impacts on livelihoods and provide their input into assessment of impacts and design of livelihood restoration and improvement measures. The agricultural users

interviewed as part of the RAP surveys provided information on current farming practices (mostly dry farming conducted to grow forage required for livestock raised by the households), crop rotation practices, previous alternative crop growing experiences, availability and use of external labour force, water well ownership, other livelihood sources such as beekeeping, availability of replacement agricultural land in the region and agricultural support needs and suggestions including agricultural consultancy and agricultural equipment provision. These feedback and input has been integrated to the entitlement matrix and livelihoods restoration and improvement design under RAP (please see RAP Chapter 5 for details).

- During construction, Nakkaş Otoyol A.Ş. will implement the SEP including the grievance mechanism and continue engaging with the PAPs, including users of fragmented and orphan parcels, on an ongoing basis. Any feedback and/or request received from PAPs related to land fragmentation, engineering structures, etc. will be investigated by Nakkaş Otoyol A.Ş. design and construction teams and assessed by an Independent Land Acquisition/Expropriation and Valuation Specialist (to avoid any conflict specially in cases where there is disagreement with the landowners on the decision of Nakkaş Otoyol A.Ş. /KGM) in terms of necessity, and technical and financial feasibility. Where necessary and feasible, Nakkaş Otoyol A.Ş., subject to approval by KGM, may include additional structures in the design throughout the construction phase (RAP, GEM 2023).
- In Sahintepe (Muratdere locality), households engaged in livestock activities reported that the parcels corresponding to the beam manufacturing facility and excavated materials storage site (south of Sazlidere Mobilisation Site) were among their grazing area (noting that the parcels are owned by TOKI – with land registry type of constructible plot not registered pasture) thus affected by the Project. Between late June and late October, the households take their ovine animals to harvested agricultural lands (at the southern cost of Sazlidere Dam – north of the Sazlidere Cable Stayed Bridge and Motorway). As the construction activities are ongoing, measures will be required to ensure their safe access to those agricultural lands between late June and late October. Nakkaş Otoyol A.Ş. has been engaging with the local community and construction teams to evaluate feasibility of providing safe crossing paths to the northern side of Motorway during construction phase and replacing affected water resources noting that the community could not propose/identify a convenient alternative as the existing water channels and creeks in the area are reported (by Sahintepe residents) to be contaminated by ongoing domestic wastewater discharges (RAP, GEM 2023).
- In Kayabasi neighbourhood, the grazing areas (vacant constructible plot parcels) located at the southern side of the Motorway route . They use the grazing area throughout the entire year (they cross the area planned Motorway route everyday between 10:00-11:00 in the morning and 21:00-21:30 in the evening) There is an overpass designed to provide crossing during the operation phase. Household engaged in bovine breeding conduct intensive stock farming and do not depend on grazing areas for their livestock activities. Nakkaş Otoyol A.Ş. has been engaging with the ovine breeders and construction teams to evaluate feasibility of providing safe crossing paths to the southern side of Motorway during construction (there is a WhatsApp messaging group in place including Nakkaş Otoyol A.Ş. CLO and herders established for the management of blasting activities). The overpass design is also being consulted with the ovine breeders to ensure that it can safely and effectively used by ovine breeders to access their grazing areas in the southern part of the Motorway throughout the operation phase – as long as vacant private constructible plot parcels used by the community remain available to them. Any future suggestion or concern of herders will be taken into consideration by Nakkaş Otoyol A.Ş. and reflected in the design to the extent this is feasible (RAP, GEM 2023).
- Nakkaş Muhtar stated that they had issues accessing their land due to the construction of Northern Marmara Motorway which has not been solved so far;
- Feedback of the owners of the affected businesses (including tenants) and their employees were collected through RAP surveys conducted in 2021. Nakkaş Otoyol A.Ş. CLO has continued ongoing consultation with the affected businesses in the first half of 2022 to receive their further feedback

and input to the planning of resettlement and design of livelihood restoration and improvement measures. This included their current relocation plans (e.g. alternative locations, if any – with their advantages/disadvantages), anticipation for workforce and customer loss/reduction, relocation assistance requirements, anticipation for relocation costs for different items (e.g. assembly, disassembly, moving, improvements required at the replacement structure, cost of temporary business interruption, etc.) and level of information about the Project and expropriation. Currently, all business owners (including tenants) are well informed of the Project and notified about the expropriation and RAP being developed Nakkaş Otoyol A.Ş.. Of note, a need for information about the exact schedule of expropriation and construction (land entry) to allow the affected businesses sufficient time for browsing/finding a replacement business structure/workplace and completing necessary improvements/ preparations required for the needs of their specific operations was identified. During the RAP consultations done in November 2021, most of the tenant businesses reported that they have not made specific plans for relocation nor started browsing a replacement workplace as the official notification has not been done yet. There are businesses that have identified and started analysing alternatives none of them except for 1 business have decided on relocation sites. None of the businesses reported plans or possibilities about business shut down or downsizing. Some of the businesses have plans for expanding their operation capacity at the relocation sites. Most of the affected businesses have made fixed investments/improvements at their existing premises such as water and electrical infrastructure, fire-fighting system, ventilation system, etc. depending on their needs. They will have to make similar investments at the replacement business structure. Transportation/moving of goods, machinery, equipment, furniture, etc. will be needed for all affected businesses. Some of the businesses reported need for guidance for finding replacement premises of adequate size and rental cost in the same region. The status of relocation planning of each business is presented in details in RAP. Based on the information and feedback collected from affected households and businesses on livelihood restoration and improvement through RAP surveys of 2021 and 2022, measures have been specified in the RAP.

- In Ömerli, the relocation of the affected businesses may involve considerable challenges as it may be difficult to find a building of equal features, i.e. capacity, location, rental fee (as the rental costs have significantly increased in certain locations due to COVID-19 pandemic), adequacy of infrastructure, etc.;
- The Project needs to consider adequate arrangements to ensure no access restriction for the remaining buildings and no potential health and safety risks for the employees and third parties/visitors.
- Based on the information received from Nakkaş Otoyol A.Ş., the community didn't have concerns on relocation of the overhead transmission lines except Head of Özkaymak Residences located at Km 58+700. Head of Özkaymak Residences expressed that the new route of the overhead transmission line was close to the residents and the residents were concerned about exposure to radiation.

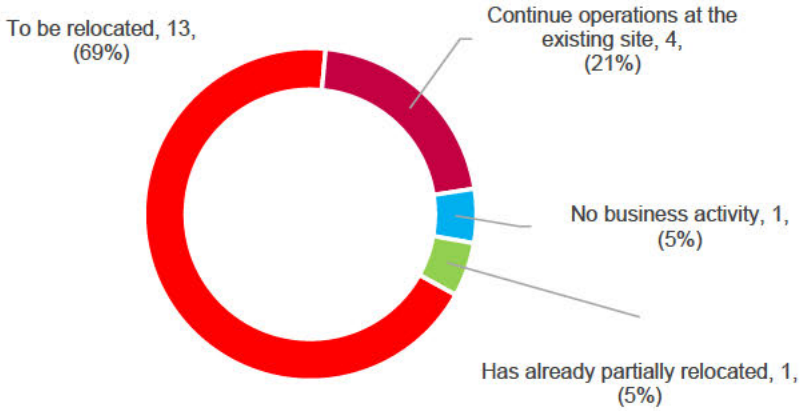
6.3.2.5 Impact Assessment

6.3.2.5.1 Construction Phase

Impacts on physical resources and related activities

- *Loss of residential structures*
- Data collected in the GEM RAP 2023 show permanent and temporary residential structures could be impacted. Physical displacement, depending on the resettlement options provided by the Project, may cause inability or difficulty of households to continue to access the same livelihood resources leading to related economic displacement impacts. *Loss of commercial, business and non-residential structures*

The businesses within the Expropriation Corridor have been identified by GEM based on the Structure Identification Reports conducted as part of the Valuation Study done per Expropriation Law. Status of the affected businesses that will be relocated are listed below:



Source: GEM

There are 14 businesses to be relocated (1 of them has already partially relocated). In addition to the businesses that will relocate due to Project, there are businesses with structures to be affected by the Project but will not relocate and continue their operations at their existing premises: Also, there is one business (Sular Valley Social Complex) for which impact on structures has been avoided by design and one business that has ceased operations during Covid-19 pandemic. Except for the latter, operations of these businesses will be monitored as part of RAP implementation and Nakkas Otoyol A.S will continue consultations with the businesses as part of SEP. The Project Grievance Mechanism will also remain available for all stakeholders including these businesses throughout the construction and operation phases of the Project.

The RAP surveys targeted full census of the businesses operating at the affected business structures, including the ones that will not relocate due to Project, to identify the ownership/tenancy statuses, potential losses, current socio-economic conditions and the potential support/assistance mechanisms/measures. The RAP surveys targeted full census of the businesses operating at the affected business structures, including the ones that will not relocate due to Project, to identify the ownership/tenancy statuses, potential losses, current socio-economic conditions and the potential support/assistance mechanisms/measures. Detailed findings of the RAP surveys done with the owners and tenants of the affected businesses are presented in RAP.

Table 6-102. Affected Businesses that will be relocated due to Project

PAP Code	Owner/ Tenant of Affected Business Structure	Description of the Business Activity	Relocation Need/ Status	Number of Employees (Direct)						
				Formal Employees			Informal Employees[221]			Total Number of Employees
				Women	Men	Total	Women	Men	Total	
BUS-0/1461	Owner	Waste collection (non-hazardous recyclables incl. metal, paper, plastic)	Already partially relocated		3	3		6	6	9
BUS-0/1119d		Manufacturing (hydraulic breakers and industrial goods)	To be relocated	1	24	25				25
BUS-669/3b		Building construction	To be relocated	7	13	20				20
BUS-163/15a	Tenant (Formal)	Manufacturing (tulle curtain)	To be relocated	11	18	29				29
BUS-163/15b		Manufacturing (creative box and packaging)	To be relocated	23	7	30				30
BUS-163/15c		Metal casting (pots, pans)	To be relocated		3	3		20	20	23
BUS-163/15d		Branch of Leasing Company	To be relocated		2	2				2
BUS-0/1119a		Manufacturing and warehouse (auxiliary chemicals for textile industry)	To be relocated	1	8	9				9
BUS-0/1119b		Import and marketing (home accessories and glassware)	To be relocated		12	12				12
BUS-0/1119c		Manufacturing (wet wipes caps, covers, cotton swabs, boxes, etc.)	To be relocated	30	15	45				45
BUS-132/53		Waste recycling (plastic)	To be relocated	2	3	5		10	10	15
BUS-190/7a		Local butcher and meat restaurant	To be relocated		2	2	2	3	5	7
BUS-190/7b (*)		Excavation works and landscaping	To be relocated		2	2				2
BUS-669/3a		Import, export, sales and marketing (floriculture and landscaping)	To be relocated	5	10	15				15
Total				**80**	**122**	**202**	**2**	**39**	**41**	**243**

Source: RAP Surveys, 2021 and June 2022.

[221] Employees who are not registered at the workplace under the Social Insurance and Universal Health Insurnace Law (No. 5510) of Turkey.

(*) RAP surveys of June 2022 identified that the owner of the business has passed away due to Covid-19. The heirs of the parcels have been reached but could not provide information on the future of business activities. As per the information received by the Nakkaş Otoyol A.Ş, from the settlement head and neighbouring business (BUS-190/7a), the business is no longer operational. The Nakkaş Otoyol A.Ş,, with support from the External Business Consultancy, will confirm the information based on registration data and consultations with the partners of the business where possible, and take into consideration any relevant information to be obtained in the RAP implementation as necessary. The employee figures are based on the data obtained in the surveys of 2021.

Owners and employees of these affected structures are expected to experience a temporary loss of income and employment due to the removal and relocation of the structures within the road footprint and the Construction Corridor. The permanency of removal of any structures beyond the construction width will be maintained. Should the businesses not be re-located close by, employees may experience economic displacement, needing to seek alternative employment in the local area.

The loss of leisure and recreation services areas will affect the space for social interaction. Access to certain areas (businesses, shops, malls, parks, wedding halls etc.) will be affected temporarily during construction and potentially also permanently in case the Project does not provide sufficient crossing points.

While during operation of the Project most business infrastructure will have been re-established, difficulty to access specific business infrastructure could be a remaining impact resulting in economic impacts. At the same time however, the construction of the motorway can increase movement of population including potential target customers, etc. Therefore, the operation of the road could have a positive effect on economic impacts considering an improved business infrastructure.

The respective impacts on a given person can range from **minor** to **major**, depending on the type of business conducted and the importance in terms of economic resource for the affected household (any other livelihood strategies, or sole money-generating activity).

Impact on natural resources and related livelihoods

A number of restrictions will apply to natural resources located inside the Expropriation Corridor. Local landowners and land users will experience loss of agricultural land such as plots and agricultural parcels as a result of Project land take and restrictions. Additionally the Project will cause severance and fragmentation of agricultural land and possibly other holdings making them less viable through limited access.

Approximately two thirds of all land (386.94 ha over 550.06 ha) within the Expropriation corridor is classified as natural resource (e.g. agricultural parcels, pastures and plots). Of all-natural land, nearly one third is located within the Construction Width and will be temporarily affected by the construction activities and for the land within the Road Footprint also permanently during operation of the road. According to the RAP, there are 7 pasture parcels in 3 settlements (Hastane, Ömerli and Nakkas). There also is a single forest parcel (0/5181 registered in Hadimkoy) within the Expropriation Corridor overlapping fully with the Hadimkoy Interchange at KM 41+420.

- *Loss of agricultural and grazing land*

Within the Expropriation Corridor, around 386.94 ha of agricultural land will be affected (e.g. land for crop cultivation and pasture). A large number of private land owners are expected to be impacted by the Project. In total, 1,323 agricultural plots will be affected, including 515 agricultural parcels, 7 pasture parcels and 801 plots. This affected agricultural land will be entirely cleared for the construction of the Project. Landowners and users will be affected facing the loss of livelihood source through permanent land take leading to economic displacement. The settlement with the biggest agricultural area to be expropriated is Nakkaş (Çatalca district) with 79.75hectares expropriated. This neighbourhood reported during the Settlement Profiling activity that they already had issues accessing land prior to the Project due to the Northern Marmara Motorway construction.

Loss of land may also impact those households engaged in animal husbandry/grazing of livestock. Around 11.15ha of land in the Expropriation Corridor is classified as pasture. Households who might lose access to grazing areas may suffer certain economic impact if alternative areas are not readily available nearby. This will also affect livestock which may be at risk due to construction activities.

Additionally the Project will cause severance and fragmentation of agricultural and possibly other holdings making them less viable through limited access. Local communities are likely thus to be affected by access restrictions to provisioning services from ecosystems.

Furthermore, the blasting activities could disturb and scare the grazing livestock due to the noise, the ground and air vibration and the dust generated. The grazing land will therefore be temporarily unusable during the duration of the blasting and its effects.

Households with particularly low incomes and high land dependency for subsistence and income generation will be the most vulnerable to this impact, especially if they count with disabled and elderly household members or if they are female or child headed. Informal workers of the agriculture sector (where women are predominant) might not be compensated properly and struggle to find other types of income if available agricultural land is reduced and not properly relocated.

The respective impacts on a given landowner can range from **minor** to **major**, depending on the size and the importance of the affected land (also in relation to remaining, unaffected land) as economic resource for the affected household and informal workers. The exact number of plots and sizes will be confirmed during the asset inventory. Blasting will have a **major** impact as Şahintepe and Şamlar (Başakşehir district) more severely, as both neighbourhoods have agriculture and animal husbandry as main or secondary livelihoods.

Impact on Lands, Crops and Other Properties

Impact on land, crops and other properties due to construction are identified and managed through the Project-specific Grievance Mechanism or by the site teams. Such impacts and/or grievances are resolved/managed by implementation of relevant measures (e.g. execution of mutual agreements, compensation of damages, ongoing monitoring). Examples to such grievances received and managed since 2021 are summarised below (RAP, GEM 2023):

- Damage on land, crops and other properties within the expropriation corridor as a result of land entry and construction before completion of expropriation process or mutual agreement – Mutual agreements and compensation payments are being completed.
- Damage on land, houses and other properties (e.g. wire fences) outside the expropriation corridor due to trespassing by construction vehicles – Damages on land and other properties are compensated or rectified. In agreement with the PAPs, impact on houses are being monitored and will be compensated upon completion of construction works.
- Loss of four ovine animals (sheeps) that fell into a drainage channel excavated by the Project near Sazlidere Excavated Material Storage Area – The owner of the animal has been provided with compensation for his loss. Fencing measures have been implemented in the area to avoid repetition of similar impacts.
- Potential impact on a water well (with no water utilisation permit in place – used to provide water to adjacent greenhouses), which overlaps with the parcel boundaries of the Sazlidere mobilisation site but located outside the fence area of the mobilisation site. Measures have been taken to avoid potential impact of construction works at Sazlidere Mobilisation Site on a nearby water well (with no water utilisation permit in place) used to provide water to adjacent greenhouses. The potential impact of the Project has been avoided through the measures taken (the water intake locations have been preserved and as required additional groundwater coming out of the construction works and captured by the construction works is pumped to the water well area of greenhouses. Nakkaş Otoyol A.Ş. has been monitoring and verifying the success of the measures in engagement with the affected people (there is no grievance received from the greenhouses as part of ongoing engagement). Nakkaş Otoyol A.Ş will continue pumping water as required throughout the construction phase. The Project is not anticipated to cause any impact on the water resources of the greenhouses during the operation phase as there will be no interference with the groundwater resources in the long term).
- Restricted access to lands and houses due to ongoing construction works or impacts related to construction (e.g. damage on local roads) – Such claims are investigated by the Contractor and the impacts identified to be caused by Project-related construction works are addressed through the Project-grievance mechanism.

Operation Phase

Permanent loss of livelihoods and household income due to permanent land restrictions

The overall average permanent land-take for the whole Project is a corridor of 80m, including the safety buffers at each side of the road subject to land acquisition and compensation. The motorway will be fenced and the following restrictions will be applied within the safety zone:

- No construction of houses or structures.
- No crops and permanent plantations (except the landscaping work within Project scope).

These restrictions will result in reduced areas available for cultivation and other livelihoods in particular agricultural and commercial activities.

Furthermore, if the RAP is not managed adequately, the Project faces a potential risk to cause forced resettlement without proper compensation, especially for vulnerable groups and women.

This is anticipated to have a **major** negative economic impact on local communities, particularly vulnerable groups such as low-income households, and especially if they have disabled and elderly household members or if they are female or child-headed as they might not be able to afford land and might have to move. These groups may have more difficulties to access information and less access to employment and other opportunities.

Changes in land values post construction in peri-urban and rural areas due to building restrictions

The construction of large transport infrastructure in peri-urban and rural areas typically leads to escalation of property speculation in peri-urban and rural areas, given the expansion of cities caused by the growth of the urban population. Due to the improvement to road access and traffic flow in the area, agricultural lands close to the motorway are targeted and transformed into non-agricultural uses.

Given the drastic upsurge in the market value of the land due to the increasing demand in peri-urban areas, land is a valuable economic resource for people who have the money to invest and can generate new revenue opportunities. The conversion of farmland into plots for residential use increases the land value per hectare. This has already been the case in the region, with Başakşehir district seeing one of the fastest increases in real estate prices in the country due to the establishment of infrastructure projects (road and aerial). Furthermore, there are several large infrastructure projects expected to be completed in the upcoming years, exacerbating the impact on land value of the Project.

As with the permanent loss of livelihoods and household incomes, this is anticipated to have a **major** negative economic impact on local communities, especially vulnerable people such as low-income households as they might not be able to afford land and might have to move. These groups may have more difficulties to access information and less access to employment and other opportunities.

6.3.2.6 Mitigation Measures

The entire process is elaborated in the RAP 2023, prepared by GEM including a central tool “the Entitlement Matrix” explaining which types of Project-Affected-Persons (“PAPs”) will be eligible for which types of compensation/mitigation to meet lenders’ requirements. The summary of the measures defined below are sourced from RAP 2023, GEM.

6.3.2.6.1 Mitigation by Design

KGM has avoided and minimised land needs and expropriation to the extent feasible during the route selection process in order to mitigate socio-economic impacts of the Project and minimise expropriation costs. As part of detailed design process, Nakkaş Otoyol A.Ş. evaluates the feasibility of alternatives

and local route modifications to further avoid and/or minimise displacement impacts during site implementation (see RAP Section 2.9 for "Avoidance and Minimisation")[222].

6.3.2.6.2 Compensation, Livelihood Restoration, Improvement and Assistance

In line with "Entitlements Matrix" presented in RAP, the Project shall provide additional compensation (on top of mandatory cash compensation to be provided KGM in line with the contractual responsibilities of Nakkaş Otoyol A.Ş. and KGM as defined in the BOT Contract), livelihood restoration and assistance measures to owners and users of the affected houses, affected businesses and affected lands.

Compensation to PAPs shall be provided at full replacement cost. To this end, a RAP Fund will be established and managed by Nakkaş Otoyol A.Ş to provide the difference between the mandatory cash compensation provided by KGM and the full replacement cost as defined and required by international standards (see Implementation Costs – RAP Fund to be allocated and managed by Nakkaş Otoyol A.Ş. in consultation with KGM).

The Project shall provide through the RAP Fund specific allowances (e.g. moving allowance, business relocation allowance, financial support package to employers and employees for the temporary business interruption during relocation) to support PAPs in the resettlement process and in livelihood restoration or improvement.

The allocation and management/disbursement budget (RAP Fund) required for the delivery of entitlements to PAPs in addition to the compensation to be provided by KGM as required by the Expropriation Law of Türkiye will be the responsibility of Nakkaş Otoyol A.Ş. As such, all costs that will be needed to compensate for additional measures not covered under national law and the human resources required to deliver successful implementation of RAP (including livelihood restoration, improvement and assistance measures) shall be covered via the RAP Fund to be allocated and managed by Nakkaş Otoyol A.Ş.

Nakkaş Otoyol A.Ş. will provide updates to KGM on RAP implementation as part of monthly progress reports or on a case-by-case basis (through correspondence or meetings) and engage with KGM as necessary for the implementation of RAP. The indicative budget, including the Expropriation Cost to be provided by KGM in line with Expropriation Law and RAP Fund to be allocated and managed by Nakkaş Otoyol A.Ş. in addition to Expropriation Cost, has been calculated based on applicable market prices thus reflects the current market conditions. It should be note that KGM will update the Valuation Report as per Expropriation Law in November 2022. Accordingly, Expropriation Cost to be provided by KGM as per the Expropriation Law will be updated in line with the updated Valuation Report.

Expropriation of the OHTL tower (pylon) locations and constitution of easement rights along the OHTL displacement route will be prioritised and conducted by KGM in line with the Expropriation Law based on the Updated Valuation Study completed in November 2022 and in accordance with the principles of the RAP that will be implemented by Nakkaş Otoyol A.Ş. in collaboration with KGM.

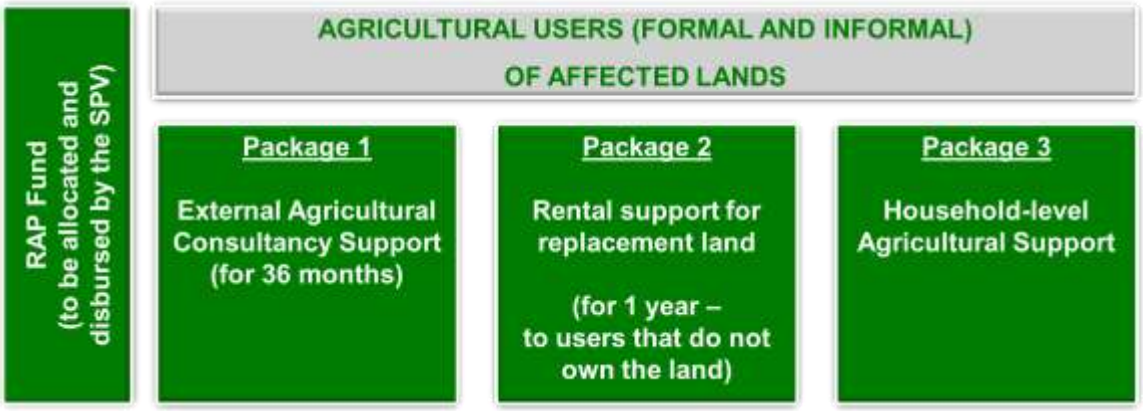
Livelihood restoration, improvement and assistance measures have been developed as part of RAP (GEM, 2023) for the following categories of affected people:

- Agricultural users (formal and informal) of affected lands
- Owners of affected businesses
- Employees (formal and informal) of affected businesses

All persons using the affected lands for generating agricultural income (including both formal and informal users – regardless of their total productive agricultural area) will be eligible for entitlements and livelihood restoration and improvement measures as defined in details in the RAP (please see RAP – Section 5.6 "Entitlements Matrix" and Section 5.7 "Livelihood Restoration, Improvement and Assistance"). For the agricultural users (formal and informal), detailed measures have been defined

[222] RAP, GEM 2022

under the following packages based on the outcomes of the PAP surveys and consultations done as part of RAP study:



For the affected business owners and the employees (formal and informal), restoration of the livelihoods has been one of the key drivers of RAP entitlements and budget. The following entitlements have been included in the RAP to enable relocated businesses to sustain their economic activities at the new premises through a well-designed relocation process providing the necessary financial and organisational support:

- Early consultations and notification for land acquisition process: The Nakkaş Otoyol A.Ş, will notify the owners and tenants of the affected businesses at least 3 months[223] in advance of the start of expropriation in consideration of the expropriation programme of KGM to avoid forced eviction and allow sufficient time for resettlement planning and preparation to allow the businesses planning the relocation process.
- Business Consultancy Support to be provided to the businesses that will relocate (with specific measures for business owners and employees including vulnerable persons, such as female, migrant, and informal workers
- Support for finding new premises.
- Pre-relocation Financial Support Package for Business owners:
  - Cash compensation to cover cost of fixed (non-movable investments/improvements) at Full Replacement Cost
  - Moving allowance to cover disassembly, transportation and assembly costs.
  - Business relocation support package to cover other relocation-related expenses such as real estate agent service fee, title deed transfer costs, potential transaction costs, subscription fees, permit renewal costs including preparation of relevant documentation, cost of approvals to be secured from related authorities, etc.
- Post-relocation Financial Support Package to Business owners for temporary business interruption (net income loss support)
- Financial Support Package for Employees for temporary business interruption (salary support)

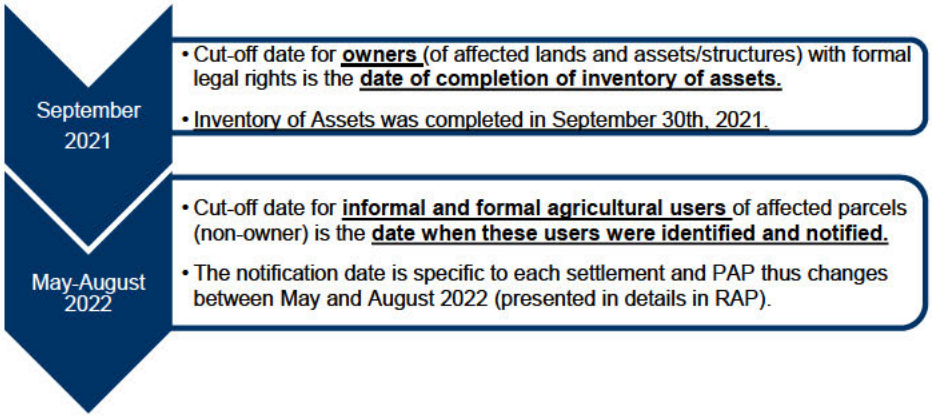
As the RAP Implementation progresses, consultations of Nakkaş Otoyol A.Ş. with the affected people and businesses (employers and formal/informal employees) will continue an ongoing basis and livelihood restoration and improvement measures will be updated as required with input from ongoing

[223] Considering that it may take at least 3 months for the title deed transactions to pass to KGM after start of expropriation and 15 days is further granted to affected people by Law to vacate the land from the date of finalization of the title deed registration – notifying 3 months in advance of start of expropriation allows affected people at least 6 months and 15 days from the date of early consultations and notification for land acquisition process to vacate the land prior to land entry.

consultations, external Agricultural and Business Consultants and related authorities and third parties (e.g., universities, professional organisations, etc.) to be collaborated as necessary.

6.3.2.6.3 Cut-off Date

For the Project, the cut-off date for eligibility has been defined separately for the (i) owners/shareholders (of affected lands and assets/structures) with formal legal rights, and (ii) formal and informal users (agricultural) of affected lands in settlements, as summarised below:



PAPs who are not included in the process and think they are eligible for the entitlements can also apply to the Project CLOs with the required documents and letter of application for the process and their eligibility for the compensation and/or assistance will be evaluated and decided by the Nakkaş Otoyol A.Ş.

After the evaluation, they will be informed regarding the outcome and if they are found to be eligible access to the relevant compensation and/or assistance will be provided.

6.3.2.6.4 Advance Notification for Land Entry

The Nakkaş Otoyol A.Ş. will notify the owners and tenants of the **affected houses and businesses** at least 3 months[224] **in advance of the start of expropriation** in consideration of the expropriation programme of KGM to avoid forced eviction and allow sufficient time for resettlement planning and preparation to allow the businesses planning the relocation process.

The Nakkaş Otoyol A.Ş. will notify the **users of affected lands** 3 months in advance of land entry. Land entry will take place only after expropriation is finalised (including expropriation payments) or mutual agreements/protocol (land entry protocols) with the landowners/users are completed.

Land entry will take place only after expropriation process or mutual agreements are executed with the owners/shareholders and compensation payments are completed for parcels to be entered, except in specific situations (absentee landowners, on-going legal issues, others) that shall then be clearly documented, with expropriation monies deposited in an escrow account for PAPs to access when all legal issues are cleared.

To avoid land entry without completion of expropriation or execution of mutual agreements, Nakkaş Otoyol A.Ş. has incorporated the completion status of expropriation to the Work Permit Form for Earthworks (please see RAP) and developed land entry and exit protocols (see RAP) in June 2022. Accordingly, land entry protocols shall be executed prior to land entry on each parcel (after completion of payments required under Turkish Expropriation Law and/or in line with the RAP as applicable). Thus, land entry will take place only after expropriation process or mutual agreements are executed with the

[224] Considering that it may take at least 3 months for the title deed transactions to pass to KGM after start of expropriation and 15 days is further granted to affected people by Law to vacate the land from the date of finalization of the title deed registration – notifying 3 months in advance of start of expropriation allows affected people at least 6 months and 15 days from the date of early consultations and notification for land acquisition process to vacate the land prior to land entry.

owners/shareholders and compensation payments are completed for parcels to be entered. Land exit protocols will be executed only for lands to be acquired temporarily.

6.3.2.6.5 Temporary Land Take by EPC Contractor and Others Contractors

Temporary facilities of motorway projects can be located inside or outside of the expropriation corridor. Land take processes for temporary facilities that are located outside the expropriation corridor are undertaken as follows:

- Privately-owned parcels: Land take for the Project is undertaken through rental agreements, mutual protocols, etc. with the owners/shareholders. In line with the conditions agreed, land will be reinstated and delivered to the owner of the land at the end of the temporary usage period by the EPC Contractor.
- State-owned parcels: Treasury lands and non-registered are temporarily allocated to the Project based on application of KGM without any payment. Land will be reinstated and delivered to the owner of the land at the end of the temporary usage period by the EPC Contractor.
- Legal entity parcels: These parcels are temporarily allocated to the Project based on application of KGM (with or without payment depending on the agreement between KGM and entity). In line with the conditions agreed, land will be reinstated and delivered to the owner of the land at the end of the temporary usage period by the EPC Contractor.

Livelihood restoration for the affected people using the lands temporarily taken and used by the Project is further presented in the Project RAP.

6.3.2.6.6 Future Acquisition/Expropriation

The same principles shall apply to any acquisition/expropriation work required in the Project in future. Potential operation phase impacts on sensitive receptors located outside the expropriation boundary (such as noise) will be monitored internally by Nakkaş Otoyol A.Ş. and externally by the Lenders through their independent consultants. PAPs shall be granted the right to request acquisition within three (3) years upon commissioning of the Motorway should any significant environmental and/or social impacts be identified through E&S monitoring that cannot be mitigated.

During the operation phase, Nakkaş Otoyol A.Ş. will implement the SEP including the grievance mechanism and continue engaging with the PAPs, including users of fragmented and orphan parcels, on an ongoing basis. Any feedback and/or request received from PAPs related to land fragmentation, engineering structures, etc. will be investigated by Nakkaş Otoyol A.Ş. design and construction teams and assessed by an Independent Land Acquisition/Expropriation and Valuation Specialist (to avoid any conflict specially in cases where there is disagreement with the landowners on the decision of Nakkaş Otoyol A.Ş. /KGM) in terms of necessity, and technical and financial feasibility. Where necessary and feasible, Nakkaş Otoyol A.Ş., subject to approval by KGM, may include additional structures in the design throughout the operation phase.

6.3.2.6.7 Disclosure and Consultation

The RAP will be publicly disclosed in manners suitable to the local context and a non-technical summary of entitlements and processes shall be provided to all PAPs and other relevant stakeholders in the form of a “Guide to Land Acquisition and Compensation”. PAPs have been engaged about the expropriation process and such engagement will continue with a combination of community and face-to-face meetings. Any compensation-related or other grievances from PAPs will be managed through Project’s Grievance Mechanism.

6.3.2.6.8 Monitoring

The Project shall establish a monitoring system to measure, and report on performance of resettlement and compensation measures, which will associate PAPs and measure their satisfaction, as described

in RAP Section 5 (“Compensation Strategy”). Land acquisition and resettlement related grievances will also be monitored.

Construction and operation phase impacts on houses and business structures (e.g., loss of value, noise, vibration, etc.) and livelihoods of the households and business owners will be identified through periodical E&S and RAP monitoring (please see RAP – Chapter 7 for relevant RAP monitoring indicators) and stakeholder consultations to be conducted in the operation phase of the Project and managed through the Project grievance mechanism.

6.3.2.6.9 Vulnerable Groups

During the RAP preparation phase, in consideration of the request of a household with a disabled child and member with no social security, design measures have been taken by Nakkaş Otoyol A.Ş. to avoid physical displacement. In line with the RAP, this household will be granted the right to request acquisition within three years upon commissioning of the Motorway should there be significant environmental and/or social impacts identified through E&S monitoring works that cannot be mitigated through technically and financially feasible measures to levels compliant with Project standards set by the ESIA Report of the Project.

Vulnerable groups will be entitled to the livelihood restoration and improvement measures described in RAP. In addition to other applicable entitlements and measures defined previously, for households with vulnerable members, case-specific in-kind assistance and measures, which will be designed through direct engagement with the affected households in consideration of their special needs, will be provided.

Specific attention during information, consultation, negotiation and post-resettlement monitoring processes through development and implementation special information and consultation methods and tools designed to address the needs of each vulnerable PAP in line with the Project SEP (i.e. vulnerable persons and groups will be specially informed by the RAP Implementation Team about the land acquisition, RAP, and the grievance mechanism).

Vulnerable groups will have priorities such as:

- Priority in accessing consultancy services, Livelihood Restoration, Improvement and Assistance measures Projects offered by the RAP;
- Assistance to follow-up and/or access to compensation payments as part of RAP implementation;
- Assistance in accessing governmental institutions, legal advice, etc. when needed and relevant (e.g. logistical support, communication assistance, assistance with preparation of official application documentation);
- Assisting illiterate, elderly and other persons in need in reviewing and processing official documents relevant to expropriation;
- Priority for job opportunities to one of the household members eligible and able to work and meeting the Project’s employment requirements; and
- Assistance in accessing and applying to governmental institutions providing existing support programs to persons with vulnerabilities.

The RAP studies showed that out of six (6) physically displaced households, three (3) of them have no vulnerable members and three (3) of them have single vulnerable member. For economically displaced households, six (6) of the households have no vulnerable members, ten (10) of them have single vulnerable household members and seven (7) of them have multiple vulnerable household members.

As for the 135 households that own land but do not use the land for agriculture (owners/shareholders of the land with no active land use 33 of them have single vulnerable household member and seven (7) of them have multiple vulnerable household members. The remaining 95 household do not have any vulnerabilities.

Surveys have identified migrant workers employed at the affected businesses (see RAP for more details). Employees with other types of vulnerabilities among the employees will further be identified by the RAP Implementation Team. Special measures/assistance to be provided to the vulnerable employees and employees who may lose job due to reasons that are not under their control and directly related to relocation will be identified and managed on a case-by-case basis. Vulnerable workers will be supported through the RAP regardless of the formality of their employment conditions.

6.3.2.6.10 Past Land Acquisition Audit and Corrective Action Plan

In April 2022, Lenders' independent E&S consultant (IESC) has been retained to undertake Environmental and Social Due Diligence (ESDD) of the Project and review the ESIA disclosure package, including the RAP, as per the applicable international standards prior to disclosure.

In parallel to IESC's ESDD process, a separate **Past Land Acquisition Audit** (conducted by an **Independent Land Acquisition and Valuation Specialist**) has been conducted and finalised in October 2022.

The Past land acquisition audit identified some material non-compliances against the Project requirements and proposed various recommended actions to fully comply with the Lenders' requirements. Based on the audit recommendations, the Nakkaş Otoyol A.Ş has developed a Corrective Action Plan (CAP) and started implementation of the CAP in Q3 2022 through completion of crop payments to informal and formal users of affected lands, identification of the heirs of the parcels for affected parcels, information of affected people about the status of expropriation process in collaboration with KGM, etc. To document the progress with CAP implementation, the Nakkaş Otoyol A.Ş has submitted a CAP Progress Update Report to Lenders in **October 2022**. The Nakkaş Otoyol A.Ş, with support from the third-party Internal RAP Monitoring Consultant retained in Q2 2023, will conduct monthly monitoring (including CAP Progress Updates) and report to the Lenders and IESC in line with the Project Environmental and Social Action Plan (ESAP) (please see RAP Section 2.10 for more details)

Second crop payments have been made by the Nakkaş Otoyol A.Ş in Summer 2023 to compensate the crops that would have been harvested land plots affected by topsoil clearance works. This covers the parcels for which expropriation/acquisition process has not been completed and officially acquired by the Project as of September 2022. Compensation amounts calculated based on the crop rotation status of fields (based on crop types), in consultation with the agricultural users of related parcels and based on the applicable crop/price/expenditure data of the related District Directorate of Agriculture. Crop payment will be redone in summer 2023, the beginning of harvest season.

Recurring Crop Payment Plan for Stripped Parcels						
Planting Season	Harvest Season	Number of Lands	Area	Completed Crop Payments	Recurring Crop Payments	Recurring Crop Payment Schedule
October, November	June, July	372	857.913 m²	1,44 million TRY	2,39 million TRY *	Summer 2023

(*) Payment amount is approximate. Before the payments are made in June 2023, the unit prices to be announced by District Directorate of Agriculture for the year 2023 will be used for calculation.

6.3.2.7 Summary impact table (Pre- and Post-mitigation – Residual)

6.3.2.7.1 Construction Phase

The table below includes a summary of the impact assessment on both Project phases, pre- and post-mitigation(s) in relation to impacts on physical resource and related livelihoods.

Table 6-103 Rating of Impacts on physical resources related to loss of residential and commercial structures (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI
Duration	*Permanent*	Permanent relocation of residential structures.	*Permanent*	Permanent relocation of residential structures.
Scale	*High*	Physically displaced structures will be compensated prior to land acquisition.	*Medium*	Physically displaced structures will be compensated prior to land acquisition.
Frequency	*One time*	One time impact occurring before start of construction activities.	*One time*	One time impact occurring before start of construction activities.
Likelihood	*Likely*	Loss of commercial, business and non-residential structures is likely.	*Likely*	Loss of commercial, business and non-residential structures is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity of the receptors is considered high as the Project would affect residential structures.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-104 Rating of Impacts on physical resources related to loss of (or access to) commercial, business and non-residential structures (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI
Duration	*Permanent*	Permanent relocation of structures.	*Permanent*	Permanent relocation of structures.
Scale	*High*	Temporary loss of income due to removal of economically viable structures.	*Medium*	Compensation, transitional support, and reasonable timeframe provided to ensure restoration of income earning capacity.
Frequency	*One time*	One time impact occurring before start of construction activities.	*One time*	One time impact occurring before start of construction activities.
Likelihood	*Likely*	Loss of commercial, business and non-residential structures is likely.	*Likely*	Loss of commercial, business and non-residential structures is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity of the receptors is considered high given the levels of dependence on commercial, business and non-residential structures to support related economic activities.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-105 Rating of Impacts on natural resources related to loss of agricultural and grazing land (construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Impact limited to AoI.	*Local*	Impact limited to AoI.
Duration	*Temporary – Permanent*	Permanent loss of agricultural land, crops, and grazing areas.	*Temporary – Permanent*	Permanent loss of agricultural land, crops, and grazing areas.
Scale	*High*	Impact is high scale given that two thirds of land has been determined to be for agricultural use. Blastings could disturb and scare the grazing livestock due to the noise, the ground and air vibration and the dust generated.	*Medium*	Finalized Resettlement Action Plan will include key measures to restore land based livelihood sources and especially agricultural activities, should this land be available in the settlement. The written notification of the blasting will help the residents avoid the nearby area for grazing.
Frequency	*Once*	Impact will occur once during RoW construction.	*Once*	Impact will occur once during RoW construction.
Likelihood	*Likely*	Loss of agricultural land, crops, and pasture is likely.	*Likely*	Loss of agricultural land, crops, and pasture is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
High Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity ranges from low to high depending on the size and importance of the affected land as an economic resource for the affected household and the availability of agricultural land in the settlement. As a result, the significance of the impact varies depending on the conditions.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major to moderate Impact			Moderate to minor Impact	

6.3.2.7.2 Operation Phase

The table below includes a summary of the impact assessment during the operation phase, pre and post mitigation(s).

Table 6-106 Rating of Impacts on the permanent loss of livelihoods and household income due to permanent land restrictions

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Impact limited to AoI.	*Local*	Impact limited to AoI.
Duration	*Long-term*	The loss of livelihoods and income associated to the restrictions for operation activities is considered to be permanent during operation of the road.	*Long-term*	Impacts will be long term.
Scale	*Low*	The scale of the impact is considered low as the amount of land where restrictions will apply are relatively small in the overall context of the land around the settlements.	*Low*	The amount of land is small and therefore scale is low.
Frequency	*Continuous*	The impact will be felt continuously throughout the years of operation as the restrictions will apply throughout.	*Continuous*	The impact will be felt continuously throughout the years of operation as the restrictions will apply throughout
Likelihood	*Likely*	Loss of access to important resources is likely	*Likely*	Loss of access to important resources is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered medium as local communities depend on existing land resources to support and sustain key livelihoods.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

Table 6-107 Ratings on Impacts on changes in land values post construction in peri-urban and rural areas due to building restrictions

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local, Regional*	Impact limited to AoI and nearby peri-urban and rural areas.	*Local, Regional*	Impact limited to AoI and nearby peri-urban and rural areas.
Duration	*Permanent*	The changes in land values are considered to be permanent during operation of the road.	*Permanent*	Impacts will be permanent.
Scale	*Low*	The scale of the impact is considered low as the amount of land where restrictions will apply are relatively small in the overall context of the land around the settlements.	*Low*	The amount of land is small and therefore scale is low.
Frequency	*Continuous*	The impact will be felt continuously as the increases in real estate prices will happen throughout the years of operation.	*Continuous*	The impact will be felt continuously as the increases in real estate prices will happen throughout the years of operation.
Likelihood	*Likely*	Increase in land values is likely.	*Likely*	Increase in land values is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Large Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered high as there are several other projects that will exacerbate the impact on land value and there are several low-income households in the AoI that may not be able to afford the new prices for renting land for agricultural or commercial purposes or housing.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Major Impact	

6.3.3 Labour and Working Conditions

6.3.3.1 Potential Impacts

Workers' rights including occupational health and safety need to be considered to avoid accidents and injuries, loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions. These issues should be considered not only for those who are directly employed by Nakkaş Otoyol A.Ş. but also its Contractors (including sub-contractors) and within the supply chain.

The Project could potentially lead to workforce-related social and health issues throughout the life cycle of the Project if worker management and rights do not meet Turkish law as well as international best practice.

Table 6-108 presents the potentially significant impacts associated with occupational health and safety and worker management during the construction and operation phases. The potential for occupational health and safety incidents throughout the life cycle of the Project are higher during the construction phase.

Table 6-108 Potential Impacts on Labour and Working Conditions

Construction Phase	Operation Phase
■ Accommodation conditions ■ Labour and working conditions/workers' rights; ■ Gender Based Violence, Harassment (GBVH) and Inequalities; ■ Worker health and safety; ■ Child labour and forced labour in the supply chain; ■ Risk of OHTL tower failure ■ Accidents during tower erection (working height). ■ Working with live power lines.	■ Labour and working conditions/workers' rights; ■ Gender Based Violence, Harassment (GBVH) and Inequalities; ■ Worker health and safety due to traffic emergencies, ■ Accidents during OHTL tower maintenance (working height). ■ Working with live power lines.

6.3.3.2 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

- In practice working conditions and labour rights in Turkey may not be fully respected. According to the Turkish Health and Safety Labour Watch (İSİG), Occupational Safety and Health violations are common in the construction industry, where accidents and fatalities are frequent.
- Additionally, one of the biggest areas of risk in the construction sector is linked to the widespread of informal workers. With the arrival of refugees in 2011, Syrian influx led to higher competition in informal job market that replaced Turkish informal workers with Syrians. Informal workers are vulnerable to abuse, due to the fact that they work under precarious conditions, have no benefits, insurance nor protections (for accidents, sickness, etc.). There are reports of migrants and asylum seekers/refugees in the AoI.
- Women may also be at risk of being discriminated against, as they are often not offered the same opportunities to get paid employment or are limited to taking on certain roles such as cooking food or providing laundry services at the camps. During recruitment, women could be suffering discrimination and may not be provided with the same working conditions as men once recruited. Additionally, the recent country's withdrawal from the İstanbul Convention, the most recent international instrument that helps provide a roadmap for the elimination of GBVH against women and girls resulted in a higher vulnerability of women to these forms of violence.
- The use of forced labour is illegal in Turkey however it prevails generally among refugee and migrant families. Furthermore, child labour persists, driven by the pandemic, taking place mainly in the agricultural sector, small or medium industry, and street work. It is therefore unlikely that the Project or its contractors and suppliers will be utilising forced labour. In the unlikely event that forced labour is used by subcontractors, this is likely to have an impact on the physical and mental health and well-being of the persons concerned, as well as on their right not to be forced to work.

6.3.3.3 Embedded Measures

There are two construction camps (Olimpiyat and Sazlidere Campsites) in place and both are operational at the moment.

Sazlidere campsite is also used for EPC Contractor and subcontractors workers accommodation purposes with a maximum capacity of 750 persons, and Olimpiyat campsite was designed in such way that they can accommodate a workforce of approximately 1,100 persons.

There are no female employees accommodating at both campsites since there is rental assistance provided by EPC Contractor to the female employees. Access to the camps is tightly controlled and restricted to the Project workforce and approved visitors.

Facilities for accommodation, meals, sanitation and welfare will be provided in campsites in accordance with local requirements and in line with Workers' Accommodation Processes and Standards IFC & EBRD Guidance Note (considering Covid-19 requirements as well) as committed by Nakkaş Otoyol A.Ş. Furthermore, Nakkaş Otoyol A.Ş. will consider gender aspects at campsites such as employment of security staff of both genders, separate gender sanitary and toilet facilities with adequate privacy, including ceiling to floor partitions and lockable doors. All these requirements will also be applicable for the EPC Contractor and subcontractors, and relevant clauses will be integrated into contracts.

Note that EPC Contractor. has also developed a Health and Safety Plan and counts with an Occupational Health and Safety (OHS) policy which will be added to the proposed mitigation measures below. It also has Zero Tolerance Policy for its subcontractors and employees resulting in the cancellation of the labour/employment contract if the ESHS procedures are not followed.

All these requirements will also be applicable for contractor and subcontractors, and relevant clauses will be integrated into contracts.

Nakkaş Otoyol A.Ş. will conduct quarterly labour audits at each site during construction phase by independent, competent labour experts to ensure compliance of the EPC contractor and its subcontractors against legislations and EBRD PR 2 and PR4 OHS requirements.

6.3.3.3.1 Supply Chain Management

Nakkaş Otoyol A.Ş. requires all its own employees and executives, also third parties such as vendors, suppliers, subcontractors, agents and affiliates with whom it has business relations to comply with the "Ronesans Business Ethics and Code of Conduct". Compliance with the Code of Conduct is one of the key requirements during performance evaluation and/or career development processes of the executives and employees. Violation of the Code of Conduct by third parties such as vendors, suppliers, subcontractors, agents, business associates with whom business relations take place results in a variety of sanctions that may even lead to the termination of such business relation.

All suppliers shall comply with the principles stated in Nakkas Otoyol A.Ş. Human Rights Policy regarding child labour, forced and compulsory labour, health and safety, non-discrimination, diversity and gender based violence, harassment and inequalities, labour and working conditions/workers' rights, personal development and data privacy.

In addition to Ronesans Business Ethics and Code of Conduct and Human Rights Policy; Nakkaş Otoyol A.Ş. already follows its own Supply Chain Management Plan requirements which obliges compliance with IFC PS 2, EBRD PR 2, IFC EHS Guidelines and ILO standards. In accordance with the Supply Chain Management Plan, the suppliers must comply the following criterias:

- Child labor and forced labor is prohibited in supply chain and appropriate actions will be taken when child labor and forced labor is detected.
- It will be ensured that any tendering process includes clauses and policies on minimum working age, normal working hours, freedom to collective bargaining, good working conditions and eradicating risks of forced labour.

- Procurement contracts will include labour management clauses.
- In case the supplier fails to meet IFC PS 2, EBRD PR 2, IFC EHS Guidelines and ILO standards, Nakkaş Otoyol A.Ş. will shift the primary supply chain to suppliers that can comply with these standards.
- All EHS requirements of the Project, including Lender's requirements, Turkish legislation will be applicable for EPC, suppliers, contractors and subcontractors.
- EPC and subcontractors will be required to appoint a safety representative who will be available on the site throughout the contract period,
- EPC, suppliers, contractors and subcontractors will comply with Nakkaş Otoyol A.Ş. human resources policies and procedures on minimum working age, normal working hours, freedom to collective bargaining, good working conditions and eradicating risks of forced labour.
- Employees of the EPC and subcontractors will have employment contract for all permanent and temporary employees in accordance with Labour law.
- Nakkaş Otoyol A.Ş. will conduct regular (every 6 months) monitoring of suppliers to avoid risks associated with child labour and forced labour.

Additionally, Nakkaş Otoyol A.Ş. has developed "Supply Chain Management Plan" which defined policy commitments, responsibilities for implementation, supply agreement content, monitoring and immediate actions to be taken in case of violation. The SCMP included:

- Maintenance of a register of all Project primary suppliers;
- Ensure all core suppliers adopt self-declarations and codes of conduct regarding prohibition of any forms of forced and child labour in their operations prior to any engagement with them;
- Dis-engagement clauses will be added to the agreements with suppliers in case of material non-compliance with key provisions listed in the responsible supplier policy;
- Nakkaş Otoyol A.Ş. to provide immediate notifications to lenders if/when forced/child labour risks or allegations are raised in relation to its core suppliers; and
- Mitigation of issues/risk identified during the supply chain risk assessments by core suppliers conducted in a timely manner. In case of failure to comply with the supplier policy requirements, then disengagement clause to be implemented in line with the timelines provided to the Lenders.

6.3.3.3.2 Contractor Management

The Project is to ensure the management by the EPC of its subcontractors and suppliers in line with the Applicable Standards. The project specific Contractor Management Plan (CMP) has been prepared for the management of ESHS aspects related to the activities of the EPC and subcontractors.

Throughout all stages of the procurement process, the EPC Procurement Department manages the selection of subcontractors with assistance from and input from other EPC departments, including H&S Management.

It is monitored whether EPC subcontractors' and own activities comply with the project's ESHS requirements and management plans. Regular site inspections, reviews of own and subcontractors' performance, dealing with non-conformities and following up on them as lessons-learned processes, and reporting on performance to the SPV comprise the oversight activities.

The SPV's assurance as an additional level of compliance verification. Periodic site inspections, audits, and formal reviews are used to ensure assurance. The goal of ESHS oversight is to monitor the progress of construction projects in order to assess the success of environmental, occupational health and safety, labor and working conditions, socioeconomic, community safety, and cultural heritage

mitigation measures put in place by EPC and Subcontractors (i.e. e. are avoiding and minimizing the impacts as intended, or whether work practices need to be improved).

The EPC implemented a program of documented site inspections addressing own activities and those carried out by subcontractors to ensure that the management plans' provisions are effectively implemented. This also contains:

- Daily walk-around inspections of how construction projects are being carried out to ensure that ESHS mitigation measures are in place.
- Joint inspections with SPV representatives. These will involve checking the labor and working conditions of subcontractors against the project requirements and applicable standards, usually on a monthly basis.
- Internal audits of the EPC ESHS. These will be carried out in accordance with the SPV-approved EPC management system policies. As a minimum, the EPC must conduct annual internal audits of ESHS. Every six months, focused audits or performance reviews that focus on particular aspects are typically conducted as needed depending on the project execution stage. An interdisciplinary team of suitably qualified health and safety, environmental, and social auditors will carry out the audits. The EPC audit team may include SPV employees.

Details of the measurements are presented in Project Contractor Management Plan.

6.3.3.4 Impact Assessment

6.3.3.4.1 Construction Phase

Labour and Working Conditions/Workers' Rights

As a result of the policies and procedures worker rights should be protected. However, issues with implementation and capacity may result in some breaches of workers' rights especially within the supply chain and amongst casual labourers. If issues arise there is the opportunity for these to be identified and addressed through the Worker Grievance Mechanism. However, individuals may be unwilling to report issues and as such breaches may go unnoticed.

The Project presents potential for positive legacy in the AoI in terms of strengthening knowledge and practice of worker rights, including the contracted as well as supplier companies and their respective employees.

During construction, local employment will be subject to local labour laws and applicable international standards to which Turkey is party (ILO conventions), in particular with respect to safeguarding the health and safety of workers. Amongst others, these include ILOs core conventions such as No.29, No.87, No.98, No.100, No.105, No.111, No.138 and No.182.

In addition contractors will need to comply with Nakkaş Otoyol A.Ş. ESHS Procedures and OHS Policy standards and Lenders standards (such as PR2 on Labour and Working Conditions) aimed at safeguarding the health and safety of its employees and subcontractors. These include the use of appropriate equipment and facilities to allow employees to undertake their duties in a professional and safe manner ensuring rights and freedom of association as well as providing a safe and sound work environment for workers. The employer/contractor is therefore expected to develop and implement appropriate health and safety measures for its workforce including enforcing the use of appropriate PPE at all times.

All employees and contractors are required to acknowledge and adopt Nakkaş Otoyol A.Ş.' environmental and social work practices and comply with all ESHS procedures as well as the Code of Conduct and Zero Tolerance Policy, reporting safety hazards, unsafe work practices, unacceptable conditions, and environmental and social issues.

All contractor contracts will include explicit reference to the need to abide by Turkish law and Nakkaş Otoyol A.Ş. standards and policies in relation to health and safety. Additionally, a Demobilisation plan

for construction workers is required from EPC and for core contractors a minimum of 6 months prior to completion should be given in order to ensure their labour rights are met.

During construction, the direct interaction between the Project and the workforce if not managed properly, may result in negative impacts on the workers' working conditions and potentially permanent impacts on their health and safety. This impact is considered **moderate** as local populations and especially informal workers may not have an understanding of their labour rights as enshrined in the law or may be willing to waive these rights in order to earn incomes.

Workers' Health and Safety

Activities of the site personnel will involve typical construction risks such as risks due to moving equipment.

Accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood due to the implementation of the management system. Injuries and fatalities could have long term impacts on workers and their families. Potential for positive legacy in terms of strengthening knowledge and practice of worker health and safety of contracted and supplier companies and their employees**.**

Explosives handling and blasting operations are high consequence activities. There are many safety hazards associated with use of explosive, transport and storage such as flyrock, fumes and dust that could cause several adverse effects.

The rate of accidents will be dependent on the consciousness and cautiousness of the personnel regarding the specific hazards of the construction work they are involved in. These risks may be managed with adequate trainings and awareness campaigns in accordance with the good management approaches and international construction site practices avoiding problems with the worker-employer relations and significant occupational health and safety risks. The impact of accidents resulting in injuries or fatalities is considered **major**.

Gender Based Violence, Harassment and Inequalities

The construction of the roadway will result in changes in local communities, including worker influx and changes in households' dynamics which can exacerbate the risk of Gender Based Violence and Harassment (GBVH) in both public and private spaces. This influx of workers, of which most of them will be young men, could increase the the demand for sex workers as well as forced marriages.

Women and men have different economic opportunities in Turkey. Traditionally males tend to dominate leadership positions and women are marginalized in the decision-making process, therefore making them vulnerable.

Women may also be at risk of being discriminated against, as they are often not offered the same opportunities to get paid employment or are limited to taking on certain roles such as cooking food or providing laundry services at the camps. During recruitment, women could be suffering discrimination and may not be provided with the same working conditions as men once recruited.

Lastly, when performing the work, OHS decisions may not use a gender-responsive approach resulting in women not having access to PPE specifically designed for them. Wearing overalls designed for men or outsized safety shoes, gloves or coats could lead to additional health and safety hazards. There are no female employees who use accommodation facilities at campsite since there is rental assistance provided by EPC Contractor to the female employees. This approach will continue during main construction phase of the Project. However, if needed, separate accommodation will be organised for female employees based on the requirements of the Gender Action Plan (GAP) developed for the Project which will include lockable doors and windows, well maintained lighting throughout the facilities and measures to avoid overcrowding and lack of privacy (for example: enough women-only bathrooms and changing rooms).

The impact of Gender Based Violence, Harassment and Inequalities is considered **moderate**.

Child Labour and Forced Labour in the Supply Chain

The use of child labour or use of people aged 16-18 in hazardous work within the supply chain remains a possibility albeit with reduced likelihood due to the implementation of mitigation measures. If there are incidences of child labour, the magnitude of the effect to the individual affected will remain unchanged. However, still potential for child labour or use of people aged 16-18 to be involved in hazardous work in the supply chain.

Potential for positive legacy in terms of strengthening knowledge and practice of avoiding and managing out child labour within contracted and supplier companies.

The likelihood of the use of forced labour will be significantly reduced as a result of the proposed mitigation such that it will become a non-routine event. However, should incidences occur, the impacts on the individuals affected will remain unchanged.

6.3.3.4.2 Operation Phase

Labour and Working Conditions/Workers' Rights

As a result of the policies and procedures worker rights should be protected. However, issues with implementation and capacity may result in some breaches of workers' rights especially within the supply chain and amongst casual labourers. If issues arise there is the opportunity for these to be identified and addressed through the Workers' Grievance Mechanism.

Potential for positive legacy in terms of strengthening knowledge and practice of worker rights of contracted and supplier companies and their employees.

Moderate impact on violations to labour rights as workforce number and use of contractors will decrease and as such there is a less likelihood of impacts occurring.

Workers' Health and Safety

Accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood due to the implementation of the management system and nature of work being undertaken. Injuries and fatalities could have long term impacts on workers and their families.

Potential for positive legacy in terms of strengthening knowledge and practice of worker health and safety of contracted and supplier companies and their employees.

During operation, accidents resulting in injuries or fatalities as activities will be less intense and will involve less workforce. However, accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood. The impact is therefore **moderate.**

6.3.3.5 Mitigation Measures

6.3.3.5.1 Construction Phase

The following mitigation measures will be implemented during the construction phase to reduce any impacts on workers' health and safety and labour rights.

Labour and Working Conditions/Workers' Rights

Rönesans Holding has Human Rights Policy[225] which is followed by Nakkaş Otoyol A.Ş. The Human Rights Policy obliges Rönesans and parties acting on behalf of Rönesans and third parties to act in compliance with the Policy.

In addition, Nakkaş Otoyol A.Ş. has developed Human Resources to ensure the following:

- Access to clear and understandable information regarding worker's labour and working conditions;

[225] https://ronesans.com/content/files/05-tr-i-ns-020863528c5bc475f0.61836371.pdf

- Provision of reasonable working conditions and terms of employment;
- Provision of employment, compensation/remuneration and working conditions, including working hours, based on equal opportunity and fair treatment, avoiding discrimination on any aspects;
- Implementation of a Grievance Mechanism for the Project's workers including subcontractor workforce;
- Adoption of open attitude towards freedom of association and in conformance with Turkish laws.

Labour Management Plan is in place (including workers accommodation) considering the following elements:

- No employee or job applicant will be discriminated against on the basis of his or her gender, marital status, nationality, age, religion or sexual orientation;
- All workers will, as part of their induction, receive training on worker rights in line with Turkish legislation to ensure that positive benefits around understanding labour rights are enhanced;
- All workers (including those of contractors and subcontractors) will be able to join unions of their choice and have the right to collective bargaining;
- All workers (including those of contractors and subcontractors) will have contracts in line with Turkish Labour Law and relevant regulations which clearly state the terms and conditions.
- Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights; and
- Contractor contracts will establish the right for Nakkaş Otoyol A.Ş. monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, Nakkaş Otoyol A.Ş.'s policies or clauses in the contract. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers.

Nakkaş Otoyol A.Ş. and Contractors' will implement a program of socioeconomic compliance monitoring to inform internal auditing and monitoring process. As such, KPIs will be developed around worker rights, discrimination and management, workforce grievance mechanism and monitoring of outcomes. As part of the contractor and supplier selection process, Nakkaş Otoyol A.Ş. will take into consideration performance with regard to worker management, worker rights, health and safety as outlined in Turkish law and ILO international standards.

As part of the contractor and supplier selection process Nakkaş Otoyol A.Ş. will take into consideration performance with regard to worker management and rights as outlined in Turkish law and international standards.

Nakkaş Otoyol A.Ş. and its Contractors (and subcontractors) will oversee whether suppliers comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with international standards.

Nakkaş Otoyol A.Ş. already put in place a Workers' Grievance Mechanism that is accessible to all workers, whether permanent or temporary, directly or indirectly employed including contractor workers. The grievance mechanism includes specific provisions to manage GBVH grievances.

As part of stakeholder monitoring, Nakkaş Otoyol A.Ş. will review and monitor the outcomes of community engagement, media coverage and its workforce and Grievance Mechanism for additional indications of labour-related issues that may arise.

During the operation phase, Nakkaş Otoyol A.Ş. will maintain all provisions of the existing 'Labour Management Plan'' in line with Turkish regulations. Nakkaş Otoyol A.Ş. will maintain the Workers' Grievance Mechanism that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. Contractors and sub-contractors will also be required to put in place a Workers' Grievance Mechanism. The Nakkaş Otoyol A.Ş. Workers' Grievance Mechanism will be open to the

contractor and subcontractor workforce in the event that their grievance is not adequately resolved by their direct employer. Nakkaş Otoyol A.Ş. will then have the authority to act to resolve this grievance.

Nakkaş Otoyol A.Ş. already follows its own Supply Chain Management Plan requirements which obliges compliance with IFC PS 2, EBRD PR 2, IFC EHS Guidelines and ILO standards. The steps of the procurement and supply is as follows:

- The purchase request is submitted to the procurement department after receiving necessary approvals.
- A market research is conducted by the procurement department about the potential suppliers. The following criteria are considered during the screening of the suppliers:
  - Priority is given to local suppliers and sustainable products.
  - The machines to be purchased must meet the basic health and safety rules in Annex-1 of the Machinery Safety Regulation published by the Ministry of Industry and Trade and bear Conformité Européenne conformity.
  - The purchased chemicals must have Turkish Material Safety Data Sheets approved at least 5 years before the current year, in compliance with the Regulation on the Safety Data Sheets for Harmful Substances and Mixtures published by the Ministry of Environment and Urbanization, and must be submitted to Nakkaş Otoyol A.Ş. at least 2 weeks before the supply.
  - The company that generates less waste with its packaging and less carbon footprint is preferred in case two companies are available with the same prices.
- Suppliers must comply the following criteria in accordance with Supply Chain Management Plan:
  - Child labor and forced labor is prohibited in supply chain and appropriate actions will be taken when child labor and forced labor is detected.
  - It will be ensured that any tendering process includes clauses and policies on minimum working age, normal working hours, freedom to collective bargaining, good working conditions and eradicating risks of forced labour.
  - Procurement contracts will include labor management clauses.
  - In case the supplier fails to meet IFC PS 2, EBRD PR 2, IFC EHS Guidelines and ILO standards, Nakkaş Otoyol A.Ş. will shift the primary supply chain to suppliers that can comply with these standards.
  - All EHS requirements of the Project, including Lender's requirements, Turkish legislation and the will be applicable for EPC, suppliers, contractors and subcontractors.
  - EPC and subcontractors will be required to appoint a safety representative who will be available on the site throughout the contract period,
  - EPC, suppliers, contractors and subcontractors will comply with Nakkaş Otoyol A.Ş. human resources policies and procedures on minimum working age, normal working hours, freedom to collective bargaining, good working conditions and eradicating risks of forced labor.
  - Employees of the EPC and subcontractors will have employment contract for all permanent and temporary employees in accordance with Labor law.
  - Nakkaş Otoyol A.Ş. will conduct labor audits quarterly including the suppliers to avoid risks associated with child labor and forced labor.

Additionally, Nakkaş Otoyol A.Ş. has been developed supply Chain Management Plan, considering the following provisions:

- Maintenance of a register of all Project primary suppliers;

- Ensure all core suppliers adopt self-declarations and codes of conduct regarding prohibition of any forms of forced and child labour in their operations prior to any engagement with them;
- Dis-engagement clauses will be added to the agreements with suppliers in case of material non-compliance with key provisions listed in the responsible supplier policy;
- Regular Labor Monitoring to ensure ongoing compliance with Project requirements, with a specific focus on age of workers and presence of forced labour etc.;
- Company to provide immediate notifications to the Lenders if/when forced/child labor risks or allegations are raised in relation to its core suppliers; and
- Mitigation of issues/risk identified during the supply chain risk assessments by core suppliers conducted in a timely manner. In case of failure to comply with the supplier policy requirements, then disengagement clause to be implemented in line with the timelines provided to the Lenders.

EPC contractor is developed a Camp Management Plan, compliant with the applicable IFC and EBRD guidelines. This plan will include:

- EHS (including fire safety) and hygiene standards to be applied as part of the external accommodation selection criteria and monitoring including provision of first aid, clean water supplies and waste management, among others.
- Specific benchmarks concerning areas such as space / density, ratio to be applied for number of toilets and showers, drinking water and provision of recreational facilities if applicable.
- Mitigation measures for COVID-19 risks, including provisions to reduce psychological effects on workers in case of quarantine and isolation requirements.
- Design of camps that are gender inclusive to avoid any potential risks to female workers.

These aspects will be checked during accommodation monitoring and measures will be taken in case of any non-compliances.

Worker Health and Safety

EPC contractor developed a Health and, Safety Plan as part of Nakkaş Otoyol A.Ş.'s Health and Safety Management System for the Project. This management system will be enforced throughout the Project including all Project personnel (including direct hire employees, advisors and consultants, contractors and sub-contractor personnel). It will include aspects such as regular training and monitoring, as well as inspections and audits.

Within the H&S Plan, the following measures will be included:

- Identification and provision of personal protective equipment (PPE) to all concerned workers during activities to avoid health implications (e.g. dust masks, protective clothing for handling waste materials etc.);
- Pre-employment screening protocols for all employees including contractors and subcontractors which will include medical checks of SARS CoV 2 history and other diseases appropriate to WHO recommendations, the individual's country of origin and vaccinations;
- Workers will be provided with primary health care and basic first aid at worksites;
- Regular medical check-ups and centralized medical treatment for all workers of the Project (Nakkaş Otoyol A.Ş., contractors and subcontractors) will be provided; and
- Workforce, including contractors and subcontractors, will be provided with health awareness training, including hazardous works, a significant briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable disease and how to protect against infection and about transmission routes and the symptoms of the communicable diseases of concerns (including STDs and COVID-19).

- Contractor contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies or clauses in the contract. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers; and
- As part of the contractor and supplier selection process Nakkaş Otoyol A.Ş. will take into consideration performance with regard to worker health and safety as outlined in Turkish law, international standards and Nakkaş Otoyol A.Ş. policies.

Any appointed contractors should establish their own Emergency Preparedness and Response Plan and communicate key information to the Project workforce prior to work commencing on any site.

Furthermore, unauthorized access to explosive materials should be restricted, allowing only qualified personnel in the initiation of the explosives. Flyrock control is essential, and the area around the blast site where flying debris may occur should be secured.

Similarly during the construction phase, Nakkaş Otoyol A.Ş. will maintain all provisions of the existing Labor Management Plan in line with Turkish regulations. Nakkaş Otoyol A.Ş. will maintain a workers' grievance mechanism that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed. Contractors and sub-contractors will also be required to put in place a Workers' Grievance Mechanism.

Gender Based Violence, Harassment and Inequalities

- Implement a Gender Action Plan for the Project, including mitigation measures in relation to Gender Based Violence and Harassment (GBVH). This will also focus on developing an inclusive, integrated and gender-responsive approach for the prevention and elimination of violence and harassment at work, aligned with the ILO Convention (C190) and Recommendation (R206) concerning the elimination of violence and harassment at work. Such an approach should take into account violence and harassment involving third parties, where applicable, and include:
  - adopt and implement, in consultation with workers and their representatives, a workplace policy on violence and harassment;
  - take into account violence and harassment and associated psychosocial risks in the management of occupational health and safety;
  - identify hazards and assess the risks of violence and harassment, with the participation of workers and their representatives, and take measures to prevent and control them, such as ensuring access to clean, safe, secure and separate toilet and welfare facilities at work. Lack of access can create or exacerbate health problems for workers as well as put them at risk of violence, including sexual violence;
  - provide to workers and other persons concerned information and training, in accessible formats as appropriate, on the identified hazards and risks of violence and harassment and the associated prevention and protection measures, including on the rights and responsibilities of workers; and
  - ensuring effective means of inspection and investigation of cases of violence and harassment, including through labour inspectorates or monitoring.
- Nakkaş Otoyol A.Ş. developed a GBVH policy and disclose its its employees, contractors and public.
- Specific provisions will be implemented in the Project's Grievance Mechanism to manage grievances related to GBVH (e.g. the complainant will be able to communicate the grievance to a person of its preferred gender, for example, if a woman prefers to explain the grievance to another woman, that will be possible). Nakkaş Otoyol A.Ş and EPC Contractor will also assign and train

GBVH focal points (including women) to deal with GBVH related incidents and grievances as well as develop response measures and support mechanisms for survivors.

- Nakkaş Otoyol A.Ş. will develop a Local Recruitment Plan ensuring that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender.
- Nakkaş Otoyol A.Ş. will ensure these requirements are also embedded into HR policies and procedures of the EPC contractor and its sub-contractors.

Child Labour and Forced Labour in the Supply Chain

Labour Management Plan and Supply Chain Management Plan consider the following elements regarding child labour in the supply chain:

- Nakkaş Otoyol A.Ş. will oversee if suppliers comply with all applicable child labour laws and only employ workers who meet the applicable minimum legal age requirement in accordance with international standards;
- Contractor contracts will specify monitoring to be undertaken by the contractor, establish the right for the Project monitoring and auditing of all contractors and subcontractors and the consequences for the contractor if they are found to be breaching national legal requirements, international standards, policies or clauses in the contract regarding forced child labour. Contractor contracts will specify that the same standards will be met by their sub-contractors and suppliers; and
- In all contractor contracts the Project will make explicit reference to the need to abide by Turkish law and international standards in relation to child labour.

6.3.3.5.2 Construction and Operation Phases

The table below includes a summary of the impact assessment on both Project phases, pre- and post-mitigation(s).

Table 6-109 Rating of Impacts Related to Labour and Working Conditions/Workers' Rights (Construction and Operation)

Project Phase: *Construction and Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Temporary*	Workers' rights need to be considered to avoid loss of man-hours, labour abuses and to ensure fair treatment, remuneration and working or living conditions.	*Temporary*	During construction and operation phases.
Scale	*Medium*	Medium impact on violations to labour rights as local population may not have an understanding of their labour rights as enshrined in the law or may be willing to waive these rights in order to earn incomes.	*Small*	Despite training and mitigation measures, individuals may be unwilling to report issues and breaches may go unnoticed.

Project Phase: *Construction and Operation*				
Type of Impact: Direct Negative Impact				
Frequency	*Rare*	Nakkaş Otoyol A.Ş. and Contractors' will implement a program of socioeconomic compliance monitoring to inform internal auditing and monitoring process.	*Rare*	KPIs will be developed around worker rights, discrimination and management, workforce grievance mechanism and monitoring of outcomes.
Likelihood	*Unlikely*		*Unlikely*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the receptors is considered medium as some workers (especially vulnerable population) may not be aware of their rights.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

6.3.3.5.3 Construction Phase

Table 6-110 Rating of Impacts Related to Worker Health and Safety (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Temporary*	Injuries and fatalities could have permanent impacts on workers mental and physical health and their families. This being said, most of the impact will be temporary and strictly during construction.	*Permanent*	Injuries and fatalities could have permanent impacts on workers mental and physical health and their families. Overall, the impact would take place during construction.
Scale	*Medium*	Medium impact on worker health and safety as workers may not have an understanding of security measures or may be willing to waive these measures.	*Small*	Despite training and mitigation measures, individuals there still may be accidents.
Frequency	*Rare*	The frequency is considered to be rare as the workforce and drivers are expected to be trained and the employer is expected to enforce the	*Rare*	The frequency is considered to be rare as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPE and health and safety measures.

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
		use of PPE and health and safety measures.		
Likelihood	*Unlikely*		*Unlikely*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the receptors is considered medium as some workers (especially vulnerable population) may not be aware of their rights.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-111 Gender Based Violence, Harassment and Inequalities (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Temporary*	The impact is important during the construction phase and is therefore temporary. However, harrasment, injuries and fatalities could have permanent impacts on workers and their families.	*Temporary*	Limited to construction phase
Scale	*Medium*	Medium impact on GBVH as female workers may not have an understanding of their labour rights as enshrined in the law.	*Small*	Despite training and mitigation measures, individuals may be unwilling to report GBVH issues and violations may go unnoticed.
Frequency	*Rare*	The frequency is considered to be rare as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPE and health and safety measures.	*Rare*	The frequency is considered to be rare as the workforce and drivers are expected to be trained and the employer is expected to enforce compliance with workers' code of conduct.
Likelihood	*Unlikely*		*Unlikely*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				

Project Phase: *Construction*	
Type of Impact: Direct Negative Impact	
The sensitivity of the receptors is considered high as some workers may not be aware of their rights and some women and vulnerable workers may fear retaliation.	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Moderate Impact

Table 6-112 Rating of Impacts Related to Child Labour and Forced Labour in the Supply Chain (Construction & Operation)

Project Phase: *Construction* and Operation				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local/Regional*	This will depend on the place of origin of supplies acquired by project	*Local/Regional*	This will depend on the place of origin of supplies acquired by project
Duration	*Medium-term (temporary)*	The incidence will be temporary for the duration of the work to supply materials.	*Medium-term (temporary)*	Temporary incidence.
Scale	*Extended*	Use of child labour or use of people aged 16-18 to be involved in hazardous work within the supply chain remains a possibility without specific mitigation.	*Extended*	Use of child labour or use of people aged 16-18 to be involved in hazardous work within the supply chain remains a possibility albeit with reduced likelihood due to the implementation of mitigation.
Frequency	*Unknown*	Child and forced labour is prevalent in Turkey particularly in areas where hazardous work is involved.	*Rare*	The commitment to audit supply chain labour practices will result in a reduced frequency.
Likelihood	*Possible*	The use of child and/or forced labour is possible in the supply chain	*Likely*	With the mitigation the likelihood should be reduced. However the risk remains.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the receptor is very high due to the age and vulnerability of the receptors.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.3.3.5.4 Operation Phase

Table 6-113 Rating of Impacts Related to Worker Health and Safety (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Permanent*	Injuries and fatalities could have permanent impacts on workers mental and physical health and their families.	*Permanent*	Injuries and fatalities could have permanent impacts on workers' mental and physical health and their families.
Scale	*Medium*	Medium impact on worker health and safety as workers may not have an understanding of security measures or may be willing to waive these measures.	*Small*	Despite training and mitigation measures, individuals there still may be accidents.
Frequency	*Rare*	Accidents resulting in injuries or fatalities as activities will be less intense and will involve less workforce. However, accidents resulting in injuries or fatalities remain a possibility albeit with reduced likelihood	*Rare*	The frequency is considered to be rare as the workforce and drivers are expected to be trained and the employer is expected to enforce the use of PPE and health and safety measures.
Likelihood	*Unlikely*		*Unlikely*	
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the receptors is considered medium as some workers (especially vulnerable population) may not be aware of their rights.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.3.4 Community Health, Safety and Security

6.3.4.1 Potential Impacts

The Project RoW passes through some highly populated areas where there are sensitive receptors close to the RoW which could affect the health, safety and security of the communities both during construction and operation phases.

Table 6-114 presents the potentially significant community health and safety impacts that may occur during the construction and operation phases.

Table 6-114 Potential Impacts on Community Health, Safety and Security

Construction Phase	Operation Phase
■ Increase in noise and vibration ■ Increase in dust ■ Nuisance on community (dust, vibration, noise, fear) and grazing animals due to blasting activities ■ Increase in road safety risks due to construction traffic ■ Increase in safety risks in areas close to the residential areas due to uncontrolled access to construction site ■ Increase in transmission of communicable diseases; ■ Increase in risk of Gender Based Violence and Harassment (GBVH); ■ Increased pressure on healthcare; Conflict with security personnel; potential repraisal risks and ■ Risk of OHTL tower failure.	■ Increase in noise at specific locations ■ Increase in air pollution at specific locations; ■ Road safety and site trespassing ■ Passage of high voltage and potential health effects due to electric-magnetic field (EMF) due to OHTLs; ■ Noise from OHTL due to Corona Effect; and ■ Risk of OHTL tower failure.

6.3.4.2 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

- There are many sensitive facilities (schools, mosques, hospitals and leisure infrastructures such as malls, parks and wedding halls) located near the road within the Project's AoI as described in the Figures in Chapter 5.4.6. Furthermore, according to the GEM RAP 2023, there are parks within the Expropriation Corridor, more specifically three (3) in Başak, 38 in Başakşehir 2, one (1) in Şahintepe and 13 in Kayabaşı, all located in the district of Başakşehir.
- Only one settlement in the AoI has a hospital inside the neighbourhood and many settlements do not have a doctor, nurse nor dispensary.
- Some settlements report having low quality asphalt, one settlement reported that the village road is sometimes blocked due to weather conditions and five settlements reported rough roads and transportation difficulties to other villages. The settlements of Arnavutköy district, Çatalca district, and Avcılar district all reported severe issues about roads and transportation from within and outside the villages.
- Road work from the Northern Marmara Motorway Project was reported to cause accidents due to its narrowness in Nakkaş (Çatalca district).
- Around 73 % of all road crash fatalities and injuries happen in the economically productive age group (15 to 64 years of age). According to Eurostat, 368 persons died due to a road accident in İstanbul in 2019, a decrease of 33.21 % since 2016 (with 551 deaths). There were 22,889 injuries in İstanbul in 2019.
- No significant communicable diseases were reported in the AoI.
- From 11 March 2020 to 15 June 2022 there have been 15,085,742 confirmed cases of COVID-19 in Turkey, and 98,996 deaths reported to WHO. In May 2021 Turkey had the fifth highest total case numbers in the world.
- The construction of the roadway will result in significant changes in local communities, including worker influx and changes in household dynamics which can exacerbate the risk of GBVH in both public and private spaces.
- Deliklikaya (Arnavutköy) and Yeşilbayır (Arnavutköy) reported having moderate issues with uncollected wastes, with Tahtakale (Avcılar), having severe issues. Furthermore, the *Muhtar* of Bahşayış (Çatalca) reported having a surplus of waste generated and dumped nearby the village by third party construction activities.

- Security issues and conflict between security forces and communities/CSOs are reportedly high in Istanbul.

6.3.4.3 Actions taken by Nakkaş Otoyol A.Ş.

The following actions have been taken by Nakkas Otoyol A.S since the commencement of construction activities:

- Local administrations (Başakşehir District Governorship, Başakşehir Municipality) were contacted, meetings were organized with the local people and project information was provided prior to the commencement of construction activities at the sensitive receptors. This approach will be followed throughout the project lifetime.
- Traffic Safety Chief took the following measures since December 2021 for the management of the traffic impacts of the Project. So far one pedestrian path was arranged considering pedestrian safety and two disabled ramps for constructed for the disabled citizens.
- Regular dust suppression is carried out in Fedakar Çıkmazı area.
- Traffic safety personnel were assigned at certain points in order to control the interaction with civil traffic due to excavation and loading activities at Atilla Altıkat Street (km 58+000), Adnan Menderes Boulevard (km 56+500), Kayaşehir Boulevard (km 55+000). Regular dust suppression and street cleaning are carried out.
- Due to VY02 works on Kayaşehir Boulevard, a signalling system has been designed which is currently in the Procurement process. Similar signalization system was designed for Adnan Menderes Boulevard as well.
- The pedestrian walkway was incorporated into the underpass of the Bridge 04 and AK05 structures' design.
- Traffic safety team maintains both the pedestrian crossing safety and the vehicle access restriction within certain periods at the blasting sites.
- Road diversion signs have been installed at Sazlıdere location to prevent third party entrance to the construction site.
- A wheel washing unit was established close to Adnan Menderes Boulevard to wash the wheels of the trucks to keep the Boulevard free from mud.

6.3.4.4 Embedded Measures

Relevant Project design elements that may potentially influence impacts are summarized as follows:

- The Project is subject to the following design standards:
  - KGM Technical Specifications – these are the underlying obligatory technical standards for all motorways of such type in Turkey. Any intended variation to these specifications requires specific prior approval by KGM;
  - Other Turkish and international design standards and specifications referred to by KGM in the BOT contract tender documents for the Project.
  - Requirements stemming from Turkish environmental and other permits and licenses for particular Project elements (as discussed above the entire Project is exempted from the Turkish EIA requirements, but other permitting and licensing requirements are nevertheless applicable);
  - Requirements stemming from the international Lender Requirements for environmental, social and health & safety topics, including the results of this ESIA as described in the ESMMP; and

- Additional standards and specifications applied by the Project designers during the further detailed design process and design modifications, for example to incorporate environmental considerations of the ESMMP, and subject to final approval by KGM.

- Nakkaş Otoyol A.Ş. will consider the road safety measures listed in "Stage 1 Road Safety Audit Report" prepared by J.B. Barry & Partners, in partnership with BTY. There will be further audits after detailed design and before operation phase.
- The motorway will be fenced and the following restrictions will be applied within the safety zone:
  - No pedestrian access.
  - No construction of houses or structures.
  - No crops and permanent plantations (except the landscaping work within Project scope).
- Nakkaş Otoyol A.Ş. makes it a priority to prevent, reuse, separate, recycle, recover and dispose waste, adopt source reduction practices and ensure control and inspection after disposal. Waste generated by the Project will be effectively monitored and managed by Nakkaş Otoyol A.Ş.;
- The excess materials from excavation (the portion that is not suitable for reuse in fill operation) will be stored at the excavated material storage sites;
- Workers will be accommodated at two campsites (Olimpiyat and Sazlidere campsites).
- All employees and contractors are required to acknowledge and adopt Nakkaş Otoyol A.Ş. environmental and social work practices and comply with all ESHS procedures as well as the Code of Conduct and Zero Tolerance Policy, reporting safety hazards, unsafe work practices, unacceptable conditions, and environmental and social issues.
- The design of the tower to be made as per the national regulations, which to ensure that a safety margin is included in the design to reduce the risk from any seismic activity, wind loads, etc.
- Risks to general public during stringing activities to be mitigated by initial on-site training of workers and sensitisation of the local community.

6.3.4.5 Impact Assessment

6.3.4.5.1 Construction Phase

Road Safety

Traffic accidents involving pedestrians during road construction and operation are likely to affect people of all ages. Furthermore, there are many sensitive facilities such as schools, hospitals, parks and leisure infrastructures located near the Project, increasing the risk of traffic accidents, especially for vulnerable population such as children and elders.

The construction phase of the Project is likely to have a **major** negative impact on road safety as it involves a large number of vehicles travelling on the low quality asphalt road networks used on the Project site before the completion of the work. Also, there will be open work fronts and roadblocks, which will result in additional crossing difficulties and associated safety risks.

The issue of road safety plays a major role for the Project. Safety considerations have been incorporated into the design stage (crossing points, utility provisions, dust and noise mitigation, etc.).

The impact is a direct result of interaction with the increased traffic associated with construction activities, and the potential risk to community safety related to construction activities. The impact is temporary in nature and limited to the settlements in the AoI and the surrounding road network. Contractors will also be required to operate according to best international practice. However, considering the potential risk posed to communities, the magnitude is considered medium. Receptor sensitivity is also rated as medium, resulting in **moderate** impact significance**.**

Site Trespassing and Injury

There is a potential risk of site trespass at work fronts for the duration of construction and maintenance and repair operation. It is assumed work fronts will be fenced, and several restrictions will be applied within the safety zone namely no pedestrian access, no construction of houses or structures and no crops and permanent plantations. Site trespass could result in accidents leading to injuries or even fatalities, especially due to the presence of large pieces of machinery. The site visit conducted has shown that there are construction sites without fences, no signage which led to local community members and animals trespassing the construction sites.

The blasting represents an even bigger risk, as fly rock could cause personal injury or death to people trespassing onto or near the site. Young people, children and elderly people are most likely to trespass onto sites and are most at risk of getting injured, as well as people looking to be employed in the Project and passers-by looking for a short cut.

Site trespassing is also a risk regarding herders and their animals (including other members of the public) being kept outside of construction areas to avoid injury. This is known to be an existing risk on the Project that needs to be adequately controlled.

This represents a **major** negative impact.

Environmental Health

Impacts on the health of the community as a result of environmental change may arise during construction as a result of noise, dust and other emissions from construction activities. As stated for the Air Quality impact (Chapter 6.1.2) the low-quality asphalt road network used across the Project Site prior to works completion can be particularly dusty when disturbed by vehicle movements. Also, construction of the roadway will progress along the route, resulting in temporary noise impacts as the construction approaches and moves past each settlement (See Chapter 6.13). These receptors have a direct impact on the well-being of communities.

In relation to Air Quality impacts, the number of Heavy Goods Vehicles (HGV, vehicles with two – six axles and a wheelbase of 3.2 m or greater) movements is anticipated to be, at peak, between 10 and 40 vehicles per hour. Assuming a 12-hour working day (among different shifts), this equates to 240 to 960 vehicle journeys per day (with two journeys per each vehicle movement). No major pollution sources have so far been observed. On the other hand, construction conditions and activities (unpaved roads, earthworks and materials handling) are likely to produce a lot of dust.

In relation to Noise Nuisance impacts (see Chapter 6.1.7), this will have a high impact during operation, as road widening inevitably leads to a higher concentration of traffic in the wide area, including quarry traffic. Furthermore, the noise levels will be higher in areas with low quality roads or steep roads.

The impacts on environmental health during construction are temporary in nature for the duration of the construction phase. Considering the temporary nature of the works and the sequential approach, the magnitude is considered medium, however the magnitude for the blasting near residential areas (see Figure 6-19) is considered large. Receptor sensitivity is also considered medium as receptors will include children, older people and others that may be susceptible to changes to environmental quality. The impact significance is therefore considered **major**.

Increased Transmission of Communicable Diseases

The presence of workforce living in work camps could lead to the increased transmission of communicable diseases within the workforce and the nearby communities. In addition, if opportunistic workers (those hoping to find employment on the Project or from related activities) migrate to work fronts or work camps this could also lead to an increase in the transmission of communicable diseases. Movements outside the camp are expected to be restricted due to security and safety issues. It must be noted that accommodation camps will be in accordance with local requirements and in line with Workers' Accommodation Processes and EBRD Performance Requirements.

The recent outbreak of COVID-19 disease should be considered a high risk for the spread of pandemics. There is the potential for increased transmission between workers living and working in close quarters and then onwards into local workers' families and the communities through interactions. Children will be at particular risk due to their poor sanitary behaviours, while the elderly will be at risk of more severe health outcomes as a result of their frailty. Health infrastructure in the AoI is reported to be poor, which could worsen the implications of the outburst spread of diseases.

The profile of the diseases will be influenced by the existing disease profile of communities along the route and the disease profile of the country's workers are sourced from, as they may carry diseases that are not present in Turkey. Considering the majority of the workforce will be sourced locally, the disease profile of the workforce is expected to be similar. This results in a **moderate** impact significance on community health.

Increased risk of Gender Based Violence and Harassment

This incidence of GBVH is expected to be exacerbated by the COVID-19 pandemic, which has brought a disruption to economic activities, especially affecting the self-employed and informal workers who have been forced to temporarily shut down in some cases, without compensations. This may also translate to heightened tension leading to violence.[226] This burden has increased during the COVID-19 pandemic, as the "stay at home" measures meant schools and other service providing institutions closed. The interruption of sources of income has placed both financial and psychological burden on breadwinners, who are mostly men.

Shifts in power dynamics between community members and within households can result in increased Gender Based Violence and Harassment (GBVH). Firstly, interactions between male-workers and community women may create frictions within the family unit. Furthermore, a major influx of male workers may pose a threat for women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence. This results in a **moderate** impact significance.

Use of Security Personnel an potential repraisal risks

It is assumed security personnel will be hired by Nakkaş Otoyol A.Ş. mainly during construction to prevent unauthorized access to the construction sites. Security personnel might constitute risks to the community and or CSOs opposing the project if they are not appropriately trained, as they may misuse their status and be abusive to local persons or apply excessive force in their handling/apprehension of potential trespassers or other unauthorised persons[227]. This impact is considered to be of **major** significance, especially if the resolution of the conflict involves the state security of the workers.

6.3.4.5.2 Operation Phase

Environmental health

The road alignment passes through open countryside, but it also passes in the vicinity of sensitive infrastructure (hospitals, schools, etc.) and housing in numerous areas. Therefore, the operation of the Project has the potential to result in significant noise impacts at nearby receptors.

Although there were impacts identified during the dispersion modelling in terms of Air Quality (see Chapter 6.1.2), in practice by 2040 road traffic emissions are expected to be substantially reduced compared to those used in the modelling. The impact is considered to be of **moderate** significance.

Road safety

Traffic accidents involving pedestrians during road construction and operation are likely to affect people of all ages. Furthermore, there are many sensitive facilities such as schools, hospitals, parks and leisure

[226] UN Women. 2021. Turkey Overview. Available from: https://eca.unwomen.org/en/where-we-are/turkey

[227] EBRD. PR4: Community Health, Safety and Security. Available from: https://www.ebrd.com/downloads/about/sustainability/ESP_PR04_Eng.pdf

infrastructures located near the Project, increasing the risk of traffic accidents, especially for vulnerable population such as children and elders.

The construction phase of the Project is likely to have a **major** negative impact on road safety as it involves a large number of vehicles travelling on the low-quality asphalt road networks used on the Project site before the completion of the work. Also, there will be open work fronts and roadblocks, which will result in additional crossing difficulties and associated safety risks.

6.3.4.6 Mitigation Measures

The following mitigation measures will be implemented during the construction phase to reduce any impacts on the communities' health and safety.

6.3.4.6.1 Construction Phase

Road safety

Nakkaş Otoyol A.Ş. has developed a Traffic Management Plan that includes the following:

- Adequate speed limits;
- Drivers of Project vehicles will be trained/briefed about safe driving with respect to other drivers, pedestrians and livestock;
- Advance warning will be given of any proposed road diversions and closures;
- Project vehicles to be identifiable to the Project (e.g. an easy to read/see sign or symbol on vehicles which shows that they are connected to the Project);
- Address how the Contractor can reduce the exposure of vehicle drivers, their passengers and other road users from the hazards of road-related accidents; and
- The plan includes a road safety audit as well as the cordoning off of active construction areas.

A Project Grievance Mechanism has been developed and implemented, and information about this mechanism will continue to be shared amongst local communities. The Contractor will also be responsible for managing a grievance mechanism that allows communities and employees to raise complaints. This will be a key monitoring and reporting requirement of the Project. The grievance mechanism will be implemented prior to commencement of the construction phase, with all relevant staff fully cognizant of their roles in the grievance resolution process so that quick and effective response is provided to the concerns raised by local stakeholders.

During operation, Nakkaş Otoyol A.Ş. will maintain the Grievance Mechanism which will be accessible to all communities.

Site trespass and injury

As part of the SEP, Nakkaş Otoyol A.Ş. will undertake stakeholder engagement and consultation activities to educate local communities of the risks of blasting and trespassing onto sites, the meaning of signs, the risks of playing on or near equipment or entering fenced areas. This will include a presentation in every primary and secondary school in communities in the AoI.

Subcontractors will be closely monitored by EPC to ensure all risks are avoided and proper measures are taken. A robust engagement plan will be adopted to give prior notice to local communities and business before civil works commence and throughout project life.

The programme will take into account especially vulnerabilities in regards to poor children. Poor children are particularly vulnerable to traffic risk, as they are less likely to receive road safety education since sometimes, they do not assist school as they work as street vendors and are exposed to hazardous road risks. Special posters and culturally appropriate signs will be provided.

A community meeting will also be given in every settlement along the route. Records of the meeting and attendees should be kept. As part of the schools meeting Nakkaş Otoyol A.Ş. will present on other issues such as construction methods and skills required to work in construction to provide benefits. Nakkaş Otoyol A.Ş. will provide access to health care for those injured by its activities. Nakkaş Otoyol A.Ş. will ensure that signs are put up around work fronts and construction sites advising people of the risks associated with trespassing. Blasting signs are to be conspicuously place along the edge of the blast site and area where flying debris may occur.

Access within the blasting area shall be controlled to prevent presence of livestock or unauthorized persons during blasting. Access will remain controlled until an authorized representative of the operator has reasonably determined that: no unusual hazards, such as imminent slides or undetonated charges, exist, and access to and travel within the blasting area can be safely resumed.

Blasting schedules will be distributed to the users of the grazing areas, residents and local governments including the name, address and telephone number of the operator; an identification of the specific areas in which blasting will take place; the dates and time periods when explosives are to be detonated; the methods to be used to control access to the blasting areas; and the type of patterns of audible warning and all-clear signals to be used before and after blasting.

In order to reduce the likelihood of people trespassing because they are seeking job opportunities in the Project, the site safety signage will include a warning stating that recruitment at the construction site will not be permitted. Furthermore, all job advertisements will clearly state no recruitment will be done on the construction site. Nakkas Otoyal A.S will also have in place a protocol for Third Party Crossing Projects to address potential risks associated with other projects crossed or will be by the Project prior to construction.

Environmental Health

As part of the SEP implemented by Nakkaş Otoyol A.Ş., awareness sessions to explain the type of noise, dust and emissions from Project activities (including the blasts), the mitigation measures implemented and a point person to contact in case of emergency etc. in order to alleviate potential concerns will be organised.

Residents of the local communities will receive a written notification at least 30 days in advance of a nearby blasting as well as two (2) more written reminders. This notification should include the blasting schedules, as well as the name, address and telephone number of the operator; an identification of the specific areas in which blasting will take place; the dates and time periods when explosives are to be detonated; the methods to be used to control access to the blasting areas; and the type of patterns of audible warning and all-clear signals to be used before and after blasting.

Blasting signs are to be conspicuously place along the edge of the blast site and area where flying debris may occur.

Access within the blasting area will be controlled to prevent presence of livestock or unauthorized persons during blasting. Access will remain controlled until an authorized representative of the operator has reasonably determined that: no unusual hazards, such as imminent slides or undetonated charges, exist, and access to and travel within the blasting area can be safely resumed.

Routing of truck movements to avoid residential and noise sensitive areas will be a key avoidance/mitigation measure, truck traffic will not pass through villages or other buildings. Speed restrictions, vehicle maintenance and driver behaviour will also comprise part of the mitigation measures. Truck routes through villages or towns will be strictly avoided during night-time hours (10pm to 5 am).

Mitigation measures will be implemented to avoid and minimize the potential health impacts caused by air and noise emissions as defined in Chapter 6.1.2 and Chapter 6.1.7.

Overhead Transmission Lines

Following measures will be implemented with regard to OHTL construction activities:

- Provide adequate training to workers on the identification of occupation EMF levels and hazards.
- Engagement with PAPs (who have already been engaged during expropriation process) will continue in line with SEP. Any compensation-related or other grievances from PAPs will be managed through Project's Grievance Mechanism.
- Risks to general public during stringing activities to be mitigated by initial on-site training of workers and sensitisation of the local community.
- Once the stringing is complete, notices (danger-sign boards) and anticlimbing devices to be put on all the faces of the tower. The landowners and local community will be given adequate notice in advance of the initiation of construction activities, the possible health and safety risks associated with it, and the safety measures to be followed.
- Appropriate signage in the local language will be erected.
- Excavation for foundations will be closed up as soon as practicable to prevent people or animals falling into the excavations.
- The transport of heavy and abnormal loads will be undertaken out of normal working hours whenever possible.
- Grounding conducting objects (e.g. fences or other metallic structures) should be installed near power lines, to prevent shock.
- Fixing of permanent warning plates (danger-sign boards).
- Fixing of anti-climbing devices on all faces of the towers.
- The community in the immediate vicinity should be informed of the possible risks associated with the transmission line, the measures put in place to ensure safety and the precautions to be taken by the local community for the same.

Increased transmission of communicable diseases

Nakkaş Otoyol A.Ş. developed a Labour Management Plan that will include:

- A Workforce Code of Conduct detailing specific values, living and working conditions which will contribute to reduce the risks of disease transmission into the community as well as a Worker Grievance Mechanism. The Code of Conduct shall expressly prohibit sexual interactions of any kind with underage persons.
- Workforce, including contractors and subcontractors, will be provided with health awareness training, including a significant briefing of hygiene practices (such as hand washing), implementation of educational outreach to increase awareness of major communicable disease and how to protect against infection and about transmission routes and the symptoms of the communicable diseases of concerns (including STDs and COVID-19).
- Pre-employment screening protocols will be conducted for all employees including contractors and subcontractors which will include checks for COVID-19 and testing for tuberculosis and other diseases appropriate to WHO recommendations, the individual's country of origin and vaccinations.
- Workers will be provided with primary health care and basic first aid at worksites.
- Regular medical check-ups and centralized medical treatment for all workers of the Project (Nakkaş Otoyol A.Ş., contractors and subcontractors) will be provided.

As part of its Emergency Preparedness and Response Plan, Nakkaş Otoyol A.Ş. developed a Covid-19 Emergency and Response Plan in line with guidance note of Ministry of Health[228].

At worker accommodation sites the following measures will be implemented by Nakkaş Otoyol A.Ş. in order to minimise disease transmission:

- Providing workers with appropriate sanitary facilities, which are appropriately designed to prevent contamination;
- In line of with the recommendations of the Turkish Ministry of Health: providing measures for social distancing, hand washing, food treatment; frequent sanitization, isolation rooms and FFP2 masks.
- Developing a robust waste handling system to avoid the creation of new vector breeding grounds or attracting rodents to the area;
- Implementing measures to reduce the presence of standing water onsite through environmental controls and source reduction to avoid the creation of new breeding grounds;
- Ensuring the worker camp is kept clean and free from any accumulation of wastes as well as supplied with clean potable water;
- Ensuring appropriate food preparation and monitoring measures are in place;
- Monitoring to ensure that all standards are being met by the relevant departments.

Increase risk of Gender Based Violence and Harassment

All employees and contractors are required to acknowledge and adopt Nakkaş Otoyol A.Ş. environmental and social work practices and comply with all ESHS procedures as well as the Code of Conduct and Zero Tolerance Policy, reporting safety hazards, unsafe work practices, unacceptable conditions, and environmental and social issues. Furthermore, Nakkaş Otoyol A.Ş. will appoint a suitable qualified Gender Focal Point to ensure gender mainstreaming through the different policies.

All contractor contracts will include explicit reference to the need to abide by Turkish law and Nakkaş Otoyol A.Ş. standards and policies in relation to health and safety. Furthermore, contracts should include a clause committing contractors to adhere to Nakkaş Otoyol A.Ş.' GBVH policies and procedures, which could include specific GBVH risks and agreed measures to address them, explicitly mentioning the Nakkaş Otoyol A.Ş.' zero tolerance towards GBVH.

Training and orientation will be delivered on respecting local communities and vulnerable populations, with a special focus on gender, human rights and GBVH risks awareness. The training will also include clear guidelines in order to create a secure environment for women and children in the area, for example: actions such as catcalling people from the community or other workers will not be permitted.

Monitoring systems will be put in place for regular reporting on GBVH, including a grievance mechanism with special provisions for GBVH grievances that include confidential and anonymous grievance reporting, referral and a support system for workers. Workers in charge of dealing with grievances should have adequate specialised training on how to conduct GBVH related investigations and provide a suitable response.

Finally, Nakkaş Otoyol A.Ş. will consider conducting mappings of formal services (healthcare and counselling) and informal resources, including women's organisations.

Apart from the Code of Conduct and Zero Tolerance Policy, the Project has in place tools such as Security Management Plan, Gender Action Plan, Labour Management Plan, amongst others to ensure the prevention of GBVH. These plans include a grievance mechanism that will allow the communication of any potential incidents throughout the construction and operation phases of the Project.

[228] https://covid19.saglik.gov.tr/TR-66301/covid-19-rehberi.html

Use of security personnel

Rönesans Holding has Human Rights Policy[229] including zero tolerance to retaliation /reprisal which is followed by Nakkaş Otoyol A.Ş. The Human Rights Policy obliges Rönesans and parties acting on behalf of Rönesans and third parties to act in compliance with the Policy.

A Security Management Plan has also been developed and implemented by Nakkaş Otoyol A.Ş. in compliance with the Voluntary Principles on Security and Human rights[230] in line with PR 4, to provide further details on:

- Procedure for conducting a security risk assessment for Project sites (and determine the need for firearm equipment if applicable).
- Due diligence and background checks to be undertaken as part of security recruitment process.
- Type and frequency of training to be provided for security personnel, including in use of force and conflict mediation, and equipment to be provided Code of conduct for security providers that aligns with international standards, required to be signed by all security employees.
- Process for reporting and investigating security incidents.
- Facilitation of community and worker grievance mechanisms as means to submit grievances related to conduct of security personnel.
- Monitor activities of the security provider on regular basis through labour and social audits.
- In case of worker strikes or community conflicts, the use of state security will be a last resort only if there is criminal act against the project personnel or assets. The community relations and Project management will try to address the issues with workers and communities in line with the Project commitments to respect human rights. The Project may use third party mediators to resolve conflicts when and as required as committed in the SEP,

6.3.4.6.2 Operation Phase

Road safety

Nakkaş Otoyol A.Ş. will maintain the Grievance Mechanism that will be accessible to all communities and stakeholders.

Nakkaş Otoyol A.Ş. will consider the road safety measures listed in “Stage 1 Road Safety Audit Report” prepared by J.B. Barry & Partners, in partnership with BTY. The Project will conduct road safety audits after detailed design and during construction as well.

Environmental health

As part of the Stakeholder Engagement Plan implemented by Nakkaş Otoyol A.Ş., awareness sessions to explain the type of noise, dust and emissions from Project activities, the mitigation measures implemented and a point person to contact in case of emergency etc. in order to alleviate potential concerns.

Overhead Transmission Lines

Following measures will be implemented with regard to OHTL operations:

- Potential exposure to the public to be maintained below the reference levels developed by the International Commission on Non-Ionizing Radiation Protection.
- Provide adequate training to workers on the identification of occupation EMF levels and hazards.
- Use of conductors to minimise corona effect during foul weather conditions.

[229] https://ronesans.com/content/files/05-tr-i-ns-020863528c5bc475f0.61836371.pdf

[230] https://www.voluntaryprinciples.org/

- Engagement with PAPs (who have already been engaged during expropriation process) will continue in line with SEP. Any compensation-related or other grievances from PAPs will be managed through Project's Grievance Mechanism.
- Risks to general public during stringing activities to be mitigated by initial on-site training of workers and sensitisation of the local community.
- Once the stringing is complete, notices (danger-sign boards) and anticlimbing devices to be put on all the faces of the tower. The landowners and local community will be given adequate notice in advance of the initiation of construction activities, the possible health and safety risks associated with it, and the safety measures to be followed.
- Appropriate signage in the local language will be erected.
- Excavation for foundations will be closed up as soon as practicable to prevent people or animals falling into the excavations.
- The transport of heavy and abnormal loads will be undertaken out of normal working hours whenever possible.
- Grounding conducting objects (e.g. fences or other metallic structures) should be installed near power lines, to prevent shock.
- Fixing of permanent warning plates (danger-sign boards).
- Fixing of anti-climbing devices on all faces of the towers.
- The community in the immediate vicinity should be informed of the possible risks associated with the transmission line, the measures put in place to ensure safety and the precautions to be taken by the local community for the same.

6.3.4.7 Summary Impact table (Pre- and Post-mitigation – Residual)

6.3.4.7.1 Construction Phase

The table below includes a summary of the impact assessment on both Project phases, pre and post mitigation(s).

Table 6-115 Rating of Impacts related to road safety (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Medium-term (temporary)*	Risk of accidents due to road safety due to construction will be limited to construction period.	*Medium-term (temporary)*	Risk of accidents due to road safety due to construction will be limited to construction period.
Scale	*High*	Serious traffic accidents could result in severe injuries or, in the worst case scenario, death.	*Medium*	Mitigation measures such as signage, driver training, advance warning of diversions, and access to grievance mechanism reduces scale to medium.

Frequency	*Often*	Current driving practices and state of the roads combined with increased traffic from project construction could lead to accidents occurring often.	*Often*	Even with implementation of Traffic Management Plan, risk of accident could occur on often throughout construction.
Likelihood	*Likely*	Road safety accidents during construction are likely.	*Possible*	Implementation of these mitigation measures is likely to reduce, but not completely eliminate the risk of accidents and injuries.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered to be high due to the lack of capacity of healthcare facilities to deal with trauma cases within the AoI and poor road safety awareness.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-116 Rating of Impacts related to site trespass and injury (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Medium-term (temporary)*	Limited to construction period.	*Medium-term (temporary)*	Limited to construction period.
Scale	*High*	Serious accidents resulting from trespass onto Project sites could lead to severe injuries or, in the worst case scenario, death.	*Medium*	Despite the mitigation the risk remains that there could be an accident resulting in injuries or fatalities. This risk will be temporary for the duration of construction.
Frequency	*Often*	Potential for accidents to occur often.	*Often*	Despite mitigation measures, potential remains for accidents to occur often.
Likelihood	*Likely*	Risk of accident due to site trespass likely.	*Possible*	Implementation of these mitigation measures is likely to reduce, but not completely eliminate the risk of accidents and injuries.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered to be high due to the lack of capacity of health care facilities to deal with trauma cases within the AoI, communities' unfamiliarity with safety precautions around construction sites.				

Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Moderate Impact

Table 6-117 Rating of Impacts related to environmental health (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Medium-term (temporary)*	Dust and noise will be present during construction on a temporary basis and will directly affect nearby settlements	*Medium-term (temporary)*	Dust and noise will be present during construction on a temporary basis and will directly affect nearby settlements.
Scale	*Medium*	There is the potential for air and noise emissions to extend beyond the construction area.	*Small*	Mitigation developed to minimise environmental impacts will minimise impacts to health and engagement will ensure that communities are kept informed.
Frequency	*Occasional*	Occasional impact occurring during construction phase for each Project site.	*Occasional*	Occasional impact occurring during construction phase for each project site.
Likelihood	*Likely*	Impacts to environmental health are likely.	*Possible*	Implementation of these mitigation measures is likely to reduce, but not completely eliminate the risk of accidents and injuries.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Receptor sensitivity is considered medium as receptors may experience disturbance and decreased well-being. Also, although structures inside the road footprint corridor will be displaced to maintain security distances to the line, houses and sensitive locations such as schools located further away mays still experience some impacts related to noise and air quality.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-118 Rating of Impacts related to increased transmission of communicable diseases (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local, Regional*	Limited to AoI and nearby urban centres.	*Local, Regional*	Limited to AoI and nearby urban centres.
Duration	Long-term (temporary)	Exposure is long term	*Long-term (temporary)*	Exposure is long term
Scale	*Large*	Following any increase in the incidence of communicable diseases (particularly COVID-19), there is a risk of on-going increased prevalence as well as long-term health consequences for those affected.	*Medium*	Communicable diseases, especially COVID-19, remain a significant threat for both national and expatriate workforce.
Frequency	*Continuous*	The possibility of transmission will exist for the duration of the Project	*Continuous*	The possibility of transmission will exist for the duration of the Project
Likelihood	*Likely*	Presence of the Project workforce combined with the baseline conditions mean that the impact is likely.	*Likely*	Implementation of these mitigation measures is likely to reduce, but not completely eliminate the risk of transmission of communicable disease.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
High sensitivity due to current outbreak of COVID-19.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-119 Rating of Impacts Related to increase risk of Gender Based Violence and Harrasment

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Permanent*	Harassment and injuries could have permanent impacts on women and their families.	*Permanent*	Harassment and injuries could have permanent impacts on women and their families.
Scale	*High*	Medium impact on women as shifts in power dynamics between community members and within households can result in increased Gender Based Violence and Harassment (GBVH).	*Small*	Despite training and mitigation measures, individuals might still engage with local women.
Frequency	*Unknown*	The frequency is unknown as such events cannot be foreseen and are usually not reported.	*Unknown*	The frequency is unknown as such events cannot be foreseen and are usually not reported.
Likelihood	*Likely*	Interactions between male-workers and community women may create frictions within the family unit. Furthermore, a major influx of male workers may pose a threat for women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence.	*Likely*	Interactions between male-workers and community women may create frictions within the family unit. Furthermore, a major influx of male workers may pose a threat for women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the receptors is considered high due to their level of vulnerability and the general widespread of GBV and harassment at country level.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-120 Rating of Impacts related to increased pressure on healthcare (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Permanent*	Permanent relocation of residential structures.	*Permanent*	Permanent relocation of residential structures.
Scale	*Medium*	In case of disease spread of COVID-19, hospitalisation would be required which would strain community access to health care.	*Small*	Nakkaş Otoyol A.Ş. will provide basic health care for its workers and put in place agreement with hospitals following a needs assessment and upgrade support ensuring no or minimal decreased access for communities.
Frequency	*Occasional*	Impact could occur occasionally throughout construction period.	*Rare*	Minimized/decreased impact will lead to rare frequency of impact to healthcare services.
Likelihood	*Likely*	Potential for outbreaks requiring hospitalization is likely.	*Unlikely*	Where mitigation measures are adequately implemented, impact is unlikely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Small Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium sensitivity due to current outbreak of COVID-19.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

Table 6-121 Rating of Impacts related to use of security personnel (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Short-term (temporary)*	Short-term during employment of security personnel during construction phase.	*Short-term (temporary)*	Short-term during employment of security personnel during construction phase.
Scale	*Medium*	Medium risk of abuse and/or excessive use of force.	*Minor*	Security Management training, grievance mechanism, and engagement with local stakeholders reduces impact to minor.
Frequency	*Occasional*	Impact could occur occasionally throughout construction period.	*Rare*	Minimized/decreased impact will lead to rare frequency of impact due to use of security personnel.
Likelihood	*Likely*	Potential for impacts from use of security personnel likely.	*Unlikely*	Where mitigation measures are adequately implemented, impact is unlikely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Medium sensitivity due to poverty and vulnerability of most communities in the AoI.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

6.3.4.7.2 Operation Phase

Table 6-122 Rating of Impacts related to road safety (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Permanent*	Risk of accidents due to road safety is long-term.	*Permanent*	Risk of accidents due to road safety is long-term.
Scale	*High*	Serious traffic accidents could result in severe injuries or, in the worst case scenario, death.	*Minor*	Mitigation measures such as signage, driver training, advance warning of diversions, and access to grievance mechanism reduces scale to minor.
Frequency	*Often*	Current driving practices and state of the roads combined with increased traffic from project operation could lead to accidents occurring often.	*Often*	Even with implementation of Traffic Management Plan, risk of accident could occur on often throughout operation.
Likelihood	*Likely*	Road safety accidents during operation are likely.	*Possible*	Implementation of these mitigation measures is likely to reduce, but not completely eliminate the risk of accidents and injuries.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered to be medium due to poor road safety awareness.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Minor Impact	

Table 6-123 Rating of Impacts related to environmental health (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Long-term (temporary)*	Air emissions and noise from cars will be present on a regular basis.	*Medium-term (temporary)*	Air emissions and noise from cars will be present on a regular basis.
Scale	*Medium*	There is the potential for air and noise emissions to extend beyond the road footprint area.	*Small*	Mitigation developed to minimise environmental impacts will minimise impacts to health and engagement will ensure that communities are kept informed.
Frequency	*Occasional*	Occasional impact occurring during operations phase.	*Occasional*	Occasional impact occurring during operation phase for each project site.
Likelihood	*Likely*	Impacts expected throughout operation.	*Possible*	Impacts expected throughout operation.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Receptor sensitivity is considered medium as receptors may experience disturbance and decreased well-being. Also, although structures inside the road footprint corridor will be displaced to maintain security distances to the line, houses and sensitive locations such as schools located further away mays still experience some impacts related to noise and air quality.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.3.5 Access to Infrastructure and Services

6.3.5.1 Potential Impacts

Construction activities will induce impacts on utilities and infrastructure, mainly due to site clearance works, excavation and movement of soil, embankment construction, and construction of the various elements of the motorway. This is likely to generate pressure on existing local utility supplies (which already have temporary disruption), disturbance to traffic and transportation due to road crossings, and short-term planned and unplanned disruption to electricity, telecommunication, sewage, storm water lines, natural gas and water supply for irrigation, domestic, drinking and industrial purposes.

Nakkaş Otoyol A.Ş. will ensure that all utilities that need to be supported, protected or relocated because of construction works are identified in sufficient time to allow the motorway schedule to proceed as programmed as well as to minimize impact on the public. Wherever possible, existing utilities shall remain in place or be incorporated into the new works. In locations where this is not possible, the utilities shall be diverted. Finally, utilities that are not scheduled to be relocated, will be protected from possible damage.

It must be noted that no infrastructures such as pipelines transporting oil and gas and BEKRA establishments were present within the Project area.

Table 6-124 summarises the potentially significant impacts on access to Infrastructure and Services during the construction and operation phases of the Project.

Table 6-124 Potential Impacts on Access to Infrastructure and Services

Construction Phase	Operation Phase
■ Disruption to infrastructure and utilities during construction.	■ Benefits from improvements to road access and traffic flow.

6.3.5.2 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows (for the full baseline please refer to Chapter 5.

- Not all settlements in the AoI have electric lines in the neighbourhood, including Sazlıbosna (Arnavutköy), Yeşilbayır (Arnavutköy), Tahtakale (Avcılar) Nakkaş (Çatalca), who reported having moderate issues due to insufficient energy resources. Furthermore, *Muhtars* claimed that the inhabitants of the settlements are discontent about tariffs;
- The municipality of İstanbul relies on dams and ponds for water, which are located mainly in the region. The AoI is located near the Sazlıdere Dam;
- All settlements have a water supply network in the neighbourhood. Even though all settlements in the AoI have drinking water infrastructure, some reported the water was not drinkable. Moreover, many settlements reported difficulties accessing the water resources, namely Şamlar and Şahintepe (Başakşehir district), Yeşilbayır (Arnavutköy district), Bahşayiş (Çatalca district) and Tahtakale (Avcılar district);
- There are several water tanks located around the neighbourhoods of the AoI, particularly near Kayabaşı, Şamlar and Şahintepe in Başakşehir;
- The settlement that reported the lowest internet usage was Yeşilbayır (Arnavutköy), with 20 %, followed by Tahtakale (Avcılar) with 50 %. All the other neighbourhoods reported an internet usage of over 90 %. All settlements reported over 85 % of the population having a mobile phone;
- The motorway transport system carries over 95 % of passenger transport in Turkey, and almost 90 % of freight transport;

- There are complex roads at different levels between these and traffic is mostly dense in the area. Başakşehir hosts mass housing areas, which implies dense traffic;
- The O-3/E80 and the D-100/E-5 corridors experience high levels of congestion, as they are two of the key local, interurban and intraurban corridors, and connect to central İstanbul and the metropolitan area. Furthermore, the O-7 is an alternative travel corridor that was developed in order to facilitate intraurban and interurban travel. The organised industrial zones, commercial areas, manufacturing intense areas in Başakşehir, Arnavutköy and Avcılar are also traffic intensive areas. Hadımköy (Arnavutköy), as a juncture point of access roads and due to business density, experiences frequent traffic density, as well as Tahtakale (Avcılar) and Firuzköy (Avcılar);
- The settlements of Ömerli, Sazlıbosna, Yeşilbayır (all located in Arnavutköy district), Bahşayış (Çatalca) and Tahtakale (Avcılar) and Şahintepe (Başakşehir) report having low quality asphalt;
- Deliklikaya (Arnavutköy) was the only village road that was blocked due to weather conditions;
- Şamlar (Başakşehir), Deliklikaya and Yeşilbayır (Arnavutköy district), Bahşayış and Nakkaş (Çatalca district), Tahtakale (Avcılar) reported rough roads and transportation difficulties to other villages;
- Bahçesehir 2, Samlar and Şahintepe (Basaksehir district), Deliklikaya and Yeşilbayır (Arnavutköy district), Nakkas (Çatalca district) and Tahtakale (Avcılar district) report having moderate to severe issues in terms of health services (Section 5.4.11.5);
- Only two (2) settlements reported to have midwives in the neighbourhood: Kayabaşı (Başakşehir), and Tahtakale (Avcılar). Midwives play pivotal role in providing maternity care, and they are crucial in saving the lives of pregnant women and preventing morbidity; and
- Nine (9) of the settlement in the AoI have a primary and secondary school and one (1) only has a primary school.
- The Project requires relocation and re-design of the existing Overhead Head Transmission Lines (OHTLs) as summarized below:
  - **KM 54+000 – KM 59+000 – OHTL Displacement Works:** The EPC Contractor has already engaged with the affected communities between Km 54+000 – Km 59+000 between January 2022 and July 2022 as presented in Chapter 4.4.8.2 "*Engagements during the ESIA and Construction Phase*".

  Based on the information received from Nakkaş Otoyol A.Ş., the community didn't have concerns on relocation of the overhead transmission lines except Head of Özkaymak Residences located at Km 58+700. Head of Özkaymak Residences expressed that the new route of the overhead transmission line was close to the residents and the residents were concerned about exposure to radiation.

  - **KM 49+500 – OHTL Re-design and Heightening Works:** Existing OHTL, consisting of 3 transmission lines (2 x 380 kV + 1 x 154 kV) will be re-designed by heightening up to 10 meters. The new tower (pylon) locations will be next to the existing tower locations, ensuring sufficient distance in terms of occupational health and safety of the works who will be engaged in heightening works. Nakkaş Otoyol A.Ş. is currently working on the detailed design of the planned works.
  - **Bahcesehir Connection Road – OHTL Re-design and Heightening Works:** Existing OHTL (single transmission line: 1 x 154) will be re-designed by heightening up to 10 meters. The new tower (pylon) locations will be next to the existing tower locations, ensuring sufficient distance in terms of occupational health and safety of the works who will be engaged in heightening works.

Further details on impacts and mitigation measures on land use, landscape, community health and safety, occupational health and safety and biodiversity have been discussed in relevant chapters of this ESIA report under each specific topic.

6.3.5.3 Embedded Measures

Nakkaş Otoyol A.Ş. intends to reduce the risks and negative impact to infrastructure and utilities by adopting the following embedded measures in the Project design:

- The presence of Sazlıdere Dam Basin was one of the criteria during selection of the Project route. The route was selected to avoid the flooding and drainage risks that might have been caused by Sazlıdere Basin;
- Site data collected on existing utilities will be reviewed and refined by the Project team on a regular basis, based site inspections and surveys. The outcome of these investigations will an updated work schedule which will indicate the status of work required. Surveys will consist of cooperation with respective authorities, study of available technical drawings, use of utility location equipment and digging of test pits and trenches. The purpose of such investigation is to ensure that all utilities that need to be supported, protected or relocated because of construction works are identified in sufficient time to allow the motorway schedule to proceed as programmed as well as to minimize impact on the public. A designated team of suitably qualified staff will be assigned to manage the overall process and to obtain all permits and approvals from the related authorities;
- Wherever possible, Nakkaş Otoyol A.Ş. will apply the following land take minimization measures:
  - existing utilities shall remain in place or be incorporated into the new works;
  - in locations where this is not possible, the utilities shall be diverted;
  - utilities that are not scheduled to be relocated, will be protected from possible damage.

6.3.5.4 Impact Assessment

6.3.5.4.1 Construction Phase

Disruption to infrastructure and utilities during construction

Potential impacts on utilities and infrastructure during road construction will stem from construction activities including site clearance works, blasting, excavation and movement of soil, embankment construction, and construction of the various elements of the road.

The main potential impacts on local infrastructure and utilities as a result of these Project activities are disruption to traffic and transportation due to road crossings, pressure on existing local utility supplies and short-term planned and unplanned disruption to electricity, telecommunication, sewage, natural gas distribution, storm water lines and water supply for irrigation, domestic, drinking and industrial purposes.

Disruption to infrastructure and utilities could result in impacts to local livelihoods or quality of life and, if left unmanaged, could result in negative health impacts (e.g. water restrictions, inability to pass roads in an emergency, etc.). With regards to road and traffic disruption specifically, Nakkaş Otoyol A.Ş. plans to use existing roads where applicable, which might result in increased traffic disruption, temporary increases in traffic flows, potential for delays and congestion, conflicts between Project employees and public road users, access restrictions, short-term closures/diversions of existing transport routes (e.g. roads, paths, railways) where routes crossed, traffic accidents and dust and noise nuisance.

If unmanaged, disruption to services might result in community distrust and resentment towards the Project, especially in those areas where access to infrastructure and utilities is already deficient such as Şamlar (Başakşehir district), Deliklikaya and Yeşilbayır (Arnavutköy district), Bahşayış and Nakkaş (Çatalca district), Tahtakale (Avcılar district). The overall impact to disruption of road networks and access to other infrastructure and utilities is expected to be **major** in significance.

6.3.5.4.2 Operation Phase

Benefits from improvements to road access and traffic flow

The Project is expected to solve the transportation problems of the developing regions of İstanbul, Halkalı, Başakşehir, Kayaşehir, Bahçeşehir and Hadımköy, meeting the transportation demand and alleviating intense traffic, enabling a more comfortable, safer, faster traffic flow. Transportation to healthcare infrastructures such as the Başakşehir Çam and Sakura City Hospital and education facilities will be eased.

Furthermore, the Project will facilitate mobility for women, granting them more access to specialised health care such as midwives, informal workplaces and subsistence agricultural and facilitating the journeys by reducing the time of commute and enabling a more comfortable and safer drive.

The resulting impact is expected to be of a long-lasting **positive** significance.

6.3.5.5 Mitigation Measures

6.3.5.5.1 Construction Phase

Disruption to infrastructure and utilities during construction

The following mitigation measures will be implemented:

- Nearby properties to the blasting areas will be inspected prior and after the blasting to assess its impacts.
- Where roads are closed, Nakkaş Otoyol A.Ş. will find local solutions (including diversions if necessary) to be put in place;
- Nakkaş Otoyol A.Ş. shall develop a Traffic Management Plan which will include a wide range of measures such as stakeholder engagement before temporary closure and diversion of the roads, appropriate signage, requirements in case a new access road needs to be built, etc.;
- Nakkaş Otoyol A.Ş. will liaise and engage with local authorities and utilities companies to ensure continuity of supply to communities. Only short term “planned” disruption to drinking water or electricity services will be allowed (and these disruptions will be communicated in a timely manner to the affected people);
- Nakkaş Otoyol A.Ş. will work with local utilities companies to ensure coordinated and rapid response to unplanned events such as damage to electric lines and water pipes;
- The Emergency Preparedness and Response Plan is developed and will be revised considering the feedback received from local authorities and utilities companies, and short term and long term actions with related to the unplanned loss of access to utilities.
- CLOs will be present at work fronts to ensure that impacts from planned disruptions are minimised and that unplanned disruptions are properly managed;
- The Grievance Mechanism will be in place ensuring rapid response time and access to a compensation process should unplanned disruption result in loss of livelihoods that could not otherwise be avoided.

6.3.5.5.2 Operation Phase

Benefits from improvements to road access and traffic flow

Community Development Framework to be developed by Nakkaş Otoyol A.Ş will be used as basis to develop the Community Development Plan which will be the main document to be implemented to continue to bring access to improved telecommunication lines, water supply and irrigation pipes, etc. to neighbouring communities.

6.3.5.6 Summary Impact Table (Pre- and Post-mitigation – Residual)

The table below includes a summary of the impact assessment on both Project phases, pre and post mitigation.

6.3.5.6.1 Construction Phase

Table 6-125 Rating of Impacts Related to Disruption to Infrastructure and Utilities (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI	*Local*	Limited to AoI.
Duration	*Short-term (temporary)*	Short-term as the impact is considered to last throughout the construction phase.	*Short-term (temporary)*	Short-term as the impact is considered to last throughout the construction phase.
Scale	*Medium*	Medium disruption to infrastructure and utilities which could result in impacts to livelihood or quality of life and if unmanaged could result in health impacts (e.g. water restrictions, inability to pass roads in an emergency, etc.).	*Small*	Embedded design and diversion schemes, and Traffic Management Plan as well as continued engagement reduce scale to small.
Frequency	*Rare*	Planned and unplanned disruption to infrastructure and services (electricity, telecommunication, sewage, natural gas distribution, storm water lines and water supply, etc.) will be short-term.	*Rare*	Only short term "planned" disruption to drinking water or electricity services will be allowed. CLOs will be present at work fronts to ensure that impacts from planned disruptions are minimised and that unplanned disruptions are properly managed.
Likelihood	*Likely*	Short-term planned and unplanned disruption is expected during construction phase	*Likely*	Short-term planned and unplanned disruption is expected during construction phase but drinking water and electricity services are expected to have only short-term and planned disruption.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the local communities is considered to be high as they depend on the road network to access healthcare services and other sensitive infrastructure such as schools.				

Significant Rating:	
Pre-mitigation	**Post-mitigation**
Major Impact	Moderate Impact

6.3.5.6.2 Operation Phase

Table 6-126 Rating of Impacts Related to Improvements to Road Access and Traffic Flow (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Positive Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local, Regional, National*	The transportation corridor will help solve transportation demand and alleviate traffic issues in the region of İstanbul, an important economic hub of Turkey.	*Local, Regional, National*	The improvement of the Project will help solve transportation demand and alleviate traffic issues in the region of İstanbul, an important economic hub of Turkey.
Duration	*Long-term (temporary)*	The new transportation corridor could potentially benefit communities' access to services (e.g. hospitals, schools) and improve business by alleviating traffic issues. Furthermore, the Project will facilitate mobility for women, granting them more access to specialised health care such as midwives.	*Long-term (temporary)*	The new transportation corridor could potentially benefit communities' access to services (e.g. hospitals, schools) and improve business by alleviating traffic issues. Furthermore, the Project will facilitate mobility for women, granting them more access to specialised health care such as midwives.
Scale	*Medium*	Improved access to certain infrastructure and services.	*Medium*	Improvement of the quality of life and social cohesion due to a better access to infrastructure and services.
Frequency	*Continuous*	The frequency of the impact is continuous throughout the operation phase.	*Continuous*	The frequency of the impact is continuous throughout the operation phase.
Likelihood	*Likely*	Infrastructure benefits are likely as part of Project enhancements.	*Likely*	Infrastructure benefits are likely as part of Project enhancements.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Medium Magnitude*	

Sensitivity/Vulnerability/Importance of the Resource/Receptor:	
The sensitivity of the local communities is considered to be high as the bad state of roads and transportation difficulties to other villages was highlighted during Stakeholder Engagement, especially in Şamlar (Başakşehir district), Deliklikaya and Yeşilbayır (Arnavutköy district), Bahşayış and Nakkaş (Çatalca district), Tahtakale (Avcılar district). Furthermore, only two (2) settlements reported to have midwives in the neighbourhood: Kayabaşı (Başakşehir) and Tahtakale (Avcılar). Midwives play pivotal role in providing maternity care, and they are crucial in saving the lives of pregnant women and preventing morbidity.	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Positive Impact	Positive Impact

6.3.6 Community Cohesion

6.3.6.1 Potential Impacts

Impacts to community cohesion are of particular importance to infrastructure projects which can often raise tensions within communities (intra-community tension) and between communities (inter-community tension).

Table 6-127 presents the potential impacts associated with disruptions to community cohesion during the construction and operation phases.

Table 6-127 Potential Impacts on Community Cohesion

Construction Phase	Operation Phase
■ Disturbance from the presence of workforce; ■ Community severance; and ■ Unmet expectations of benefits.	■ Business Infrastructure ■ Loss of (access to) communal resources as well as infrastructure and social services ■ Loss of community cohesion – severance issue ■ Unmet expectations of benefits (cost implications)

6.3.6.2 Baseline Conditions

- Along the AoI there are many small scale businesses and shops in retail goods, food and services;
- There are a number of businesses impacted by the Project that employ Syrian refugees;
- Despite the rapid development of the province, not all districts have grown to the same extent, and the province has Turkey's highest rates of inequality living standards.
- In Turkey, informal employment also shows higher rates among women (46 % of women compared to 28 % of men), as women are more likely to work in low-paid jobs or the informal sector without social security;
- The unemployment rate in the different districts in the AoI varies greatly. Furthermore, the average income per year varies greatly as well;
- Gender gaps, youth unemployment and the poverty rate have increased due to the COVID-19 crisis. The risk of inequalities has increased in the last few years, and the health crisis is expected to further weaken economic and social gains;
- Some settlements have reported the presence of seasonal workers;
- Some neighbourhoods' status (such as Bahşayış) changed status recently (from village to neighbourhood). Due to this change, animal husbandry was restricted and many community members had to stop agricultural activities seeing as it was not financially beneficial anymore, as production costs became higher than selling prices;

- İstanbul's literacy rate was 97.56 as of 2019. That same year, schooling rate for both primary and middle school was of 98.12 %. It is estimated that 59 % of the population have attended primary and middle school, 22 % have attended high school and 19 % have tertiary education;
- In the neighbourhoods of the AoI, the *muhtars* of Kayabaşı, Şahintepe and Bahçesehir 2 (Başakşehir), Deliklikaya and Ömerli (Arnavutköy), Bahşayiş (Çatalca), Tahtakale (Avcılar) reported the presence of illiterate persons, with the *Muhtar* of Kayabaşı reporting the highest number (5500), and the rest reporting less than a dozen;
- In Kayabaşı (Başakşehir district) and Bahşayiş (Çatalca district), the *Muhtars* reported that the main barrier in accessing school is that some families cannot afford it.

6.3.6.3 Embedded Measures

It is estimated that an average of 2,032 personnel per month will be employed throughout the duration of the Project, with a peak of 2,875 workers in one month. In addition, 23 workers engaged by Nakkas Otoyol A.Ş. will be employed in construction. Furthermore, the toll of the motorway has been set as 0.0678 euro/km (0.70 TL/km).

The following embedded measures will be taken into account by the Project design and planification in order to minimise and mitigate risks and negative impacts:

- The criteria for the selection of the route of the Project was to avoid agricultural areas and the need for resettlement as much as possible, to minimize the potential social impacts on people and livelihoods. Personal applications by the communities was taken into consideration;
- All employees and contractors are required to acknowledge and adopt Nakkaş Otoyol A.Ş.' environmental and social work practices and comply with all ESHS procedures as well as the Code of Conduct and Zero Tolerance Policy, reporting safety hazards, unsafe work practices, unacceptable conditions, and environmental and social issues;
- The minimisation of severance impacts is one of the main issues that will be addressed by appropriate design of the Project (e.g. numerous crossings). The final Project design will include safe road crossing options for pedestrians, bicycles, vehicles, animals, etc. to enhance access to communal resources, land and infrastructure where required;
- Issues regarding equal opportunities between men and women are mentioned in the General Rules of Employment of Nakkaş Otoyol A.Ş., prohibiting the discrimination in the process of hiring due to gender. Nakkaş Otoyol A.Ş.' subcontractors are required to comply with these same requirements, in accordance to EBRD requirements.

6.3.6.4 Impact Assessment

6.3.6.4.1 Construction Phase

Disturbance from the presence of workforce

The average workforce per month during overall construction period is estimated at 1,959 personnel. Tension between the local population and non-local workers may arise due to the belief that non-locals are taking the economic opportunities of the resident population. Furthermore, interactions between male-workers and community women may create frictions within the community. A major influx of male workers may pose a threat for women workers and community in terms of safety and GBVH. This may also translate to heightened tension leading to violence.

Furthermore, it is often the case with large construction projects that individuals move to the area looking to benefit either from direct work or from indirect economic opportunities. Such influx of opportunity seekers would be unmanaged and, should it be significant, is likely to pressurize the limited services and infrastructure in the local settlements. A high degree of influx could result in other effects such as inflation, socioeconomic tensions, and changes to behavioural norms.

6.3.6.4.2 Labour Influx

- All workers will be provided with the Worker Code of Conduct in a language understandable to them. The Project Company will ensure that the EPC Contractor prioritises the recruitment of local workforce for both skilled and unskilled positions.
- All foreign Workers (include those who come from other parts of Turkey) will be provided with mandatory cultural sensitization training programmes regarding engagement with local communities.
- The EPC Contractor will cooperate with the local law enforcement in order to prevent the spread of crime or misconduct within the workforce.
- EPC Contractor will provide recreational facilities within accommodation areas to minimise and ultimately reduce the need for workers to use local community facilities.
- EPC Contractor will undertake campaigns and awareness training on sexually transmitted illnesses to workers and local communities, including access to testing facilities, prevention etc (in a culturally appropriate manner).
- EPC Contractor will adopt a zero-tolerance policy towards unacceptable workforce behaviour towards females or any community member.
- EPC Contractor will provide regular substance abuse prevention and management programs.

The significance of the impact before mitigation is **moderate** on the potential disturbances regarding inter-community and intra-community tensions.

Community Severance

The construction of the motorway is likely to cause communities, households and individuals to be affected due to severance of resources, infrastructures and communities. Figure 6-19below presents an example where the road upgrade and resulting imposition of traffic restrictions may split a commercial area and that could lead to loss of access to this space. Figure 6-20presents an example in an urban, heavily built up area (Section 2) where the building of the motorway may split a community and could lead to loss of access to a social complex. Figure 6-21presents similar issues, with the motorway splitting a settlement and a commercial area and Figure 6-22shows a split between a community and fields.

Figure 6-19 Potential for severance impacts on Division of Commercial Area in Section 1 (Ömerli, Arnavutköy)

Figure 6-20 Potential for severance impacts on Division of Community and Social Complex in Section 2 (Başak, Başakşehir

Figure 6-21 Potential for severance impacts between Commercial Area and Community in Section 1 (Hadimköy, Arnavutköy)

Figure 6-22 Potential for severance impacts between Community and Fields in Section 2 (Kayabaşı, Başakşehir)

Source: GEM RAP, 2023

The Project will cause severance and fragmentation of agricultural and possibly other holdings making them less viable through limited access. Limited crossing options will cause parts of communities, households and individuals being affected due to severance of resources, infrastructures and communities.

Severance issues, such as households no longer having direct access to some of their land, schools, shops, other neighbourhoods etc., due to physical barrier posed by the Project is one of the main detrimental effects to social fabrics of the communities in the AoI. The harmful effects of community severance are not limited to a restriction of movement, but also to psychological consequences on individuals which, experienced collectively, permeate the entire social fabric of each community. The disruption of the community may lead to a loss of satisfaction with life in the community and reduced participation in community activities.

If not mitigated, impacts related to the change of access may range from **minor** to **major** in specific cases.

Unmet Expectations of Benefits

There is a high degree of expectation that the proposed Project will bring local and municipal/district level benefits. The main expectation for benefits is access to employment opportunities, compensation packages and economic and livelihood benefits thanks to the improvements to the road infrastructure. Due to the extent of these expectations, there is potential for unmet expectations especially if workers from other parts of Turkey are on site.

There is a risk for some communities to have perceptions of unfair or inequitable compensation arrangements for land and the belief that those people who are being resettled are receiving additional benefits resulting in the perception that there are 'winners and losers' or that some people are missing out. This fear is exacerbated as many people do not have title deeds to the land/businesses they utilise and are concerned that they will not be eligible for compensation.

Furthermore, the risk of unfair and inequitable compensation arrangements for land and less benefits in terms of access to employment opportunities may be more significant for vulnerable groups, including women, as they may have more difficulties to access information and engagement related to the Project's activities.

The significance of the impact before mitigation is **moderate.**

6.3.6.4.3 Operation Phase

Business infrastructure

While during operation most business infrastructure will have been re-established, difficulty accessing specific businesses could be a remaining issue resulting in economic impacts. At the same time however, the construction of the motorway can increase movement of population including potential target customers, etc. Therefore, the operation of the road could have a **positive** impact on the local economy considering an improved business infrastructure.

Loss of (or access to) communal resources as well as infrastructure and social services

During operation, difficulties to access communal resources, infrastructure and social services may prevail. Insufficient crossings can cause community members being cut off from health care centres, schools, places of worship, agricultural fields, etc. In other cases, access will still be possible, but may take longer due to needed de-tours to use provided crossing points. The disruption of the community may lead to a loss of satisfaction of residents with regards to life quality in the AoI, leading to reduced participation in community activities.

The significance of the impact before mitigation is **moderate** on the potential disturbances regarding inter-community and intra-community tensions.

Community severances

During operation, difficulties to access communal resources, infrastructure and social services may prevail. Insufficient crossings can cause community members being cut off from health care centres, schools, places of worship, forests etc. In other cases, access will still be possible, but may take longer due to needed de-tours to use provided crossing points. The harmful effects of community severance are not limited to a restriction of movement, but also to psychological consequences on individuals which, experienced collectively, permeate the entire social fabric of each community. The disruption of the community may lead to a loss of satisfaction with life in the community and reduced participation in community activities.

The significance of the impact before mitigation is **moderate** on the potential disturbances regarding inter-community and intra-community tensions.

Unmet expectations of benefits

There is a high degree of expectation that the proposed Project will bring local and municipal/district level benefits. The main expectation for benefits in the operational phase of the Project is the possibility

to use the newly constructed road, which will bring quality of life and economic benefits thanks to the alleviation of the traffic flow. Due to the extent of these expectations, there is potential for unmet expectations especially if members of the community cannot afford the tolls.

The toll has been set as 0.0678 euro/km (0.70 TL/km). Following the Feasibility Study[231] developed by Mott MacDonald, expenditure on Nakkaş-Başakşehir tolls would constitute 5.1 % of the average household disposable income in the first year of operation. However, İstanbul province has Turkey's highest rates of inequality living standards, and there are significant gaps in the socio-economic development levels of the districts in the AoI. There is a risk for some communities to have perceptions of unfair or inequitable benefits of the Project as some people may be able to afford the road and others might not. This might be exacerbated as some members of the community might lose their livelihood or sensitive infrastructure due to expropriation in the context of the Project, resulting in the perception that there are 'winners and losers' or that some people are missing out on the benefits of the Project altogether.

The significance of the impact before mitigation is **moderate** on the potential disturbances regarding inter-community and intra-community tension.

6.3.6.5 Mitigation Measures

6.3.6.5.1 Construction Phase

Disturbance from presence of workforce

In order to limit disturbances related to the influx of outside workers into the Project area, the Employment Strategy and Recruitment Process will clearly communicate to stakeholders that local candidates will be prioritised to the fullest extent possible.

The Project's Community Liaison Officer (CLO) will proactively and regularly engage with local stakeholders prior to commencement of construction activities, providing updates and answering their queries. The CLO will be present on the ground during the whole construction process and available to the affected communities. The aim of this is to ensure that all working practices are transparent and any issues between local residents and non-local workers are communicated and dealt with early on.

Ongoing dialogue will be maintained between the Project and local communities to assist in information sharing regarding employment practices and the use of non-local staff. Local communities will be provided information on the number of non-locals to be brought to the area, their housing arrangements and the measures that the Project is putting in place to ensure that all workers abide by local customary practices.

Information will also be shared on the number of local unskilled and semi-skilled positions available to local residents, along with the recruitment methods used to identify potential candidates.

A Project Grievance Mechanism has been developed and being implemented, and information about this mechanism will continue be shared amongst local communities. The Project will also be responsible for managing an internal Grievance Mechanism that allows employees to raise complaints. This will be a key monitoring and reporting requirement of the Project. The Grievance Mechanism will be implemented prior to commencement of the construction phase, with all relevant staff fully cognizant of their roles in the grievance resolution process so that quick and effective response is provided to the concerns raised by local stakeholders. Additional resources may be required to resolve concerns within a set timeframe.

A Stakeholder Engagement Plan (SEP) is developed which states:

- Communication will be based on the principle of transparency and clarity, clearly explaining the selection process and criteria;

[231] Mott Macdonald, PPP Road Nakkaş-Başakşehir – Feasibility Study Review and VfM Analysis, 2021

- Ongoing dialogue between the Project, through its representatives and local communities to assist in information sharing with regard to employment practices and the use of non-local staff. Local communities to be provided information on the number of non-locals to be brought to the area, their housing arrangements and the measures that the Project is putting in place to ensure that all workers abide by local customary practices. Information will also be shared on the number of local unskilled and semi-skilled positions available to local residents, along with the recruitment methods used to identify potential candidates;
- Relevant Project information in particular those related to environmental and socioeconomic impacts, employment and project benefits will be disclosed at the local level in a manner that is accessible, understandable and culturally appropriate for those affected. This will be facilitated by the representatives employed for the duration of construction activities. The Community Liaison Officer (CLO) will proactively and regularly engage with local stakeholders prior to commencement of construction activities, providing updates and answering their queries. The CLO will be present on the ground during the whole construction process and available to the affected communities. The aim of this is to ensure that all working practices are transparent and any issues between local residents and non-local workers are communicated and dealt with early on.

A Community Development Plan will be developed in consultation with local communities, with active engagement required to determine the location and nature of investments. All stakeholders will be kept informed on the progress of investment activities and opportunities.

As women within the AoI could be excluded from decision-making and information sharing processes, making female headed households particularly vulnerable, additional measures will be established to ensure they have equal access to benefits. All measures listed above should carefully consider gender aspects, as well as be implemented without raising tensions with the rest of the population.

All workers will be provided with the Worker Code of Conduct in a language understandable to them. The Project Company will ensure that the EPC Contractor prioritises the recruitment of local workforce for both skilled and unskilled positions.

All foreign Workers (include those who come from other parts of Turkey) will be provided with mandatory cultural sensitization training programmes regarding engagement with local communities.

The EPC Contractor will cooperate with the local law enforcement in order to prevent the spread of crime or misconduct within the workforce.

EPC Contractor will provide recreational facilities within accommodation areas to minimise and ultimately reduce the need for workers to use local community facilities.

EPC Contractor will undertake campaigns and awareness training on sexually transmitted illnesses to workers and local communities, including access to testing facilities, prevention etc (in a culturally appropriate manner).

EPC Contractor will adopt a zero-tolerance policy towards unacceptable workforce behaviour towards females or any community member.

EPC Contractor will provide regular substance abuse prevention and management programs.

Community severances

Community Development Plan will be developed and implemented by Nakkaş Otoyol A.Ş in consultation with local communities, with active engagement required to determine the location and nature of investments. All stakeholders will be kept informed on the progress of investment activities and opportunities.

Severance issues will be taken seriously and sufficiently addressed through compensation and livelihood restoration measures, taking into account vulnerable population's special needs, including women.

Unmet expectations of benefits

Communities will be made aware of project benefits including local employment opportunities in a transparent manner. In addition, communities will be engaged in the preparation of the Community Development Plan activities to be taken forward in the vicinity of their communities. They will then be kept informed on the progress of such activities and opportunities for their involvement will be maximised.

Nakkaş Otoyol A.Ş. will release quarterly Project update leaflets from six months prior to construction to the end of the construction phase. These information releases will emphasise the limited nature of employment and the recruitment processes.

Crossings

Insufficient crossings can cause community members being cut off from health care centers, schools, places of worship, grazing /agricultural lands; forests etc. The Project will commit to provide adequate access roads to ensure the communities are nor cut off from the facilities.

Additionally, awareness campaigns will be put in place in sensitive receptors, such as schools.

6.3.6.5.2 Operation Phase

Business Infrastructure

The following mitigation measures will be implemented:

- Livelihood restoration, improvement and assistance measures in the RAP will aim to enhance the positive effect the motorway will have considering its improved transportation infrastructure. Vending, trading, transportation and other businesses could have an increased customer range;
- To ensure access to business infrastructure is not lost and adequately re-established, the Project will continue to monitor this issue and make the grievance mechanism available.

Loss of (or access to) communal resources as well as infrastructure and social services

While the final Project design will include safe road crossing options for pedestrians, bicycles, vehicles, animals, etc. to enhance access to communal resources, land and infrastructure, these may not be sufficient. Nakkaş Otoyol A.Ş. will monitor this issue and make the grievance mechanism available. Relevant grievances will be acted upon and installation of additional crossings will be considered.

Loss of community cohesion – severance issue

Apart from the already mentioned embedded measures (e.g. numerous crossings), the following mitigation measures will be adopted:

- Nakkaş Otoyol A.Ş. will monitor this issue and make the grievance mechanism available. Relevant grievances will be acted upon and installation of additional crossings will be considered as well as compensation claims for orphaned land;
- Effectiveness of compensation and livelihood restoration measures aiming to mitigate severance issues will be assessed, monitored and adjusted on a continuous basis.

Unmet Expectations of Benefits

Nakkaş Otoyol A.Ş. will monitor this issue and make the grievance mechanism available to all affected people

Nakkaş Otoyol A.Ş. will be transparent about the project benefits and will ensure equal distribution of project benefits between affected communities (except vulnerable groups who will be given priority but this will also be agreed with elected community representatives) in order to avoid any conflict with affected people. The Company will also release Project leaflets prior to and during construction.

6.3.6.6 Summary Impact Table (Pre and Post-mitigation – Residual)

6.3.6.6.1 Construction Phase

The table below includes a summary of the impact assessment on both Project phases, pre and post mitigation(s).

Table 6-128 Rating of Impacts Related to Disturbance from the Presence of Workforce (Construction)

Project Phase: *Construction*				
Type of Impact: Direct and Indirect Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Local AoI	*Local*	Disturbance from the Presence of workforce
Duration	*Short-term (temporary)*	Disturbance from the presence of workforce would be mainly during the construction period	*Short-term (temporary)*	Disturbance from the presence of workforce would be mainly during the construction period
Scale	*High*	Infrastructure Projects often raise tensions within communities (intra-community tension) or between communities (inter-community tension).	*Minor*	The establishment of representatives of the community to assist in information sharing with regard to the use of non-local staff and the grievance mechanism will diminish the perceived tensions by communities
Frequency	*Intermittent*	Potential disturbance would only occur during day time in areas where workforce could have interaction with communities	*Intermittent*	Local communities to be provided information on the number of non-locals to be brought to the area, their housing arrangements and the measures that the Project is putting in place to ensure that all workers abide by local customary practices. This will reduce the frequency of potential disturbance
Likelihood	*Unlikely*	Considering construction camps and delimited work fronts, interaction is not considered likely to happen	*Unlikely*	Considering the implementation of the SEP and its related measures, it is unlikely to have disturbance incidents
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Minor Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Istanbul province has the highest rates of inequality in terms of living standards, there is a significant gap in the socioeconomic development levels of the settlements in the AoI.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

Table 6-129 Rating of Impacts Related to Community Severance (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Local AoI	*Local*	Local AoI
Duration	*Short-term (temporary)*	Community severance would be mainly during the construction period	*Short-term (temporary)*	Community severance would be mainly during the construction period
Scale	*High*	Most of the severance and displacement will occur 60 m on each side of the centre line (120 m wide).	*High*	Detailed Severance Management Plans will be developed in each settlement location to address specific impacts.
Frequency	*Continuous*	Disruptions to movement as well psychological affects on social fabric to be a continuous impact.	*Continuous*	Disruptions to movement as well psychological affects on social fabric to be a continuous impact.
Likelihood	*Likely*	Severance issues are likely to occur.	*Likely*	Severance issues are likely to occur.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Large-Minor Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Severance issues, such as households no longer having direct access to some of their land, schools, shops, other neighbourhoods etc., due to physical barrier posed by the Project is one of the main detrimental effects to social fabrics of the communities in the AoI.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-130 Rating of Impacts Related to Unmet Expectations of Benefits (Construction)

Project Phase: *Construction*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Impacts restricted to AoI.	*Local*	Impacts restricted to AoI.
Duration	*Long-term (temporary)*	Anger and resentment associated with unmet expectations will fluctuate over the life of the Project with varying intensity as different components are completed.	*Long-term (temporary)*	Anger and resentment associated with unmet expectations will fluctuate over the life of the Project with varying intensity as different components are completed.
Scale	*Medium*	The impact will affect the majority of the population as they all have high expectations regarding Project benefits.	*Small*	Proactive communication and involvement of communities in preparation Community Development Plan will reduce unrealistic expectations.
Frequency	*No Designated Frequency*	Resentment may fluctuate over time however is likely to be strongest during high periods of land acquisition and Project employment.	*No Designated Frequency*	Resentment may fluctuate over time however is likely to be strongest during high periods of land acquisition and Project employment.
Likelihood	*Likely*	Unmet expectations of benefits impacts are to expected by all project affected individuals	*Likely*	Unmet expectations of benefits impacts are to expected by all project affected individuals
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
The sensitivity of the population will be high due to local expectations around jobs and compensation benefits. It is likely that resentment will form if direct Project employment opportunities are not geared towards benefiting local populations and workers from other parts of Turkey are onsite. In addition, lack of title deeds and unfair or inequitable compensation arrangements may create a perception of "winners and losers."				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Moderate Impact			Minor Impact	

6.3.6.6.2 Operation Phase

Table 6-131 Rating of Impacts Related to Business Infrastructure (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Positive Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI.	*Local*	Limited to AoI.
Duration	*Permanent*	Permanent relocation of structures.	*Permanent*	Permanent relocation of structures.
Scale	*High*	Temporary loss of income due to removal of economically viable structures.	*Medium*	Compensation, transitional support, and reasonable timeframe provided to ensure restoration of income earning capacity.
Frequency	*Continuous*	Impact occurring due to the displacement.	*Continuous*	Impact occurring due to the displacement.
Likelihood	*Likely*	Loss of commercial, business and non-residential structures is likely.	*Likely*	Loss of commercial, business and non-residential structures is likely.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Medium Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Improved business infrastructure can lead to higher revenues and higher quality of life. However, the businesses and the employees which have been directly affected by the land acquisition will be impacted negatively if the RAP and LRP is not well managed.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-132 Rating of Impacts Related to Loss of (access to) Communal Resources as well as Infrastructure and Social Services (Operation)

Project Phase: Operation				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Impact limited to AoI.	*Local*	Impact limited to AoI.
Duration	*Long-term (temporary)*	Short-term impacts may prevail into operation phase.	*Long-term (temporary)*	Short-term impacts may prevail into operation phase.
Scale	*Medium*	Short-term reductions in community well-being from loss of access to basic services before reinstatement is considered medium scale.	*Small*	Continued monitoring and use of the grievance mechanism to identify need for additional crossings.
Frequency	*Continuous*	Access restricted is continuous if number and location of crossing points is insufficient.	*Continuous*	Access restricted on continuous if number and location of crossing points is insufficient.
Likelihood	*Not Likely*	Continued loss of access to infrastructure, services, and resources is not likely due to design considerations developed during Project construction phase.	*Not Likely*	Continued loss of access to infrastructure, services, and resources is not likely due to design considerations developed during Project construction phase.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity is considered medium as local communities depend on existing infrastructures/resources to support and sustain key livelihoods as well as access services such as healthcare.				

Significant Rating:	
Pre-mitigation	**Post-mitigation**
Moderate Impact	Minor Impact

Table 6-133 Rating of Impacts Related to Loss of Community Cohesion – Severance Issue (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI.	*Local*	Limited to AoI.
Duration	*Permanent*	Severance issues will be permanent.	*Permanent*	Severance issues will be permanent.
Scale	*High*	Most of the severance and displacement will occur 60 m on each side of the centre line (120 m wide).	*Medium*	Continued monitoring and use of the grievance mechanism to identify need for additional crossings as well as effectiveness of compensation and livelihood restoration measures.
Frequency	*Continuous*	Disruptions to movement as well psychological effects on social fabric to be a continuous impact.	*Continuous*	Disruptions to movement as well psychological affects on social fabric to be a continuous impact.
Likelihood	*Likely*	Severance issues are likely to occur.	*Likely*	Severance issues are likely to occur.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	
Sensitivity/Vulnerability/Importance of the Resource/Receptor:				
Sensitivity range from medium to high on sections where sensitive infrastructure (healthcare, schools, etc.) and social complexes (wedding halls, etc.) are involved.				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Moderate Impact	

Table 6-134 Rating of Impacts Related to Unmet Expectations of Benefits – Cost Implications (Operation)

Project Phase: *Operation*				
Type of Impact: Direct Negative Impact				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extent	*Local*	Limited to AoI.	*Local*	Limited to AoI.
Duration	*Permanent*	Anger and resentment associated with unmet expectations will be permanent.	*Permanent*	Anger and resentment associated with unmet expectations will be permanent.
Scale	*Medium*	The impact will affect the majority of the population as they all have high expectations regarding Project benefits.	*Small*	Proactive communication will reduce unrealistic expectations.
Frequency	*No Designated Frequency*	Resentment may fluctuate over time however is likely to be strongest during high periods of land acquisition and Project employment.	*No Designated Frequency*	Resentment may fluctuate over time however is likely to be strongest during high periods of land acquisition and Project employment.
Likelihood	*Likely*	Unmet expectations of benefits impacts are to expected by all Project affected individuals	*Likely*	Unmet expectations of benefits impacts are to be expected by all Project affected individuals.
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Medium Magnitude			*Small Magnitude*	

Sensitivity/Vulnerability/Importance of the Resource/Receptor:	
The sensitivity of the population will be high due to local expectations around jobs and compensation benefits, and as some communities may be able to afford the toll and others may not. This might be exacerbated as some members of the community might lose their livelihood or sensitive infrastructure due to expropriation in the context of the Project, resulting in the perception that there are 'winners and losers' or that some people are missing out on the benefits of the Project altogether.	
Significant Rating:	
Pre-mitigation	**Post-mitigation**
Moderate Impact	Minor Impact

6.3.7 Cultural Heritage

6.3.7.1 Baseline Conditions

Relevant baseline conditions that may potentially influence impacts are summarized as follows:

- The Nakkas-Basaksehir Motorway Project is located in the Thrace region, which historically extends between Macedonia and the Bosporus;
- Important settlements were established in the Palaeolithic[232], Neolithic[233] and Chalcolithic[234] periods in the Thrace region;
- Yarımburgaz Cave is located in the east of the Sazlıdere Valley within the boundaries of Altınşehir quarter of Başakşehir District and approximately 3 km west of the Nakkaş-Başakşehir Motorway Project route;
- Findings belonging to the further phases of the Palaeolithic Period were encountered in Ağaçlı Village located near the Black Sea coastline in the north of Kemerburgaz;
- Menteşe, Ilıpınar, Fikirtepe and Pendik were among the most important archaeological settlements in Marmara dated to this period of the "agricultural revolution" in human history;
- During the field survey it was determined that some of the traditions related to the transition periods of life are still alive in the Project area and its vicinity;
- Multicultural aspect of the region is reflected to many areas of life such as traditions, dances, foods and transition periods of life as the customs of Rum, Christian, Turkish and Muslim people have interviewed with each other in time

6.3.7.2 Impacts During Construction Phase

Project construction as a substantial portion of this corridor will be affected by ground disturbance.

6.3.7.2.1 Directly Affected Cultural Heritage Resources

Based on the baseline survey results, the following cultural heritage resources presented in Table 6-135 Cultural Heritage Resources Within the RoWwill be directly affected by the construction activities since they are located on the RoW.

[232] The Paleolithic or Palaeolithic is a prehistoric period of human history distinguished by the development of the most primitive stone tools discovered and covers roughly 95% of human technological prehistory. It extends from the earliest known use of stone tools, probably by Homo habilis initially, 2.6 million years ago, to the end of the Pleistocene around 10,000 BC.

[233] Traditionally considered the last part of the Stone Age, the Neolithic followed the terminal Holocene Epipaleolithic period and commenced with the beginning of farming, which gave raise to the "Neolithic Revolution".

[234] The Chalcolithic period or Copper Age was a period in the development of human technology, preceding the Bronze Age, before it was discovered that adding tin to copper formed the harder bronze.

Table 6-135 Cultural Heritage Resources Within the RoW

No	Site Name	Registration Status	Chainage	Directly Impacted (Within the RoW)	Impacting Activity
1	Kayabaşı Archaeological Site	Not registered	Km 54+920 – Km 55+144	√	Earthworks including clearing, grading and excavation of the Motorway.
2	Kayabaşı Historical Quarry Site	Not registered	Km 54+158 – Km 54+306	√	Same as above
3	Historical Military Bunker 102	Registered	Km 36+276	√	Same as above
4	Historical Military Ditch 1	Registered	Km 36+543	√	Same as above
5	Historical Military Bunker 150	Registered	TEM Connection Section West (Km 4+420)	√	Same as above
6	Historical Military Bunker 127	Registered	TEM Connection Section West (Km 4+000)	√	Same as above
7	Historical Military Bunker 18	Registered	Km 41+740	√	Same as above
8	Historical Military Bunker 19	Registered	Km 41+740	√	Same as above
9	Historical Military Bunker 20	Registered	Km 41+740	√	Same as above
10	Historical Military Bunker 21	Registered	Km 41+740	√	Same as above
11	Historical Military Bunker 22	Registered	Km 41+740	√	Same as above
12	Historical Military Bunker 23	Registered	Km 41+740	√	Same as above

6.3.7.2.2 Indirectly Affected Cultural Heritage Resources

Cultural heritage resources and intangible cultural heritage lying within the 2 km study corridor but outside of the 200 m corridor are less likely to be directly and indirectly by loss of access, change in visual setting, noise, dust levels etc, demographic changes through influx, etc. since the ground disturbance in the wider corridor will be less complete and limited to access roads, construction compounds, associated facilities and ancillary construction activities outside the main road corridor.

However, the potential for impacts to the known sites and sites that have not previously identified cannot be discounted. For sites that have above ground or built components, as well as cultural heritage resources, such as ancient tumuli with visible landscape components, construction impacts are possible as a consequence of:

- damage to sensitive and fragile sites from vibration and ground effects from construction equipment and traffic;

- reduction in the amenity and attractiveness of sites of recreational and tourist importance;
- changes to the setting and physical context of a site, place building or monument; and
- increases in noise, air pollutants, soiling and dust in the vicinity of a historic site.

Based on the current design and construction activities, none of the areas (access roads, construction compounds, associated facilities and ancillary construction activities outside the main road corridor) are interacting with identified cultural heritage resources. In case there are changes required in design, Nakkas Otoyol A.Ş. will ensure that the impacts on cultural heritage are assessed, managed and mitigated in accordance with Turkish law, Good International Practice (GIP) and the objectives of the EBRD PRs and IFC PSs.

The "Bahşayiş Bastion" used as the event area during Tepreç festivities and Hıdırellez celebrations is located approximately 1.2 km to the west of the Project route. It is determined that the Project does not have any negative impact on the area where festivities and celebrations are organized. There is no risk of damaging or losing the existing cultural fabric due to the Project since resettlement is not envisaged and there is no access disruption by Project activities.

None of the ICH determined as the result of the studies conducted within scope of this report are negatively affected by the Project.

6.3.7.3 Impacts During the Operation Phase

Negative impacts are not envisaged during operation of the Motorway since the actions required by the relevant authorities are assumed to be implemented during construction phase. The Operation and Maintenance (O&M) Contractor will be informed about the archaeological background of the Project, and cultural heritage assessment studies (including stakeholder engagements) will be conducted by Nakkaş Otoyol A.Ş. in case operational maintenance activities require new access road constructions, service roads, additional drainages, etc. along the Motorway.

6.3.7.4 Mitigation Measures

IFC PS 8 recommends the cultural heritage to be protected by preservation in its place, since removal is likely to result in irreparable damage or destruction of the cultural heritage. IFC PS 8 requires the clients not to remove any nonreplicable cultural heritage unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal;
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- Any removal of cultural heritage is conducted using the best available technique.

Nakkaş Otoyol A.Ş. and EPC Contractor will ensure that all above steps have been evaluated before removal option.

A number of embedded measures are already in place by Law, which will help to minimize the impacts to as low as possible as listed below.

- Notification of the relevant museum directorate about the cultural heritage sites those have been identified along the RoW and the chance finds in case encountered during Project activities as per the requirements of Law on Preservation of Cultural and Natural Assets (Law No. 2863).
- Liaison with the İstanbul Regional Council No: 1 for the Conservation of Cultural Property to agree a strategy for archaeological mitigation.
- Not starting any physical Project activity at the cultural heritage sites before the studies of the related museum directorate are finalised and the official views of the authorities on relevant sites are obtained.

- In addition to the embedded measures, Nakkaş Otoyol A.Ş. will take the following actions to avoid and minimize the potential impacts on cultural heritage:
- Conduct pre-construction archaeological investigations to identify, investigate and scientifically remove any archaeological deposits encountered.
- Appoint qualified archaeologist during ground disturbing activities and on all construction fronts particularly at risk areas.
- Liaise at early stages with relevant museum directorate in case blasting will be required close to archaeological sites.
- Develop a Cultural Heritage Management Plan to manage the cultural heritage issues adequately. Among other, items to be addressed in the plan will include Regulator Engagement, Access Management, Mitigation Control and Management of Intangible Heritage through community engagement.
- Process/indicate the archaeological sites as “historical sensitive area” in all Project documentation, drawings, etc. and notify EPC Contractor and subcontractors about the presence of these sites.
- Develop a Chance Finds Procedure which includes:
  - Presence of a competent archaeologist during ground disturbing activities and on all construction fronts particularly at risk areas;
  - Operating an active look ahead construction site inspection program over the next construction section;
  - Training of all site personnel in the recognition and proper handling and custody of archaeological finds which are the property of the Turkish government;
  - Establishment of protocols for responding to chance finds including cessation of work for finds and notification of Nakkaş Otoyol A.Ş. and its archaeological consultant, who will advise the appropriate authorities including the Regional Protection Council and Museum; and
  - Expedited procedures for evaluation and treatment of significant chance finds in order to limit impacts to important resources while limiting construction delays. This may include, for example, recording and removal or more detailed investigation by excavation; decisions on further actions will in any case be made in agreement with the Regional Protection Council.

6.3.7.5 Conclusion

- The impact assessment presented in Table 6-136 Impact Assessment on Cultural Heritage during Construction and in Table 6-137 Rating of Impacts Related to Disturbance of Cultural Heritage Resources During Constructionindicated that the significance of the impact before mitigation is major on the cultural heritage resources. However, the residual impact is negligible once all the mitigation measures defined are implemented.
- As discussed in previous chapters, the studies identified numerous cultural heritage resources within or very near to a 1 km study corridor centred on the Motorway alignment. All of these are sites of archaeological interest and some have above ground built components which are protected under Turkish law. It is assumed that any heritage site must be investigated sufficiently to determine its importance (and protection degree) prior to the start of ground disturbing activity that could impact it.
- The recording of precise coordinates and meaningful site boundaries for the known sites have already been finalized during ESIA studies to implement mitigation measures including avoidance during detailed design development where feasible and controlled removal accompanied by study and preservation when sites cannot be avoided.

- No negative impacts have been identified during operation of the Motorway considering that the actions required by the relevant authorities would already been implemented during construction phase to protect cultural heritage.
- No negative impacts have been identified on intangible cultural heritage as the result of the studies, since neither Motorway alignment, access roads nor Project components have interaction with intangible cultural heritage. Any unforeseen impacts to local cultural resources and ICH be managed through the ongoing community engagement programme and sucessful implementation of the project Grievance Mechanism.
- Residual impacts will occur when archaeological or any other heritage resources must be removed from their setting, as that process cannot assure full preservation. Further residual impacts will occur where archaeological chance finds are encountered during construction in case Chance Finds Procedure is not followed and implemented.

Table 6-136 Impact Assessment on Cultural Heritage during Construction

Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
Complete or partial removal of cultural heritage assets on the RoW	Major Impacts on Archaeological sites listed in Table 6-135 and Samlar Archaeological Site (Chance Find)	■ "Avoidance" through detailed design / Constraints Mapping is the preferred mitigation (for the 12 sites within the ROW). ■ Notification of the relevant museum directorate about the cultural heritage sites those have been identified along the RoW and the chance finds in case encountered during Project activities as per the requirements of Law on Preservation of Cultural and Natural Assets (Law No. 2863). ■ Liaison with the İstanbul Regional Council No: 1 for the Conservation of Cultural Property to agree a strategy for archaeological mitigation. ■ Not starting any physical Project activity at the cultural heritage sites before the studies of the related museum directorate are finalised and the official views of the authorities on relevant sites are obtained. ■ Appointing qualified archaeologist during ground disturbing activities and on all construction fronts particularly at risk areas. ■ Implementation of Chance Finds Procedure	Minor Impacts since the assets will be preserved and/or relocated as per instructions by decision given by İstanbul Regional Council No: 1 for the Conservation of Cultural Property
Complete or partial removal of cultural heritage assets outside of the RoW	Major Impacts on Archaeological sites within 1 km corridor due to temporary constrction componenets and/or design changes	■ Conduct additional cultural heritage assessment studies including stakeholder engagements in case of a route or design change, and prior to the selection of any temporary construction components such as quarries, borrow pits, surplus material dumpsites, batch plants, mechanical asphalt plants, new access roads, etc. ■ Notification of the relevant museum directorate about the cultural heritage sites those have been identified along the RoW and the chance finds in case encountered during Project	Minor Impacts since the assets will be preserved and/or relocated as per instructions by decision given by İstanbul Regional Council No: 1 for the Conservation of Cultural Property

Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
		activities as per the requirements of Law on Preservation of Cultural and Natural Assets (Law No. 2863). ■ Liaison with the İstanbul Regional Council No: 1 for the Conservation of Cultural Property to agree a strategy for archaeological mitigation. ■ Not starting any physical Project activity at the cultural heritage sites before the studies of the related museum directorate are finalised and the official views of the authorities on relevant sites are obtained. ■ Appointing qualified archaeologist during ground disturbing activities and on all construction fronts particularly at risk areas	Minor Impacts since the assets will be preserved and/or relocated as per instructions by decision given by İstanbul Regional Council No: 1 for the Conservation of Cultural Property
Damage to the cultural heritage due to blasting actvities	Major Impacts	■ Liaise at early stages with relevant museum directorate in case blasting will be required close to archaeological sites. ■ Not starting any physical Project activity at the cultural heritage sites before the studies of the related museum directorate are finalised and the official views of the authorities on relevant sites are obtained.	

Table 6-137 Rating of Impacts Related to Disturbance of Cultural Heritage Resources During Construction

Project Phase: *Construction*				
Type of Impact: *Direct Negative Impact*				
Rating of Impacts:				
	Pre-mitigation		**Post-mitigation (Residual) – including embedded measures**	
	Designation	**Summary of Reasoning**	**Designation**	**Summary of Reasoning**
Extend	*Project area*	Impact limited to the project area	*Project area*	Impact limited to the project area
Duration	*Permanent*	Construction earthworks will permanently disturb the assets	*Temporary*	Relocation of the monuments to a suitable location[235]
Scale	*High*	Earthworks and vibrations may permanently disturb assets	*Negligible*	Permanent damage
Frequency	*Once-off*	Construction activities will only occur once	*Once-off*	Construction activities will only occur once
Likelihood	*Likely*	Located within project area of influence	*Likely*	Located within project area of influence
Magnitude:				
Pre-mitigation			**Post-mitigation (Residual)**	
Large Magnitude			*Negligible Magnitude*	
Sensitivity / Vulnerability / Importance of the Resource / Receptor:				
High Sensitivity: All areas listed in Table 6-135 Cultural Heritage Resources Within the RoW*are 3rd degree cultural heritage sites by law.*				
Significant Rating:				
Pre-mitigation			**Post-mitigation**	
Major Impact			Negligible Impact	

[235] Will be subject to the decision given by the relevant authorities.

7. CUMULATIVE IMPACT ASSESSMENT

7.1 Introduction and Approach

This chapter presents the cumulative impact assessment (CIA) of the Project, comprising a description of the potential cumulative impacts of the Project with respect to other identified significant projects being developed within or near the sphere of influence of the Project ("Project Area"). It also sets out, where applicable, the mitigation measures to either prevent or minimise risks related to potential cumulative impacts in consideration also of those mitigation measures already planned within other topics of the ESIA.

IFC PS1 and EBRD PR1 specify that risks and impacts of a project are to be analysed in such a CIA, inter alia, with respect to cumulative impacts from:

- other existing projects or conditions gathered from baseline surveys, review of available published information and stakeholder engagement activities,
- other future developments (including future stages of the project itself) that are realistically defined at the time the ESIA is undertaken and for with the sphere of influence of the various projects or developments may overlap.

Cumulative impacts are thus defined for this ESIA as impacts which result from incremental changes caused by the Project together with other presently ongoing, or reasonably foreseeable future planned actions/projects within the Project Area[236].

Depending on the type/characteristics of other identified projects and their specific impacts, the main issues of concern with respect to the CIA can thus include any type of impact that is considered in the ESIA.

7.1.1 Objectives

The objectives of the CIA are the following:

- To determine if the combined impacts of the Project, other projects and activities, and natural environmental and social drivers will result in a Valued Environmental and Social Component (VEC) condition (or "receptors and resources") that may put the sustainability of a VEC at risk (i.e. exceed a threshold for VEC condition which is an unacceptable outcome).
- To determine what management measures could be implemented to prevent an unacceptable VEC condition; this may include additional mitigation of the Project being assessed, additional mitigation of other existing or predictable future projects, or other regional management strategies that could maintain VEC condition within acceptable limits

The overall aim of the CIA is to avoid/minimize any of the identified cumulative impacts.

7.1.2 Assessment Methodology

The evaluation of potential cumulative impacts is highly dependent on the particular locations/activities under review, and therefore each situation is assessed qualitatively on a case-by-case basis.

The approach to the CIA is undertaken in line with the IFC Good Practice Handbook: *Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets.* In line with the Handbook's proposed approach, a Rapid Cumulative Impact Assessment (RCIA) approach is

[236] The definition is also based on that given in the EC Document "Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions", May 1999; in addition, the IFC Good Practice Handbook "Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, 2013, was used to inform the assessment process.

considered to be appropriate for the Project as it considers the challenges to conducting a CIA in an emerging market, which apply in this case, namely:

- Lack of baseline data related to the other project developments;
- Uncertainties associated with anticipated developments; and
- Limited and emergent, strategic regional, sectoral, or integrated resource planning schemes.

In line with IFC PS 1 guidance notes (GN41) that the assessment should be "*commensurate with the incremental contribution, source, extent, and severity of cumulative impacts anticipated*", this assessment attempts to focus only on the potentially significant cumulative impacts, and where the Project's contribution to the cumulative impact is considered to be significant. Per the guidance provided in Section 2 and 3 of the IFC Handbook, potential mitigation measures are designed to focus on cooperation and information-sharing, in recognition of the limited control and direct influence/decision-making ability of Nakkaş Otoyol A.Ş.

In general, this cumulative impacts assessment follows the recommended approach to a RCIA as described by the IFC Handbook and is undertaken through the following methodology:

- ***Step 1:*** *Definition of the relevant spatial and temporal boundaries;*
- ***Step 2:*** *Identification of key VECs and screening/Identification of potentially relevant other projects in the region;*
- ***Step 3:*** *Determine present conditions of the VECs; and*
- ***Step 4 & 5 & 6:*** *Assessment of potential cumulative impacts and identification of appropriate mitigation measures*[237]*.*

These steps are elaborated in the following chapters. No new field-baseline information has been gathered for the purpose of this CIA; where applicable, reference is made concerning baseline information, impacts and mitigation as described in the preceding ESIA chapters.

7.1.3 Information Sources

The technical background information presented in this Chapter is drawn from the baseline information gathered through the ESIA process. This baseline information gathering included primary data collection, review of relevant existing scientific sources as well as review of regional planning documentation.

The key potential cumulative impacts are screened also considering the outcomes of the impacts assessment process.

The CIA also cross-references the stakeholder engagement process and outcomes from discussions and inputs from public and statutory stakeholders is considered. The scoping engagement discussions have provided inputs with regard to the identification of key issues, as applicable to the VEC confirmation. Although the specific exercise of identifying VECs for the RCIA was carried out with local stakeholders, through the engagement and contributions during the scoping engagement and baseline studies, the stakeholders have identified key issues important to the relevant stakeholder groups, which is reflected in the impact assessment, a key input to the CIA (Step 2).

Additional specific information is included as necessary for the description or assessment on a case-by-case basis. Information on potential other projects has frequently been obtained from publicly available sources.

[237] Please note that Steps 4, 5 and 6 are included as one element here within the approach as the results of assessment and proposed mitigation are presented (in one table) for each of the projects where there are considered to be overlapping VECs.

7.2 Step 1 – Defining Spatial and Temporal Boundaries

7.2.1 Spatial Boundaries

The relevant spatial boundaries for this CIA are essentially the same as the specific Area of Influence (AoI) defined in the ESIA Report for each relevant topic; this area typically extends (depending on the topic) from about 100 m to 1000 m (e.g. for visual and landscape features) as measured from the centre-alignment of the Motorway.

For the purpose of the subsequent Screening in Step 2, a regional approach is used considering a zone of about 10 – 15 km (or more) from the Project; the intent here in the screening is too be inclusive of projects that might reasonable be relevant for the CIA, and if doubtful they are included. For the impact assessment in Step 4, 5 & 6, a narrower focus is then made as appropriate for the relevant assessment topics.

7.2.2 Temporal Boundaries

The temporal boundary of the CIA formally encompasses the entire Project life cycle, from construction through long-term operations. Nevertheless, the CIA process is inherently constrained by the ability to reasonably predict future events and trends, including (as will be discussed in the Screening in Step 3), the planning/implementation of other relevant projects in the region. Therefore, for the purpose of this CIA, consideration is given of the construction phase and, for operations – to the extent feasible for discussion and assessment of cumulative impacts with the other projects.

7.3 Step 2 – Identification of VECS and Screening of Other Projects in the Region

The ESIA process identified a number of VECs in the Project area that may be subject of potential impacts from the Project – and other relevant projects in a cumulative manner.

The outcomes of the impact assessments were reviewed to identified VECs that are impacted by the Project, and further narrowed by considering those where the Project would be a significant contributor to any cumulative impact realized. These significant impacts are considered to represent the development's contribution to cumulative impacts. Full details of all receptors and potential impacts are described in the respective ESIA chapters.

Relevant VECs to be considered within the RCIA are therefore considered to be:

- Sensitive habitats;
- Soil, groundwater and freshwater;
- Local communities – property owners and residents living near construction areas/access roads;
- Local viewsheds;
- Local livelihoods; and
- Cultural heritage.

The approach and logic used to identify the VECs is shown in the table below.

Table 7-1 Key VECs

Aspect	Impact	VEC Identified
Resources and Waste Impacts	Disposal of excavated waste soil	Soil, groundwater and freshwater
Resources and Waste Impacts	Hazardous waste generation during construction activities	Soil, groundwater and freshwater
Resources and Waste Impacts	Hazardous waste generation during operations	Soil, groundwater and freshwater
Biodiversity	Disturbance on flora and fauna	Küçükçekmece Basin Important Bird Area (IBA) and Key Biodiversity Area (KBA)
Noise and vibrations/Community H&S	Disturbance and nuisance due to noise generated by construction activities and operation of the Motorway	Local communities
Road Safety	Safety concerns on community due to construction traffic in the vicinity	Local communities
Air Emissions	Air pollution during the operation of the Motorway at sensitive receptors close to the RoW	Local communities
Landscape and Visual	Change of landscape due to changes in land use and visibility of new structures	Local viewers Local viewsheds
Land Use and Property	Effects on livelihood from livestock activities	Local livelihoods
Land Use and Property	Loss of agricultural lands suitable for soil cultivation	Local livelihoods
Land Use and Property	Loss of pasturelands available for public use	Local livelihoods
Archaeology and Built Heritage	Complete or partial removal of cultural heritage assets	15 Archaeological sites

7.3.1 Approach to identifying other relevant projects in the region

The purpose of the Screening is to identify those other projects and activities in the region that could potentially have impacts that overlap spatially and temporally (per Step 1) with impacts of the Project on any the VECs identified.

As a first step, a “long-list” was prepared of known and reported larger infrastructure and other projects in some stage of planning or development in the Project region. This list (see Table 7-2) includes 5 transportation projects and 16 mass housing projects including shopping facilities.

Each project in the Screening Table was then screened for relevance in the CIA via the evaluation of the project characteristics (namely type of project, proximity to the Project and expected timing of construction and operations) compared to a set of Screening Considerations to determine the potential for likely cumulative impacts:

- **Spatial Overlap:** Are the two projects close enough to each other that the Areas of Influence are likely to affect each other?
- **Temporal Overlap:** Do the timelines of key activities (namely Construction and Operations) overlap with each other?
- **Common VECs:** Which VECs may be affected cumulatively by both projects (considering the previous special and temporal factors)?

A qualitative conclusion was then given if the specific project is either “Screened In” or “Screened Out” of further consideration in this CIA.

In addition, the current status of other projects was evaluated for this CIA as follows:

- For projects already in existence and operating: any existing emissions/impacts of the project would already be reflected in the baselines studies conducted for this ESIA and hence integrated within the impact assessment and any mitigation measures foreseen; as such, they are screened out of the CIA;
- For projects currently under construction or approved and about to commence construction: reasonable assumptions are made about likely emissions/impacts that may occur with the spatial and temporal boundaries of the CIA; such projects are usually screened in;
- For projects that are reportedly planned, but the start of construction is uncertain (and/or the project is under public dispute): unless such a project potentially has a direct and significant impact on shared VECs spatial and temporal boundaries, such projects are considered speculative and typically screened out.

Table 7-2 Other Projects and Developments – Screening Step 3

Characteristics of Other Projects				Screening Considerations			Result
No	**Name and Description of the Project**	**Proximity to Project**	**Construction Status**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Screened in?**
Transportation Projects							
1	Halkalı-İstanbul Airport Metro Line Project: The purpose of the metro line is to connect the busiest living areas of the European Side to İstanbul Airport in an uninterrupted ad fast way. The metro line will pass via three districts Arnavutköy, Başakşehir and Küçükçekmece including seven stations at following locations: ■ Halkalı Station ■ Halkalı Stadium ■ Olimpiyatköy ■ Kayaşehir ■ Fenertepe ■ Arnavutköy 1 ■ Arnavutköy 2 ■ İstanbul Airport	Crosses the Project RoW at KM 56+500	Ongoing Construction will be completed end of 2022.	Yes Local communities are the VECs due to the following aspects: ■ Noise and vibrations ■ Dust ■ Visual ■ Community H&S	Yes	Yes Nakkaş-Başakşehir Motorway interacts with metro line at KM 56+500. Tunnel constructions of the metro line overlapping with the Motorway viaduct abutments have been completed. The viaduct abutment design has been designed in such a way that it will not interfere with the subway tunnels.	Yes
2	Başakşehir-Kayaşehir Metro Line Project: The metro line is 6.20 km long planned as the continuation of the Kirazlı-Başakşehir-Olimpiyatköy Metro Line. The main purpose of the metro line is to provide easy access to Ikitelli Integrated Health Campus which will be an important health centre in the region. The metro line will be located within Başakşehir district including five stations at following locations: ■ Metrokent ■ Onurkent ■ Başakşehir Çam ve Sakura City Hospital ■ Kayaşehir 15th District ■ Kayaşehir Centre	Crosses the Project RoW at KM 56+500	Completed	Yes Local communities are the VECs due to the following aspects: ■ Noise and vibrations ■ Dust ■ Visual ■ Community H&S	Yes	No Construction completed. Similar with Halkalı-İstanbul Airport Metro Line, Nakkaş-Başakşehir Motorway interacts with Başakşehir-Kayaşehir Metro Line at KM 56+500. Tunnel constructions of the metro line overlapping with the Motorway viaduct abutments have been completed. The viaduct abutment design has been designed in such a way that it will not interfere with the subway tunnels.	No
3	Northern Marmara Motorway Project: The NMM is a 243 km long toll motorway with 2 x 4 lanes between Kınalı junction (Silivri) and the Akyazı junction (Sakarya). The NMM was originally comprised of seven sections in total connecting Asia and Europe with an uninterrupted traffic flow and is considered an alternative route to the European Road 80 (E 80 also known as Trans European Motorway (TEM). The first seven sections of the NMM have already been completed and are under operation. As discussed in Chapter 1 of this ESIA Report, the NMM project was exempted from Turkish EIA, however two ESIA Reports (European side and Asian side) have been prepared for NMM Project in line with IFC Standards as required by the project Lenders. In 13 November 2020, 1st Regional Directorate of General Directorate of Motorways (KGM) involved Section 8 – Nakkaş-Başakşehir Motorway.	The Project is the last section of NMM Project and has adjoining sections to the NMM.	Seven sections have been completed ad in operation.	Yes Local communities due to the following aspects: ■ Community H&S	Yes	Yes (during adjoining the sections of Nakkaş-Başakşehir Motorway with existing sections of the NMM which is under operation) Yes (during operation)	Yes
4	Canal İstanbul Project: Canal İstanbul is located in the western part of İstanbul running parallel to the Bosphorus aiming to connect the Black Sea with Marmara Sea.	Canal intersects with the Nakkaş Başakşehir	Not started	Yes Soil, groundwater and freshwater,	Yes	No (during construction) Yes (during operation)	Yes

Characteristics of Other Projects				Screening Considerations			Result
No	Name and Description of the Project	Proximity to Project	Construction Status	Common VEC?	Spatial Overlap?	Temporal Overlap?	Screened in?
	Length of the canal is approximately 45 km long, 20.75 m deep having 275 m width at its narrowest point.[238]. The canal route will pass through Terkos Lake, Sazlıdere Dam and Küçükçekmece Lake which are located in the following districts with indicated lengths: ■ Arnavutköy District: 27 km ■ Başakşehir District: 6 km ■ Avcılar District: 3 km ■ Küçükçekmece District: 6 km There are following integrated structures planned as part of the Canal İstanbul project: ■ Küçükçekmece Marina, ■ Marmara Container Port ■ Black Sea Logistics Centre ■ Recreation Area EIA report was prepared and concluded with “EIA positive decision”. Project completion time is assumed to be 7 years, but the tendering process has not yet started. The canal interacts with Nakkaş-Başakşehir Motorway at KM 51+300. Based on the information provided by Nakkaş Otoyol A.Ş., Canal Istanbul and Nakkaş-Başakşehir Motorway Projects are separate projects having no relation with each other.	Motorway at KM 51+300.		Küçükçekmece Basin IBA and KBA, local communities, local livelihoods the VECs due to the following aspects: ■ Landscape and Visual ■ Land Use and Property ■ Biodiversity ■ Resources and Waste Impacts ■ Noise and vibrations/Community H&S ■ Air Emissions			

Housing Projects by Housing Development Administration of Turkey (TOKİ)[239] and Private Sector

No	Name and Description of the Project	Proximity to Project	Construction Status	Common VEC?	Spatial Overlap?	Temporal Overlap?	Screened in?
6	TOKI Başakşehir – North Ayazma Slum Prevention Project: 363 Residence units 10 Commercial units	2.5 km South	Not started	■ Local communities ■ Local livelihoods	No	No	No
7	Mavera Residence Housing and Commercial Development Project: 485 Residence units 11 Commercial units	1.7 km South	Not started	■ Local communities ■ Local livelihoods	No	No	No
8	Mavera Comfort Project: 705 Residence units 33 Commercial units	1.6 km South	Not started	■ Local communities ■ Local livelihoods	No	No	No
9	TOKI Başakşehir – Kayabaşı – 868/5 Project: 476 Residence units 48 Commercial units	1.5 km North	Not started	■ Local communities ■ Local livelihoods	No	No	No
10	TOKI Başakşehir – Kayabaşı – 868/5 Project: 476 Residence units 48 Commercial units	2 km North	Not started	■ Local communities ■ Local livelihoods	No	No	No
11	TOKI Başakşehir – Kayabaşı – 919/6 Project: 435 Residence units	2 km North	Not started	■ Local communities ■ Local livelihoods	No	No	No

[239] https://www.toki.gov.tr/illere-gore-projeler

Housing Projects by Housing Development Administration of Turkey (TOKİ)[239] and Private Sector

No	Name and Description of the Project	Proximity to Project	Construction Status	Common VEC?	Spatial Overlap?	Temporal Overlap?	Screened in?
	29 Commercial units						
12	TOKI Başakşehir – Kayabaşı – 869/43 Project: 399 Residence units 33 Commercial units	1 km North	Not started	■ Local communities ■ Local livelihoods	No	No	No
13	Mavera Homes Project: 200 Residence units 10 Commercial units	1 km South	Not started	■ Local communities ■ Local livelihoods	No	No	No
14	TOKI Başakşehir – Kayabaşı – 968/5-7 Project: 652 Residence units 6 Commercial units	500 m North	Not started	■ Local communities ■ Local livelihoods	No	No	No
15	TOKI Başakşehir – Kayabaşı 9704-6-8 Project: 794 Residence units 16 Commercial units	400 m North	Not started	■ Local communities ■ Local livelihoods	No	No	No
16	TOKI Başakşehir – Kayabaşı Project: 483 Residence units 12 Commercial units	800 m North	Not started	■ Local communities ■ Local livelihoods	No	No	No
17	TOKI Başakşehir – Kayabaşı Project: 521 Residence units	1 km North	Not started	■ Local communities ■ Local livelihoods	No	No	No
18	TOKI Başakşehir – Kayabaşı Project	800 m North	Not started	■ Local communities ■ Local livelihoods	No	No	No

Housing Projects by Housing Development Administration of Turkey (TOKİ)[239] and Private Sector

No	Name and Description of the Project	Proximity to Project	Construction Status	Common VEC?	Spatial Overlap?	Temporal Overlap?	Screened in?
	496 Residence units						
19	Hayat Park Prestij Konakları Project: 234 Residence units 23 Commercial units	2 km South	Not started	■ Local communities ■ Local livelihoods	No	No	No
20	VMALL Shopping Mall 207 Shops	600 m North	Not started	■ Local communities ■ Local livelihoods	No	No	No
21	Oyak Residences and Commercial Units 1349 residential units and 109 commercial units	2 km Northeast	Not started	■ Local communities ■ Local livelihoods	No	No	No

7.3.2 Results of Screening

As a result of the “long-list” screening exercise, the following “short-list” of other projects was identified as being screened in and thus relevant for further evaluation in the CIA:

- Halkalı-İstanbul Airport Metro Line
- Halkalı-Kapıkule Railway Line
- Northern Marmara Motorway Project (Seven sections which are under operation)
- Canal İstanbul Project

Başakşehir-Kayaşehir Metro Line is screened since the construction of the metro line has been finalized before Nakkaş-Başakşehir Motorway construction started, and no interactions are applicable during the operation phase.

As indicated in Table 7-2 there are significant number of projects involving mass housing, shopping mall and shops projects planned especially in Başakşehir and Arnavutköy by Housing Development Administration of Turkey (TOKİ) and other private investors. These projects are screened out either because the construction of the project date of construction start is not known and cannot be predicted (no Temporal Overlap of the VECs) and/or there are no apparent common VECs impacted.

All existing and upcoming projects (both screened in and screened out) in the vicinity of the Project are shown in Figure 7-1 which gives a clear picture to understand the interaction of the Nakkaş-Başakşehir Motorway Project with other projects.

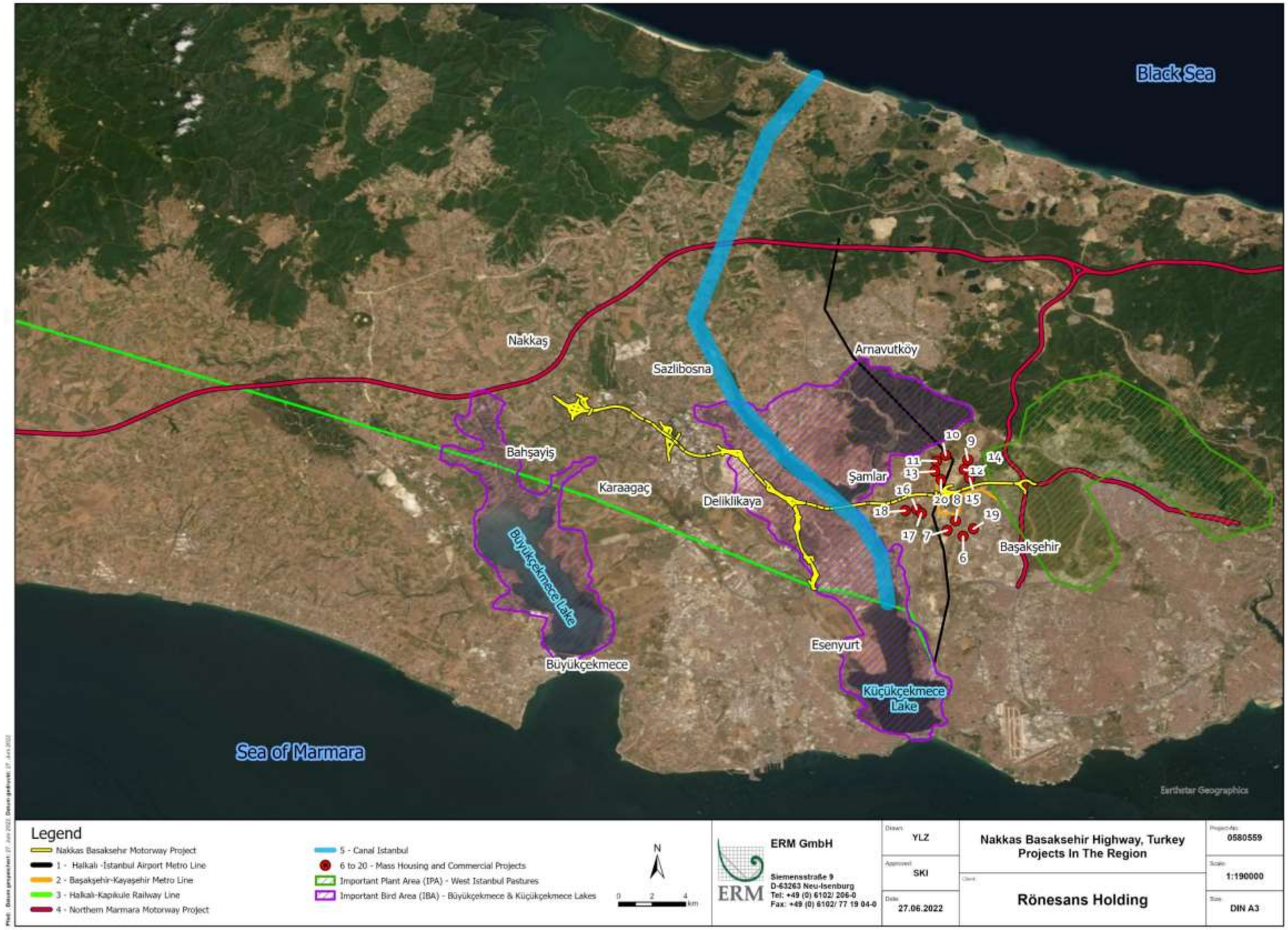


Figure 7-1 Other Projects in the Area

7.4 Step 3 – Determine Present Conditions of the VECs

The present conditions of the VECs identified at:

- KM 56+500 (Halkalı-İstanbul Airport Metro Line crossing),
- KM 7+800 Yeşilbayır Connecting Road (Halkalı-Kapıkule Railway Line crossing),
- KM 51+300 (Sazlıdere Bridge) are described in the respective baseline chapter of the ESIA report.

The current understanding of baseline conditions has been used to identify and assess the potential cumulative impacts presented in Chapter 7.5 below.

7.5 Step 4&5&6 – Assessment of cumulative impacts and identification of mitigation measures

7.5.1 Approach

For each of the short-listed projects identified in the preceding Step 2, a qualitative assessment of potential cumulative impacts on the identified VECs is undertaken per the following sequence:

- Brief description of the relevant other project and location/activity, with reference made to respective ESIA Chapters for further information regarding baseline conditions and other relevant data (if applicable);
- Assessment of key potential types of cumulative impacts on the VECs identified and estimation of significance and magnitude (as compared to the impacts of the Project on its own);
- Description of potential mitigation measures and residual cumulative impacts.

Depending on the specific impact characteristics, it may or may not be feasible to assign a specific significance to the cumulative impacts. Where feasible, the significance criteria will be referred to for the corresponding types of impacts in the respective ESIA chapters.

7.5.2 Transportation Projects

 # 1 – Project Name: Halkalı-İstanbul Airport Metro Line
Brief Description: The project involves the construction of a new Metro line of about 70 km in total connecting Gayrettepe-İstanbul Airport (38 km) and Halkali-İstanbul Airport (32 km). The project interaction with Nakkaş-Başakşehir Motorway will be limited with İstanbul Airport – Halkali section since this route starts from Halkali and passes through Tema Park, Olimpiyat, Kayaşehir and Fenertepe. The construction is ongoing and planned to be finalized in end of 2022.
Potential cumulative impacts: Nakkaş-Başakşehir Motorway and İstanbul Airport – Halkali Metro line intersects around KM 56+000. Tunnel constructions of the metro line overlapping with the Motorway viaduct abutments have been completed. The viaduct abutment design of Nakkaş-Başakşehir Motorway has been designed in such a way that it will not interfere with the subway tunnels. The tunnels overlapping with Nakkaş-Başakşehir Motorway have already been completed and the interaction of the Project will only be limited at KM 56+500. However, tunnel collapse risk that can be caused by major accidents or natural disasters shall be taken into account during the design of the Project relevant components.

# 1 – Project Name: Halkalı-İstanbul Airport Metro Line	
Cumulative Assessment: **Noise and vibration VCEs** *NA* **Social – Community Health and Safety VCEs** *NA* **Ecological VECs** *NA* **Social-Landuse VECs** *NA*	
Resulting Cumulative Significance: **NA**	
Additional Mitigation Measures:	None

# 3 – Project Name: Halkalı-Kapıkule Railway Line	
Brief Description: Halkalı – Kapıkule Railway Line is a speed railway project 229 km in total consisted of two parts Halkalı-Çerkezköy (153 km) and Çerkezköy-Kapıkule (72 km). The purpose of the railway is to connect Turkey directly to the European Union countries. The railway project is consisted of 2 parts: The construction of the 153 km Çerkezköy-Kapıkule section of the project has started with the co-financing of the European Union and 47 % of the construction has been completed as of August 2021. Nakkaş-Başakşehir Motorway interacts with railway project. The overlapping location of the railway and the Motorway has been designed in coordination with both project design teams.	
Potential cumulative impacts: The project interaction with Nakkaş-Başakşehir Motorway will be limited around Karaağaç – Bahşayış and Yeşilbayır Interconnection. The necessary transition reservations were left by Nakkaş Otoyol A.Ş. design team in such a way that both projects design align with each other at overlapping location. Several impacts may occur at the VECs in case both project activities takes place at the same time at the at interaction location: ■ Clearance of the construction strip – vegetation removal of sensitive habitats; ■ Noise, dust, nuisance of construction equipment on local communities; ■ Nuisance to local communities VEC caused by disruption of local traffic and transport paths; ■ Impacts on community safety related with road safety risks; and ■ Land use restrictions, potential income reduction for local communities and local livelihoods.	
Cumulative Assessment: The relative impact of the railway is less than the Motorway construction. It can be expected that by application of the already-planned Mitigation Measures the cumulative impact on the local habitats and ecology will remain **Minor.**	
Discussion: The social and land use impacts of the Motorway Project on the local communities will be of wider scale than the railway project. Nevertheless, there will likely be a small number of landowners/residents who are affected twice: first for the railway and then for the Motorway, whereby the railway construction process may be quicker than for the Motorway. Similarly, some of the affected landowners will be subject to expropriation/compensation for use of the land twice, impacting on local livelihoods VEC. In some cases the net effect on landowners may be beneficial, for others negative. In summary, the Motorway Project will need to carefully assess each landowner situation on a case-by-case basis. Whilst there may be some specific situations of a Moderate impact to a particular Project	Resulting Cumulative Significance: **Minor**

# 3 – Project Name: Halkalı-Kapıkule Railway Line	
Affected Peoples (PAPs), overall the cumulative impact on the social-land use topics will remain to **Minor.**	
Additional Mitigation Measures:	Nakkaş Otoyol A.Ş. will meet with the representatives of Halkalı-Kapıkule Railway Line to confirm details of the construction time-line to minimise any potential construction activity and logistical interference, and minimise common areas of land disturbance. Also to harmonise in respect of reinstatement/revegetation measures. Nakkaş Otoyol A.Ş. Community Liaison Officer (CLO) will pay special attention to landowners/residents in this area where the two projects overlap, and should reach out early to Halkalı-Kapıkule Railway Line representatives to ensure a mutual understanding of the commonly affected PAPs. Collaboration of the timing of vehicle movements (avoiding school hours) and road safety measures could be considered as mitigation measure which will be included in Traffic Management Plan.

4 – Project Name: Northern Marmara Motorway Project
Brief Description: The NMM is a 243 km long toll motorway with 2 x 4 lanes between Kınalı junction (Silivri) and the Akyazı junction (Sakarya). The NMM was originally comprised of seven sections in total connecting Asia and Europe with an uninterrupted traffic flow and is considered an alternative route to the European Road 80 (E 80 also known as Trans European Motorway (TEM). The first seven sections of the NMM have already been completed and are under operation. The NMM project was exempted from Turkish EIA, however two ESIA Reports (European side and Asian side) have been prepared for NMM Project in line with IFC Standards as required by the project Lenders. In 13 November 2020, 1st Regional Directorate of General Directorate of Motorways (KGM) involved Section 8 – Nakkaş-Başakşehir Motorway.
Potential cumulative impacts: The project interaction with Nakkaş-Başakşehir Motorway will be adjoining at the sections of the NMM. Since all the rest of the NMM sections are already in operation, the construction of the adjoining sections will be carried out under traffic flow. Therefore road narrowing and diversion will be required during the construction activities which may possibly impact the road users including the communities present in the vicinity. Other construction impacts on VECs such as local communities, soil, groundwater and freshwater will overlap spatially only at the connection points, but not temporally. Assuming similar mitigation measures are applied as specified for this Project, the resulting residual impacts in the other segments are expected to also be comparable.
Cumulative Assessment: The overall impact of the NMM Project for the wider region is positive since the NMM creates an alternative northern route from western Anatolia to Europe as a bypass to the huge bottleneck at İstanbul. This will enable savings of time and fuel with corresponding lower emissions – and especially avoidance of traffic exposure (noise, dust emissions, nuisance etc.) to the many millions of residents in and around İstanbul.

# 4 – Project Name: Northern Marmara Motorway Project	
The relative impact of the Project is less than the overall seven sections of the NMM. It can be expected that by application of the already-planned Mitigation Measures the cumulative impact will remain **Minor.**	
Resulting Cumulative Significance: **Minor**	
Additional Mitigation Measures:	Nakkaş Otoyol A.Ş. will meet with the representatives of NMM operating company to confirm the details of the construction time-line to minimise any potential construction activity and logistical interference, and minimise common areas of land disturbance. Also to harmonise in respect of reinstatement/revegetation measures. Nakkaş Otoyol A.Ş. Community Liaison Officer (CLO) willl pay special attention to landowners/residents in this area where the two projects overlap, and should reach out early to representatives of NMM representatives to ensure a mutual understanding of the commonly affected PAPs.

 # 5 – Project Name: Canal İstanbul Project

Brief Description:

Canal İstanbul is located in the western part of İstanbul running parallel to the Bosphorus aiming to connect the Black Sea with Marmara Sea. Length of the canal is approximately 45 km long, 20.75 m deep having 275 m width at its narrowest point.

The canal route will pass through Terkos Lake, Sazlıdere Dam and Küçükçekmece Lake which are located in the following districts with indicated lengths:

- Arnavutköy District: 27 km
- Başakşehir District: 6 km
- Avcılar District: 3 km
- Küçükçekmece District: 6 km

There are following integrated structures planned as part of the Canal İstanbul project:

- Küçükçekmece Marina,
- Marmara Container Port
- Black Sea Logistics Centre
- Recreation Area

EIA report was prepared and concluded with "EIA positive decision" in 2020. Project completion time is assumed to be 7 years, but the tendering process has not yet started.

The canal interacts with Nakkaş-Başakşehir Motorway at KM 51+300. Based on the information provided by Nakkaş Otoyol A.Ş., Canal Istanbul and Nakkaş-Başakşehir Motorway Projects are separate projects having no relation with each other.

Potential cumulative impacts:

Potential E&S impacts and mitigation measures of the Canal İstanbul are described in EIA Report dated 2020[240]. The main potential impacts are:

[240] EIA Report prepared by Cınar Engineering and Consultancy, January 2020.

# 5 – Project Name: Canal İstanbul Project	
■ Removal of Sazlıdere Dam which supplies the freshwater needs of İstanbul; ■ Habitat loss and habitat fragmentation; ■ Isolation of the land behaving like an island ecosystem; ■ Construction of new residential units, commercial units and integrated structures such as marina, port, logistic centre around the canal which will change the rural and demographic character of the region. ■ Increase in population which may bring additional issues such as inadequate urban services (infrastructure, education, health, drinking water, etc.), transportation problems. ■ Mass housing and commercial unit development areas planned by TOKI and KİPTAŞ ■ Loss of agricultural lands and loss of livelihood in the region.	
Cumulative Assessment: The overall impact of the Nakkaş Başakşehir Motorway Project will be significantly less than the impacts of Canal İstanbul.	
Resulting Cumulative Significance: **Minor**	
Additional Mitigation Measures:	It is assumed that the construction of Canal İstanbul will be carried out during the operation of Nakkaş-Başakşehir Motorway. Nakkaş Otoyol A.Ş. will need to engage with the representatives of Canal İstanbul in early stages of the design and construction planning. Canal İstanbul representatives shall confirm the details of the construction time-line to minimise any potential construction activity and logistical interference, and minimise common areas of land disturbance. Nakkaş Otoyol A.Ş. Community Liaison Officer (CLO) willpay special attention to landowners/residents in this area where the two projects overlap, and should clearly indicate that Canal İstanbul and Nakkaş-Başakşehir Motorway Project is two different standalone projects.

7.6 Conclusion

After assessment of 4 projects which are screened in:

- Halkalı-İstanbul Metro Line was found that the potential cumulative impact was *"Negligible"*.
- Halkalı-Kapıkule Railway Line was further assessed and found out that the potential cumulative impact was *"Minor"*.
- Northern Marmara Motorway Project was further assessed and found out that the potential cumulative impact was *"Minor"*.
- Canal İstanbul Project was further assessed and found out that The overall impact of the Nakkaş Başakşehir Motorway Project will be significantly less than the impacts of Canal İstanbul. Therefore the potential cumulative impact of Nakkaş-Başakşehir Motorway was concluded as "*Minor*".

Based on the assumption that mitigation measures are implemented for the Project as laid out in the previous ESIA chapters, and additional communication and liaison mitigation actions indicated within the CIA, the expected significance of the cumulative impacts is the same as for the Project alone (usually **Minor**).

No specific recommendations are made for monitoring or measurements of potential impacts in the field. However, a number of mitigation measures are recommended in respect of contacting the

responsible persons of the relevant projects to coordinate construction logistics, mitigation measures and other topics, and to include such parties in the Project SEP to enhance ongoing communication.

No **Major** cumulative impacts are expected that would warrant additional specific technical mitigation.

ANNEX 1 DESIGN CHANGE MANAGEMENT PROCEDURE

ANNEX 2 EHSS LEGAL REGISTER

ANNEX 3 EIA EXEMPTION LETTER

ANNEX 4 INTERNATIONAL CONVENTIONS RATIFIED BY TURKEY

ANNEX 5 STUDIES OF QUARRIES, CAMPSITES AND PRODUCTION PLANTS

ANNEX 6 AIR QUALITY BASELINE STUDY

ANNEX 7 SOIL SAMPLING ANALYSIS REPORT

ANNEX 8 LICENCED WASTE MANAGEMENT FACILITIES IN THE PROJECT AREA

ANNEX 9 SURFACE WATER ANALYSIS REPORT

ANNEX 10 NOISE BASELINE STUDY

ANNEX 11 BIODIVERSITY SURVEY REPORTS

ANNEX 12 STAKEHOLDER ENGAGEMENT TELEPHONIC INTERVIEWS

ANNEX 13 PARIS ALIGNMENT STUDY

ANNEX 14 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

ANNEX 15 CONSTRAINTS MAPS

ANNEX 16 FLOOD RISK ASSESSMENT

ANNEX 17 CONSTRUCTION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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