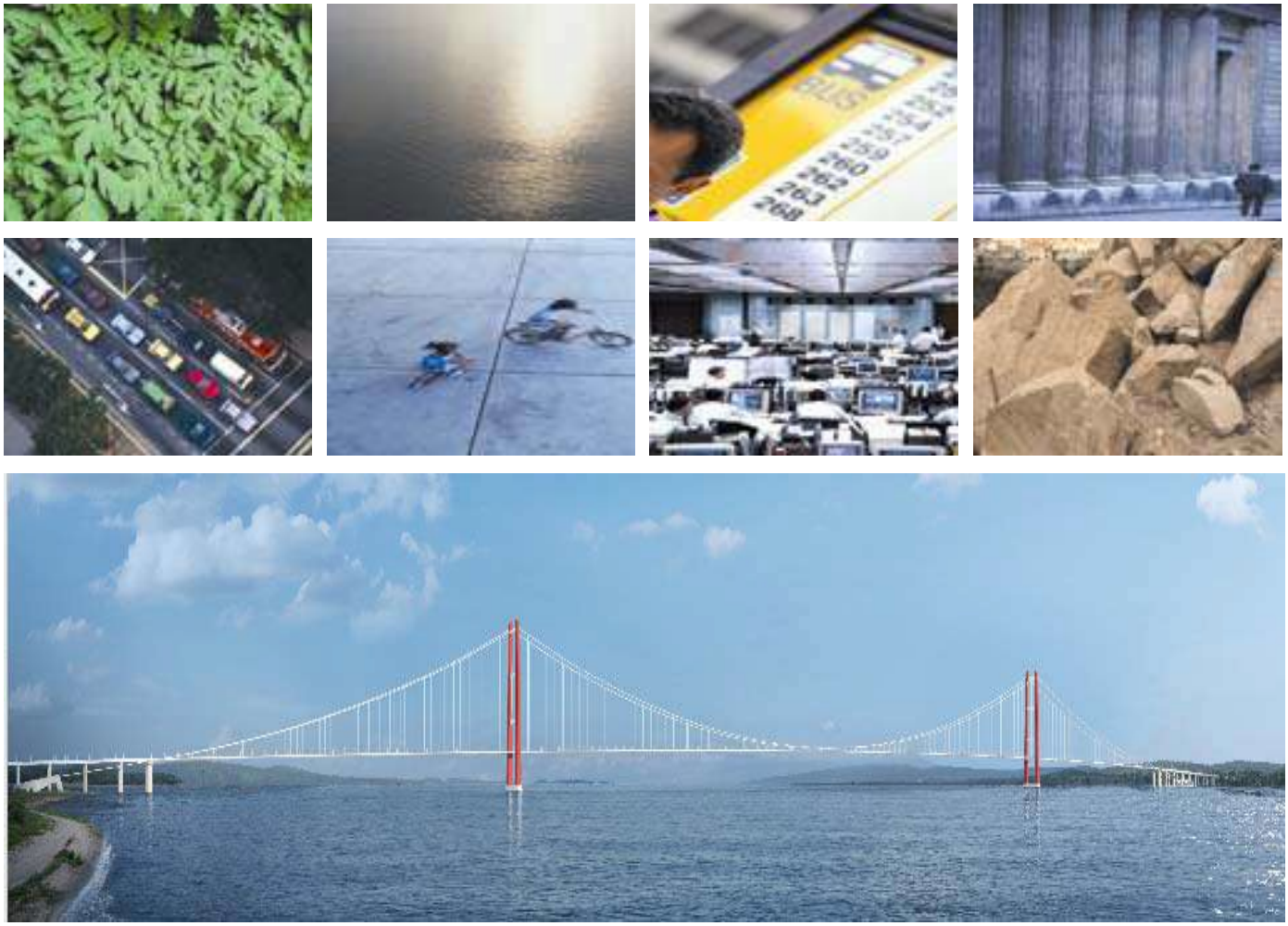

Environmental and Social Impact Assessment Report Final

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Kinali – Tekirdag – Canakkale – Savastepe Motorway Project:
Malkara – Canakkale Section (including 1915 Canakkale Bridge)

To: COK A.Ş.
March 2018

The business of sustainability

ERM

FINAL REPORT

ERM GmbH
Environmental
Resources
Management

Kinali – Tekirdag – Canakkale – Savastepe Motorway Project:
Malkara – Canakkale Section (including 1915 Canakkale Bridge)

Environmental and Social Impact Assessment Report

Prepared for:
COK A.S.

ERM GmbH
Neu-Isenburg
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Mitglied der
Environmental Resources
Management Group

Client	**Project No: 0403910**
COK A.S. Kinali – Tekirdag – Canakkale – Savastepe Motorway Project: **Malkara – Canakkale Section (including 1915 Canakkale Bridge)**	
Summary and version history:	Date: 15 March 2018 Approved by: Raimund Vogelsberger, Partner in Charge: Dana Bratu, Project Manager:

Version	Description	By	Checked	Approved	Date
0	Preliminary Draft – not for further distribution	ERM ACE ENCON	DB	RV	October 2017
1	Draft v1	ERM ACE	DB	RV	November-December 2017
2	Draft v2	ERM ACE	DB	RV	22 January 2018
3	Draft v3	ERM ACE	DB	RV	19 February 2018
4	Final	ERM ACE	DB	RV	15 March 2018

Distribution:

☐ Internal ERM Team

☒ Client

☐ Confidential

☒ Public

CONTENTS

LIST OF ABBREVIATIONS

α	Fisher's alpha index
µg/m³	Microgram per cubic meter
µm	Micron
µS/cm	Microsiemens/centimeter
a	Organism species number in sampling a
AAD	Annual Average Day
AADT	Annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
AD	Latin abbreviation for Anno Domini, referencing to the traditionally reckoned year of the birth of Jesus, with AD denoting years after the start of this epoch.
ADR	Accord européen relatif au transport international des marchandises Dangereuses par Route
AFS	Anti-fouling systems on ships
AIDS	Acquired immune deficiency syndrome
AIS	Automatic Identification Systems
Al	Aluminium
ALARP	As Low As Reasonably Practicable
AoI	Area of Influence
As	Arsen
ASCI	Area of Special Conservation Interest
asl	Above Sea Level
AST	Aboveground Storage Tank
ASTM	American Standard Society for Testing Material
ATS	Action Tracking System
AWEMR	Turkish Air Quality Assessment and Management Regulation
b	Organism species number in sampling b
Ba	Barium
BAP	Biodiversity Action Plan
BC	Before Christ
bgl	Below Ground Level
bn	Billion
BOD	Biological Oxygen Demand
BOT	Build, Operate and Transfer
BP	Before present
BS	British Standard
BTEX	benzene, toluene, ethylbenzene and xylene
°C	Celsius
c	Organism species numer in sampling c
CaCl2	Calcium chloride
CAGR	compound average growth rate
Cat	Category
CBD	Convention on Biodiversity
CBR	California Bearing Ratio
cc	Cubic centimetre
CCTV	Closed-circuit television
Cd	Cadmium
CD	Conservation Dependent
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CESMP	Construction Environmental and Social Management Plan
CFP	Chance Finds Procedure
CGDYY	Regulation on the Assessment and Management of Environmental Noise
CH	Cultural Heritage

CHMP	Cultural Heritage Management Plan
CHC	Central Hunting Commission
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLAP	Community Level Assistance Programme
CLC	Corine Land Cover
CLO	Community Liaison Officer
cm	centimetre
CM	Change Management
CMP	Construction Management Plan / Change Management Plan
CNA	Community Needs Assessment
CO	Carbon monoxide
CO_2	Carbon dioxide
COD	Chemical Oxygen Demand
COK A. Ş.	Çanakkale Otoyol ve Köprüsü İnşaat Yatırım ve İşletme A.Ş.
COLREG	Conventions on the International Regulations for Preventing Collisions at Sea.
CORINE	Coordinated Information on the European Environment
Cr	Chrome
CR	Critically Endangered
Cu	Copper
d	Margalef index value
dB(A)	Decibel, A-weighted; unit of noise levels
DA	Decare (1,000 m2)
DCMP	Design Change Management Procedure
DD	Data Deficient
DFBOM	Design-Finance-Build-Operate-Maintain
DLSYJV	Daelim, Limak, SK EC, Yapı Merkezi Join Venture
DMRB	Design Manual for Roads and Bridges
DO	dissolved oxygen
DSI	Turkish State Hydraulic Institute
DWT	Deadweight Tonnage
E	East
EAF	East Anatolian Fault
ERT	Emergency Response Team
EBRD	European Bank for Reconstruction and Development
EC	European Community
EC	Electrical conductivity
ECB	European CentralBank
ECoW	Ecological Clerk of Works
EEA	European Environmental Agency
EEC	European Economic Community
eg or e.g.	abbreviation of Latin 'exempli gratia', for example
EHS	Environment, Health and Safety Throughout this document EHS refers to Environmental, Health and Safety, Socio-economic and Cultural Heritage aspects.
EHSC	Environmental Health, Safety and Community
EHSS	Environmental, Health and Safety and Social
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMEP	European Monitoring and Evaluation Programme
EMP	Environmental Management Plan

EN	Endangered
EN	European Standard
ENCON	Encon Group Inc.
EOMP	Environmental Operation Management Plan
EP	Employment Policy
EPC	Engineering, Procurement and Construction
EPFI	Equator Principles Financial Institutions
EPPP	Environmental Pollution Prevention Project
EPR Plan	Emergency Prevention and Response Plan
ERC	Emergency Response Centres
ERM	Environmental Resources Management
ERP	Emergency Response Plan
ERT	Emergency Response Teams
ESAP	Environmental and Social Action Plan-
ESIA	Environmental & Social Impact Assessment
ESHS	Environmental & Social, Health and Safety
ESMP	Environmental and Social Management Plan (same documents in ESIA as ESMMP)
ESMS	Environmental and Social Management System
ESMMP	Environmental and Social Management and Monitoring Plan (same documents in current ESIA as ESMP)
ES	Ecosystem Services
ESR	Ecosystem Services Review
Et al.	Et alli (and other)
etc.	Et Cetera
EU	European Union
EUNIS	European Nature Information System
EW	Early Works
EW	Extinct in Wild
EWCMP	Early Works Construction Management Plan
EX	Extinct
F	Fauna
FGD	Focus Group Discussions
FSS	Field Social Survey
FTE	Full Time Equivalent
g kg^{-1}	Gramm per kilogramm
GDP	Gross Domestic Product
GDRS	General Directorate for Rural Services
GIS	Geographical Information System
GLAC	Guide to Land Acquisition
GM	Grievance Mechanism
GP	Grievance Procedure
GPS	Global Positioning System
GRT	Gross Register Tonnage
GSI	Geological Strength Index
H	Shannon index
HDD	Hard Disk Drive
H&V	Habitat & Vegetation
Ha	Hectare
Hg	Mercury
HGV	Heavy Goods Vehicles
HICP	Harmonised Index of Consumer Prices'
HIV	Human immunodeficiency virus
HM	Heavy Metals

HP	Horse Power

HR	Human Resources
HSE	Health, Safety and Environment
HSE-MS	Health, Safety and Environment Management System
Hz	Hertz
I.D.	Identificator
IALA	International Association of Lighthouse Authorities
IBA	Important Bird Area
ICH	Intangible Cultural Heritage
ie or i.e.	that is (id est)
IFC	International Finance Corporation
ILO	International Labour Organisation
IMO	International Maritime Organization
IPA	Important Plant Areas
IRF	International Road Federation
ISO	International Organization for Standardisation
ISO 14001	International Organization for Standardisation standard for Environmental Management Systems
ISQG	Interim Sediment Quality Guidelines (
IUCN	International Union for Conservation of Nature
IVM	Integrated vegetation management
JICA	Japan International Cooperation Agency
JV	Joint Venture
KBA	Key Biodiversity Area
KGM	Turkish Ministry of Transport, General Directorate for Highways - Türkiye Cumhuriyeti Ulaştırma Bakanlığı Karayolları Genel Müdürlüğü
KM	Chainage Kilometer
km	Kilometre
km/h	Kilometre per hour
km^2	Square Kilometre
KOSBİ	the Kemalpaşa Organized Industrial Zone
kph	Kilometre per hour
KPI	Key Performance Indicator
kV	Kilo Volt
KVA	Kilo Volt Ampere
LACRF	Land Acquisition-, Compensation- and Resettlement Framework
LACRP	Land Acquisition-, Compensation- and Resettlement Plan
LC	Least Concern
LEP	Labour / Employment Policy
LGV	Light Goods Vehicles
LLCA	Local Landscape Character Areas
LR	Low Risk
M	Magnitude
m	Meter
m/sec; m/s; $m.s^{-1}$	Meter per Second
m^2	Square metre
m^3	Cubic metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MSTFP	Marine Safety for Tower Foundation Procedure
MEUP	Ministry of Environment and Urban Planning
MFWA	Ministry of Forestry and Water Affairs
$MgCl_2$	Magnesium Chloride
mg/l; $mg.l^{-1}$	Milligram/litre

mio	million
mm	Millimetre
Mm^3	Million cubic metre
MoENR	Ministry of Energy and Natural Resources
MoEU	Ministry of Environment and Urbanization
MS	Management System
MSDSs	Materials Safety Data Sheets
MW	Mega Watt
N	North
NaCl	Sodium chloride, salt
n	Total number of individuals
n.d.	Not determined
N/A	Not Available
NAF	North Anatolian Fault
NE	North - East
NE	Not Evaluated
NGO	Non-governmental Organisation
ni	Number of individuals belonging to taxon i
No	Number
NO_2	Nitrogen dioxide
NOx	Oxides of Nitrogen
NOV	Notice of Variation
NT	Near Threatened
NTS	Non-technical Summary
NW	North-West
OECD	Organization for Economic Co-operation and Development
OG	Official Gazette
OHSAS	Occupational Health- and Safety Assessment Series
O&M	Operation and Maintenance
Pa	Pascal
PAH	Project Affected Households
PAH	Polycyclic aromatic hydrocarbons
PAPs	Project-Affected-Persons/People
PB	Lead
PCB	Polychlorinated Biphenyl
PCU	Passenger Car Units
PDEU	Provincial Directorate of Ministry of Environment and Urbanization
PDF	Portable Document Format
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
PEC	Predicted Environmental Concentration
PEEN	Pan European Ecological Network
pH	Pondus Hydrogenii or Potentia Hydrogenii. A scale for the measurement of acid value.
PID	Project Information Document
PM_x	Particulate Matter with aerodynamic diameter below x µm
PPE	Personal Protective Equipment
PPG	Pollution Prevention Guidance
ppt	parts per thousand
PPV	Peak Particle Velocity
PR	Performance Requirement
PR	Public relations
PS	Performance Standard
PSM	Project-Specific Measure

psu	Practical Salinity Units
PTS	Permanent Threshold Shift

Q	Quarry
QAFMP	Quarries and Associated Facilities Management Plan
RAPs	Resettlement (and Compensation) Action Plans
RC	Road Contribution
RC	reinforced concrete
RDBT	Red Data Book Of Turkey
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
rms	root mean square
ROW	Right of Way
RUSLE	Revised Universal Soil Loss Equation
S	South
SAoI	Impact Assessment for the Social Area of Influence
SCADA	Supervisory Control and Data Acquisition
SDS	Safety Data Sheet
SE	South - East
SEE	Safety Evaluation Earthquake
SEIA	Socio-Economic Impact Assessment
SEL	Sound Exposure Level
SERLMP	Soil Erosion Reistatement and Landscape Management Plan
SEO	Stakeholder Engagement Officer
SEP	Stakeholder Engagement Plan
SEP	Special Environmental Protection
SCMP	Supply Chain Management Plan
SIA	Social Impact Assessment
SMP	Subcontractor Management Plan
SO_2	Sulfur dioxide
Sp.	Species
SSK	Social Security
SPL	Sound Pressure Levels
spp.	Species (plural)
SPA	Special Protection Areas
SPV	Special purpose vehicle
SSHB	Standard Specifications for Highway Bridges
STD	Sexually Transmitted Disease
Subsp.	subspecies
t	ton
TA Luft	German Technical Guideline on Air
tbd	To be decided
TPCP	Traffic Project and Control Plan
TCDD	Turkish State Railways
TETAŞ	Türkiye Elektrik Ticaret ve Taahhüt A.Ş.
TEU	Twenty foot Equivalent Units
TMMOB	Union of Chambers of Turkish Engineers and Architects
TEM	Trans European Motorway
TEMA	Turkish Foundation for Combating Soil Erosion, Reforestation and the Protection of Natural Habitats
TOC	Total Organic Carbon
TOPRAKSU	Turkish Acronym for Soil–Water General Directorate
ToR	Terms of Reference
TPCP	Traffic Project and Control Plan (TPCP)
TCSAP	Transport Control and Site Access Procedure
TPH	Total Petroleum Hydrocarbons
TR	Turkish Regulation

TS	Turkish Standards
TSI	Turkish Statistical Institute
TSS	Traffic Separation Scheme
TÜRSAB	Association of Turkish Travel Agencies
TV	Television
UDHB	Ulaştırmadenizcilikve haberleşme bakanlığı
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPGMA	Unweighted pair-group average
UPS	Un-interruptible Power System
US	United States
US EPA	United States Environmental Protection Agency
USD	United States Dollar
USDA FSA	United States Department of Agriculture Farm Service Agency
UST	Underground Storage Tank
UTM	Universal Transverse Mercator
UVS	Underwater Visual Census
V	Volt
Var.	Variety
VAT	Value-added tax
VOC	Volatile organic compound
VOC	Vehicle operating cost
VOT	Value of Time
vs	versus
VTS	Vessel Traffic System
VU	Vulnerable
W	West
WCP	Watercourses Crossing Plan
W&W	Wetland and Watercourse
WHO	World Health Organisation
WRI	World Resources Institute
WWF	World Wildlife Fund
WWTP	Wastewater Treatment Plant
Y/N	Yes / No
Yrs	Years
Zn	Zinc

1 INTRODUCTION & CONTEXT

1.1 INTRODUCTION TO THE PROJECT

ERM GmbH (ERM) was contracted by Çanakkale Otoyol ve Köprüsü İnşaat Yatırım ve İşletme A.Ş. (*COK A.Ş.*) (*the Client*) to conduct an Environmental and Social Impact Assessment (ESIA) to international standards for the Malkara – Canakkale Motorway, including the 1915 Canakkale Bridge (*the Project*). The Motorway is 88.5km in length and the Bridge about 3.6 km long (including a center span of 2023m, making it the world's longest suspension bridge). The Project is part of the larger 324.4 km long Kinali – Tekirdag – Canakkale – Savastepe Motorway project in western Anatolia, Turkey.

ERM has teamed up with Turkish companies ENCON (mainly for baseline data collection) and ACE (*ESIA Team*) to undertake the ESIA (see *Section 1.6* below).

Based on the Turkish Government's "Vision 2023", the Turkish Ministry of Transport, General Directorate for Highways (*KGM - Türkiye Cumhuriyeti Ulaştırma Bakanlığı Karayolları Genel Müdürlüğü*) has set national goals for strengthening of the motorway network. As the overall promoter and initiator of the Project, KGM tendered the Project under a Build, Operate and Transfer (BOT) contract model with a 16 year 2 months 12 days concession period. The tender was won by a Consortium of two Turkish firms (Limak and Yapı Merkezi) and two Korean firms (Daelim and SK Engineering). COK A.S. is the Turkish based company (*Special Purpose Vehicle - SPV*) created by the Consortium for implementing the Project. At the end of the BOT contract period the Motorway and the 1915 Canakkale Bridge will be transferred to KGM.

COK A.S. has appointed the company DLSY Joint Venture, formed of the same four above-named construction firms, as the engineering, procurement and construction (EPC) Contractor for the main design and construction works. DLSY JV will perform the works via several subcontractors on different segments of the Project. For the future operation and maintenance of the Motorway, COK A.S. will appoint a contractor in due course (referred to herein as the "O&M Contractor").

An Environmental Impact Assessment (EIA) Study) was completed in November 2016 for the entire 324,4km long motorway in conformance with Turkish EIA regulatory requirements. The EIA, entitled "Kınalı-Tekirdağ-Çanakkale-Savaştepe 1st and 2nd Section Motorway EIA (2016 Turkish EIA)", was approved by the Ministry of Environment and Urbanization on 23 November 2016 (Decree no. 4388). This Turkish EIA, however, is not of sufficient scope and detail to meet the above-described requirements of international lenders. Therefore, the more detailed and comprehensive ESIA is required for the Project.

The main construction phase of the Project is scheduled to begin later in Q2 2018 and will extend for 5.5 years. Between December 2016 and March 2017, COK A.Ş. has issued the tender for EPC contractors, who will be in charge with completing the detail design. The so-called "Early Works"[1] for the Project (e.g. construction of dry docks) were initiated in Q3 2017.

1.2 PURPOSE OF THE ESIA REPORT

COK A.Ş. is seeking project finance from the international financial community. The Lenders are expected to be signatories to the Equator Principles (2) or acting on similar standards (e.g. IFC) and as a result part of the process of obtaining international funding will require the preparation and public disclosure of an ESIA Package and accompanying Environmental and Social Management Plan (ESMP).

For current planning purposes, it is assumed that the future lenders will require the Project and the ESIA to comply with the EBRD 2014 Environmental and Social Policy, Equator Principles, IFC 2012 Performance Standards on Social and Environmental Sustainability, the IFC General Environmental, Health and Safety Guidelines (3) , the specific Health and Safety Guideline for Toll Roads (4) and other relevant international standards, eg World Bank Operational Policies and European Union Directives.

The ESIA is a study into the effects of construction and operation of the Malkara – Canakkale Motorway (including the 1915 Canakkale Bridge) Project on the physical, natural, cultural, and socio-economic environment. The ESIA Report describes the Project and the impacts it is predicted to have on environmental and social conditions in both construction and operation phases and explains how the Project has been designed and how it will be implemented in order to minimise its adverse impacts and maximise its benefits.

1.3 CONTEXT OF ALL DOCUMENTS COMPRISING THE ESIA PACKAGE

This document in hand represents the main ESIA Report, and is Volume II of the overall multi-volume ESIA package prepared for this Project.

I. *Volume I* - The NTS - **Non-Technical Summary**

[1] An Early Works Construction Management Plan is being prepared to manage and monitor these Early Works, in accordance with relevant International Standards and Turkish regulations.

(2) http://www.equator-principles.com/

(3) http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards, http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf

(4) http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/$FILE/Final+-+Toll+Roads.pdf

This is a stand-alone summary (about 20-25 pages long) written in simple language to explain the key points of the ESIA to a wider public.

II. *Volume II* - The **main ESIA Report**
This is the central document and contains most of the relevant information and key findings for the readers, except for the detailed items in Volume III and the related Annexes thereto. This Volume also includes the Stakeholder Engagement Plan.

III. *Volume III* - **ESIA Appendices**
This volume includes a number of ESIA-related details (eg stakeholder meeting protocols, regulatory specifics, etc), plus a stand-alone "topic assessment chapter" for each major topic (air, noise, etc). These topic chapters contain the technical (baseline) data, methodologies for Impact Assessment, analysis and results, including the "long list" of impacts and the significance. Where appropriate, detailed baseline data sets, calculations etc. are attached as annexes.

IV. *Volume IV* - **ESMP**
The relevant mitigation measures and overall monitoring plan are compiled in the Environmental and Social Management Plan (ESMP) document. This forms the "umbrella" management plan for the Project and spells out which additional, topic-specific management plans are required as the basis for implementing and monitoring the various mitigation measures.

V. *Volume V* **– LACR Framework**
This volume comprises the Land Acquisition, Compensation and Resettlement (LACR) Framework document, which provides the basis and "road-map" for the subsequent implementation and monitoring of the LACR Plan. The key points of the LACR Framework will be compiled in a concise brochure format for public distribution in the Guidance on Land Acquisition and Compensation (GLAC).

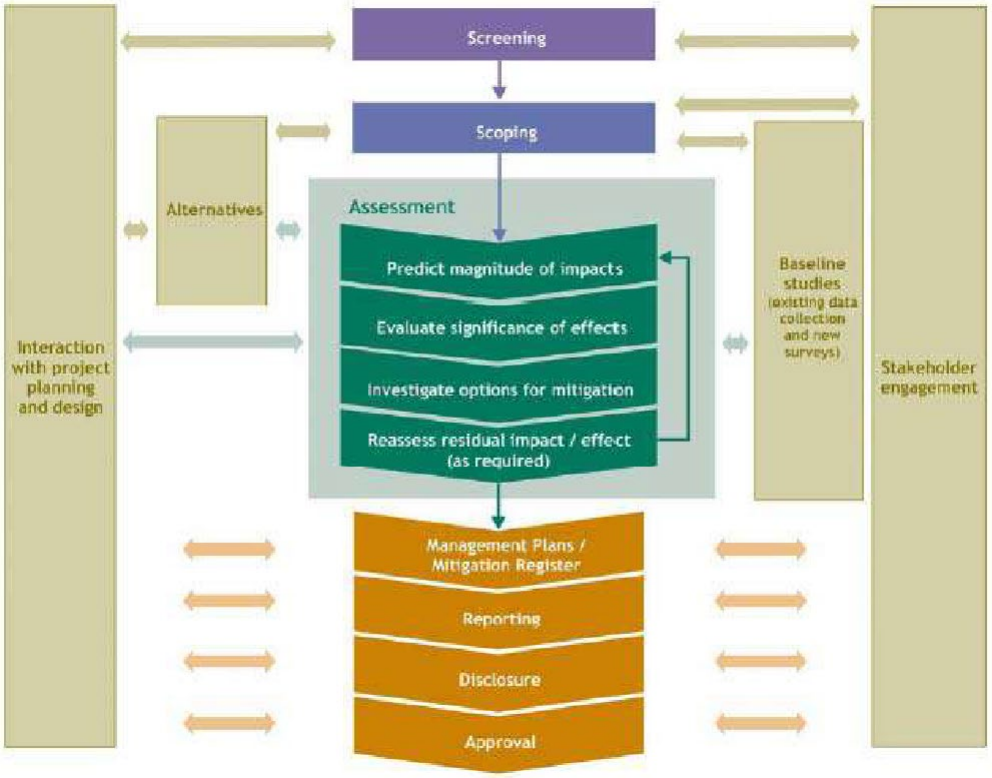
VI. Volume VI- **SEP**

This volume comprises the Stakeholder Engagement Plan, which described the stakeholder engagement process to date and details how the Project will continue to engage with external stakeholders during the following stages of its development including establishment of a Grievance Process.

1.4 OVERVIEW OF THE ESIA APPROACH

Figure 1 sets out the approach that has been adopted for the ESIA study, which reflects ERM's global ESIA methodology that has been well-proven on many successful ESIA projects around the world.

Figure 1-1 ESIA Approach



The key process steps of the ESIA are described in the table below, along with a comment about the relevance/context for this Project.

Table 1-1 Summary of the ERM ESIA Process and Project Context

ESIA Stage	Description	Project Context
Screening	Screening is the first stage in impact assessment, in which the need for assessment and the level of assessment required is determined for a particular project.	Need for EIA/ESIA was established under the Turkish EIA regulations. A full scope ESIA is expected of lenders for such a Category A project.

ESIA Stage	Description	Project Context
Scoping	This is where the key issues to be addressed in the ESIA are identified. Scoping ensures that the process is focused on the significant environmental and social (E&S) impacts which may arise from the Project, also taking into account the results of consultations undertaken to date on the Project.	Scoping was performed for this ESIA, also considering input from Turkish EIA and initial meetings held in Project area by ESIA Team in May 2017 and thereafter.
Baseline development	For the key issues identified in scoping, available information on the current environmental and social conditions is gathered, and this is supplemented by field studies and surveys where necessary.	Baseline information was collected for various E&S topics, as determined per the results of the Scoping.
Impact assessment	This stage is focused on predicting E&S changes from the baseline as a result of constructing and operating the proposed Project. Each impact is evaluated to determine its significance for the environment and society by reference to established standards and norms. The focus is on identifying the significant impacts (*ie* the most important and the impacts with the potential to cause greatest harm) although the assessment reviews a wider range of possible impactsto determine which are likely to be significant.	The impact assessment is performed as described in this document for the relevant topics and identified potential impacts. For each topic, the standard procedure is followed of: - predicting the potential Magnitude of an impact; - evaluating the Sensitivity of the receptors;and on this basis determining the resulting impact Significance.
Mitigation measures	Following the prediction and evaluation of impacts in the previous stage, solutions (or mitigation measures) are developed to reduce the significant impacts. Mitigation can either be amending the Project design or through methods to be adopted during construction or operation of the project. Mitigation included measures to avoid, reduce or remedy adverse effects, and where this is not possible to provide compensation by offering resources or facilities to replace those that are lost. Mitigation can also include measures to provide environmental and social benefits.	Two types of mitigation measures were defined for this Project: -the "Embedded Controls" representing the many actions and physical measures that will be implemented for the Project in compliance with Turkish laws and/or are part of the Project design; and - the "Mitigation Measures" that are required on top of the Embedded Controls to further reduce Significance of an impact to an acceptable level.
ESMP	The various mitigation measures are compiled in a Commitments Register and presented in an E&S Management Plan (ESMP), describing how the measures will be implemented during the detailed design, construction and operation of the project.	The Commitments from the Turkish EIA as well as the mitigation measures defined for the Project as Embedded Controls or additional mitigation measures are compiled within the Commitments Register which is provided as annex of the ESMP.

ESIA Stage	Description	Project Context
		The ESMP which forms Volume IV of the ESIA details the responsibilities and resources for implementation, the timing and monitoring and audit plans to ensure that all the mitigation commitments are met. It also identified any requirements for training and other capacity building.
Stakeholder Engagement Plan	The Stakeholder Engagement Plan details how the Project will continue to engage with external stakeholders during the following stages of its development including establishment of a Grievance Process	This is developed as a standalone document of the ESIA package.
Resettlement Framework Policy (Land Acquisition and Compensation Resettlement Framework)	The Resettlement Framework Policy (the full name Land Acquisition and Compensation Resettlement Framework - LACRF , will identify potential displacement associated with the Project and "establish the principles, procedures, and organisational arrangements by which the Project Sponsor will abide during project implementation" (reference: IFC Handbook for Preparing a Resettlement Action Plan) .	The LACRF for the Project has been developed for the Bridge and the motorway, and is included as Volume V to this ESIA.

During the ESIA studies the team frequently seeks the views of interested parties so that these can be taken into account in the assessment and reflected in the proposals for mitigation. Once complete, the ESIA Report will be subject to public disclosure and comment and all comments will be taken into account in revising the final ESIA Report and ESMP.

Throughout the ESIA the team carried out ongoing collaboration with the Project designers and engineering team to ensure that potential impacts are accurately assessed and appropriate mitigation is developed.

1.5 CLIENT

The overall promoter and initiator of the Project is the KGM, and the BOT contractor is *COK A.S.* As such, this ESIA is prepared on behalf of COK A.S.

COK will need to liaise with KGM for clarification of implementation of certain ESIA measures, while many of the ESIA obligations will be passed contractually from COK A.S. to the EPC Contractors. Nevertheless, COK A.S. will have ultimate responsibility to ensure that the ESIA measures are properly implemented during all stages of the Project.

1.6 ESIA TEAM - ABOUT THE AUTHORS

The ESIA was prepared by a highly qualified team of national and international experts under the direction of ERM Environmental Resources Management (from ERM offices in Germany, UK, Russia, Ireland, Spain, South Africa and Romania). ERM was supported by the reputable Turkish companies ENCON (Ankara)- mainly for baseline data collection and ACE (Istanbul), and supplemented by experts from specialist subcontractors, such as REGIO for terrestrial cultural heritage and Prof. Harun Ozdas of Dokuz Eylul University, Institute of Marine Science and Technology, Izmir, Turkey, for marine cultural heritage.

The ESIA team includes environmental and social consultants having experience and previous involvement in the ESIAs prepared for the European and Asian Sections of the North Marmara Motorway Project and the Gebze-Orhangazi-Izmir Motorway Project (including Izmit Bay Bridge), both projects being part of the 2023 Vision of KGM for development of the Turkish motorway network, as well as the ESIA for the recently completed Eurasia Bosphorus Tunnel in Istanbul.

Besides these above projects, the ESIA core team has broad experience in conducting local EIAs in Turkey and international ESIAs around the world to meet project finance requirements.

Overall Project Director for ERM is Raimund Vogelsberger, Partner, ERM Germany; the Project Managers are Olan Howell, Principal Consultant, ERM Ireland and Dana Bratu, Senior Consultant, ERM Romania.

Information related to the elaboration of the current ESIA Study can be provided by the following person(s):

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1.7 NEXT STEPS IN THE ESIA PROCESS

The current stage of this ESIA Report is the "Final " version. This version has been reviewed by COK and signed off by the Lenders E&S consultant. This Final version considers the comments received during the Draft Final ESIA disclosure period.

2 THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION AND PROJECT'S PARTIES

2.1.1 Project overview

The Kınalı-Tekirdağ-Çanakkale-Savaştepe (Kınalı-Balıkesir) Motorway with a length of 324km (ie the wider project of which the Malkara-Canakkale Motorway and 1915 Bridge is one segment), is one of the key KGM "Vision 2023" Projects.

Figure 2-1 Overview of the Kınalı-Balıkesir Motorway Project

The Kınalı-Balıkesir Motorway corridor begins at the Kınalı-1 Junction of the existing O-3 Istanbul-Edirne Trans European Motorway (TEM) and continues west through the Marmara Ereğli and Çorlu regions and subsequently north of the Tekirdağ Province center. The Motorway corridor direction from this point on can be described as below (north to south):

- Heading southwest from south of the Malkara settlement and reaching the Gelibolu Peninsula east of the Evren Settlement after passing north of the Şarköy settlement.
- Continuing through the northern part of the Gelibolu settlement to reach the 1915 Çanakkale Bridge (Bridge) planned to be built between Sütlüce (European Side) and Şekerkaya (Asian Side) provinces.
- Passing the Bridge and continuing south of the Lapseki settlement, heading southeast and arriving to the Çan settlement.

- Passing south of the Çan Settlement, heading north of the Yenice settlement and reaching the southeast of the Balya settlement
- Heading towards the Balikesir province and finally connecting to the Gebze-İzmir Motorway west of Balikesir.

2.1.2 Bidding process

A consortium comprising of Daelim Industrial Co. Ltd ("Daelim"), Limak İnşaat Sanayi ve Ticaret A.Ş. ("Limak"), SK Engineering & Construction Co., Ltd. ("SKEC") and Yapi Merkezi İnşaat ve Sanayi A. Ş. ("Yapi"), all together „"Sponsors" or „Consortium" were awarded the tender for the development of the Project on a "Build-Operate-Transfer ("BOT") model basis on 26th January 2017.

The tender was administered by Republic of Turkey, Ministry of Transportation, Maritime and Communication ("MoTMC") – General Directorate of Highways ("KGM") ("Grantor" or "Authority")

The tender was administered in accordance with the Law no. 3996 on the Procurement of Certain Investments and Services within the Framework of the Build-Operate-Transfer (BOT) Model ("Law No. 3996") . The tender was competitively and transparently bid

Four bidders submitted bids including the Sponsors ultimately being awarded the concession after a thorough review process. The competing bidders also included international consortiums consisting of global companies from Japan, China, Korea, Italy and Turkey. The consortium bid for a concession tenor of 16 years and 2 months and 12 days.

The implementation contract was signed with KGM on March 21, 2017. The Project is expected to be completed and commence receiving traffic in January of 2022.

In line with the BOT scheme that has been implemented successfully in landmark infrastructure projects, the KGM provides a minimum volume traffic guarantee during the operational period. The overall concession framework is based on precedents that have widely and successfully obtained debt financing for a number of projects across Turkey.

The consortium have since incorporated a special purpose company, under the relevant laws of the Republic of Turkey - Çanakkale Otoyol ve Köprüsü İnşaat Yatırım ve İşletme AŞ ("COK") to implement the Project.

2.1.3 Project Sponsors

DAELIM

Daelim Group is one of Korea's largest enterprise groups having been founded in 1939 with 13 affiliates covering construction, power generation, trading, logistics, manufacturing and leisure. Daelim Industrial Co. Ltd is one of the main affiliates of Daelim Group and a global EPC contractor and petrochemicals company. Daelim has an asset portfolio of USD 18bn with large scale projects being implemented in 35 countries worldwide. Daelim was ranked 42nd in the top International Contractors ENR Ranking in 2016.

Daelim is a bridge expert with a successful track record, having implemented five suspension bridges and 11 cable stayed bridges. Daelim's suspension bridge successes include construction of the Yi Sun-sin bridge in Yeosu / Gwangyang in October 2012 – the largest suspension bridge in South Korea and the fifth longest suspension bridge globally.

LIMAK

Limak, which was established in 1976 as a construction company, has become one of the leading Turkish conglomerates operating in the construction, energy, infrastructure, cement and tourism sectors both in Turkey and abroad. Limak's commercial activities include construction, electricity generation and distribution, cement production, airport & seaport operations and it was ranked 135th in the top International Contractors according to ENR Ranking in 2016, reflecting the quality and scale of its EPC contracts (including contracts for mega projects such as Istanbul Grand Airport with 150 M passenger capacity and Kuwait International Airport with over 4.3 B USD contract value). Limak Inşaat is the principle operating entity of the Limak Group.

Limak has a proven track record in the region and has demonstrated efficient contract management, strong negotiation with governing authorities, best practice construction quality with early completion and realizing value from investee companies by implementing enhanced management techniques, increased efficiencies and quick turnarounds. Limak has successfully completed and currently operating multiple PPP projects both in and outside of Turkey. After successfully completing Istanbul Sabiha Gökçen International Airport, Limak has started the construction of Istanbul New Airport PPP, which will be one of the largest airports in the World. In addition to this, Limak is the sole contractor for the Kuwait International Airport Project.

SKEC

SKEC was established in 1977 and belongs to the 3rd largest Korean conglomerate, the SK Group. SKEC is the flagship of the construction business of the SK Group. SKEC was ranked 39th in the top International Contractors ENR Ranking in 2016 and is a global top-tier EPC Contractor in oil & gas, petrochemical, power, civil and housing sectors.

SKEC has a deep understanding of the region and insight into project development based on the successful execution of a number of strategic projects in Turkey including the Eurasia Subsea Tunnel project (developer and EPC contractor) and the Istanbul 3rd bridge project (as EPC contractor).

YAPI

Yapi was established in 1965 as a contracting company in Turkey and has become one of the leading actors in the infrastructure and construction sectors, focusing on general contracting, mass transit systems, prefabrication, prestressing, pipe production, railway, subway, special buildings, strengthening & restoration and PPPs. In addition to Yapı's land-mark projects and remarkable participation in Turkey's infrastructure and construction sector, Yapi also has a strong presence in the international arena

actively carrying out projects in Middle East and Africa. Yapı was ranked 93rd in the top International Contractors ENR Ranking in 2016.

Over the years Yapı has demonstrated an ability and capacity to build mega construction projects earlier than scheduled, in budget and at the quality targeted. Yapı's successful presence in the structuring and management of PPP & BOT projects as evidenced by its recent success with the Eurasia Subsea Tunnel (along with SKEC). It has strong relationships with a diversified set of international financial institutions.

2.1.4 Construction and operation team

A dedicated team consisting of experienced professionals from the Sponsors and the industry has been chosen to lead the Project and manage its implementation. The construction of the Project will be done under a lump sum, turnkey engineering, procurement and construction contract with the EPC Contractor set up by the four Sponsors. This structure has been selected in order to utilize and leverage their extensive collective project experience.

All Sponsors have wide-ranging experience with similar large scale civil projects having been involved in the following (amongst others):

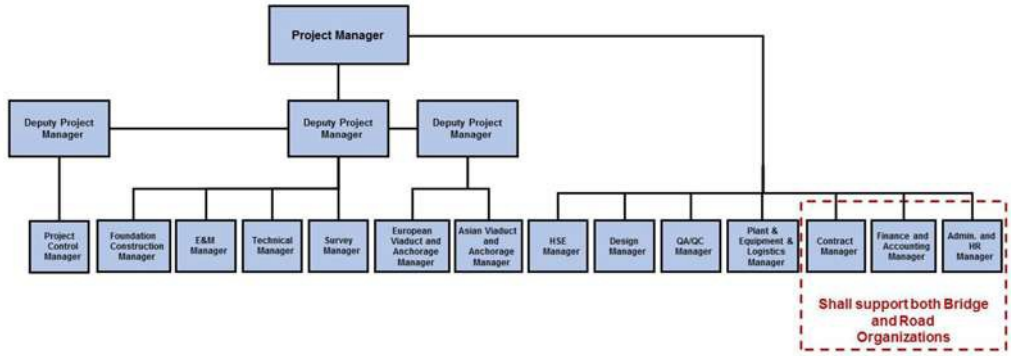
- Daelim: Yi Sun-Sin, longest suspension bridge in Korea and 5th longest in the world (EPC) ;
- Limak – Istanbul New Airport (EPC/PPP), North Marmara Motorway (EPC/PPP), Kuwait Airport (EPC) ;
- SKEC: 3rd Bosporus Bridge (EPC), Yi Sun-Sin, longest suspension bridge in Korea and 5th longest in the world (EPC) ;
- Yapi Merkezi and SKEC: Eurasia Tunnel (EPC / PPP).

The operation phase of the Project envisages the involvement of an experienced international operator with a track record of successfully managing tolled motorways and bridges. It is expected that a robust O&M contract will be executed such that risks and obligations of operation and maintenance are passed on to the operator under and in accordance with such O&M contract. The Sponsors have started the selection process for the O&M partner. The O&M partner will be involved either as a) a subcontractor to the O&M Company or b) an investor in the O&M Company (alongside the Sponsors).

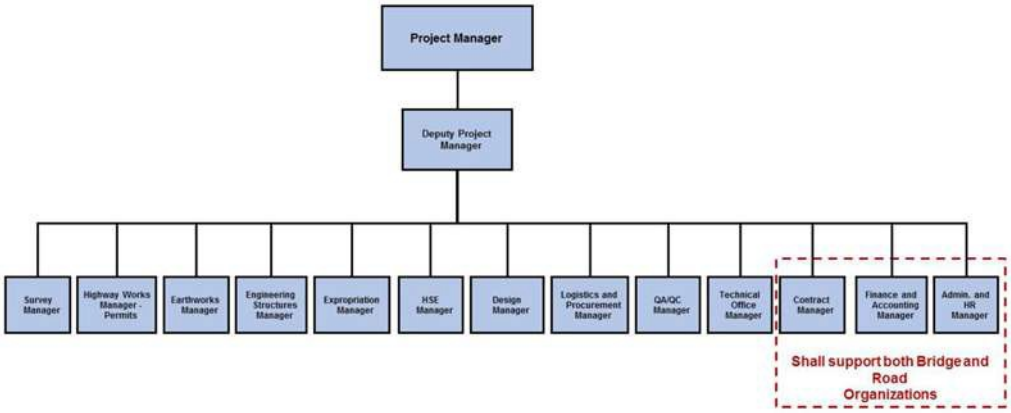
2.1.5 EPC Contractor

The Project consists of the Bridge and the Road sections which require different expertise. Therefore two separate organization sub-structures are planned under DLSY for the effective management of the Project. The organizational structure of the EPC Contractor (Bridge & Road Sections) is shown below.

Bridge

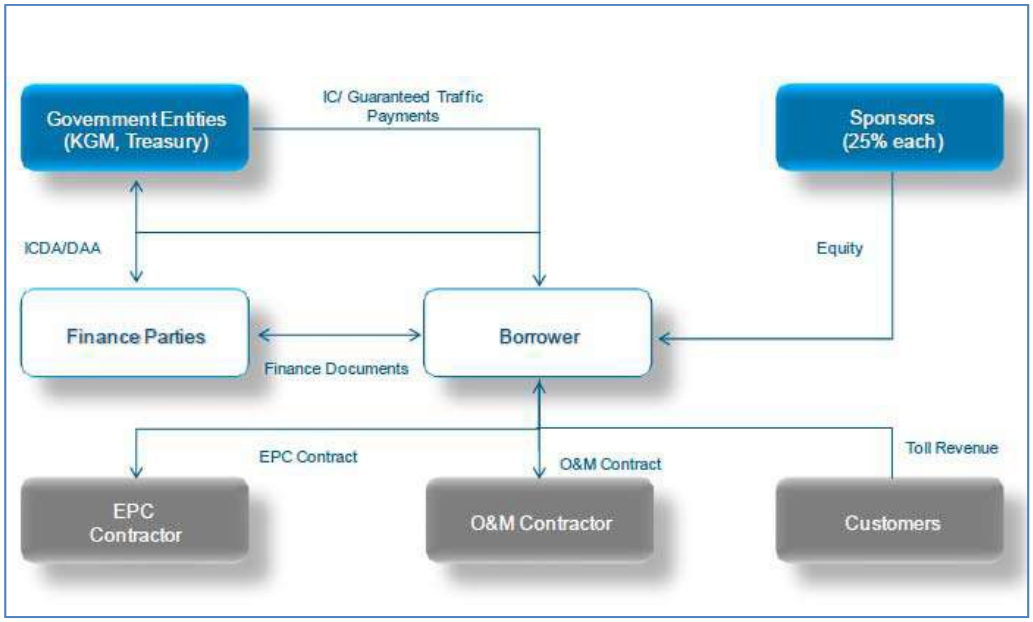


Motorway



2.1.6 CONTRACTUAL STRUCTURE

The high level contractual structure of the Project is represented pictorially below. The contractual framework follows proven BOT/PPP schemes, which have been successfully implemented in Turkey for other large scale transport infrastructure projects. Previous successes include the Eurasia Tunnel Project as well as two other KGM projects namely the Gebze- Orhangazi-Izmir motorway - including the Izmit Gulf Crossing and access roads and the Third Bosporus Bridge project.



2.1.7 *IMPLEMENTATION CONTRACT*

The contractual arrangement between KGM and the Project Company (as concessionaire) is enshrined in the IC, a concession agreement, which is subject to private law. The IC grants the Project Company the right to implement and operate the Project and sets out the material provisions in relation to the Project including but not limited to:

- Concession timing, milestones and related incentives (e.g. early completion, etc.) ;
- Toll collection and adjustment regime ;
- Minimum Traffic guarantee (MRG framework and mechanics);
- Provisions for a finance parties' Implementation Contract Direct Agreement ("ICDA") ;
- Changes in cost ;
- Project Company defaults, cure periods, Finance Parties' step-in rights and
- Termination regime .

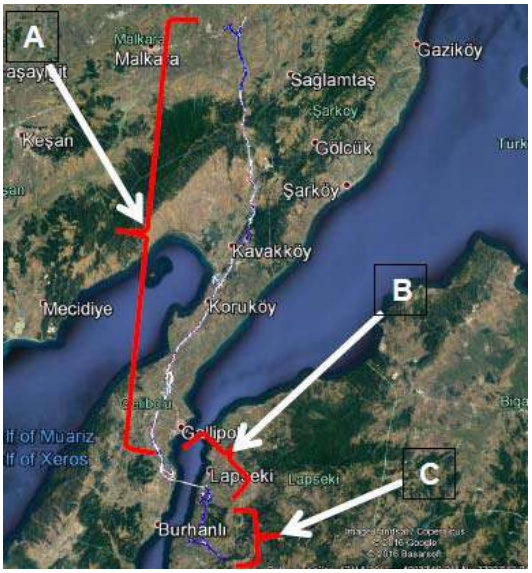
2.2 *PROJECT AREA*

The COK Motorway section (Figure 2-2) covers the segment of the Kınalı - Balıkesir Motorway starting at the Malkara Junction at around KM 106+840 and ending at KM 191+707 for a total of 88.5 km long motorway section including the 1915 Çanakkale Bridge (3563m long span). The Project can be sub-divided into three sections1:

[1] These dimensions are based on the ESIA ToR documents, subject to design change. Minor changes in the dimensions will not affect the ESIA results

- A-Malkara Junction-Gelibolu South Junction (length 72.529 km; access road length 9.595 km)
- B- Gelibolu South Junction – Çanakkale 1 Junction (1915 Çanakkale Bridge)
- C-Çanakkale 1 Junction – Çanakkale 2 Junction (length 7.885 km, access road lengths 3.11 km; 1 viaduct-568.8m)

Figure 2-2 ***Sections of the Project***



Project terrain conditions vary in the Tekirdağ Province section of the Motorway, where the alignment elevations are between 20m to 300m above sea level. A 30km section of the Motorway in the Çanakkale Province is located on flat terrain following the mountainous area section. The Project alignment is parallel to the National Road D-55 in this part of the Project Area. Maximum fill and cut section heights are likely to be 30m and 25m, respectively. The topography varies gradually following the 1915 Çanakkale Bridge in the Asian section (see Figure 2-3).

Figure 2-3 Overview of the Project (motorway section and the bridge)

Source: http://1915canakkale.com/

2.3 PROJECT DESIGN

An overview of the key Motorway and Bridge elements is given below. This information is based on the design status as of July 2017; subsequent design changes, if significant for the ESIA results, will be evaluated as part of the Change Management Procedure. Design Works of Motorway will be accomplished by Yüksel Project.

2.3.1 *The Overall Motorway Alignment*

The route is planned as three lanes in each direction for a six-lane motorway. All intersections in the Project will be single and one way direction lanes. The general Motorway speed will be 120 km/h, 100 km/hour, 80 km/hour on exits and entrances and 50 km/hour under poor conditions in accordance with topography and ambient.

Table 2-1 Technical requirements for the motorway

Design Element	Unit	Main Carriageway	Connection Road
Design Speed	km/hr	120	100
Width of Lane	m	3.75	3.5
No. of Lane	nos	2@3	2@2
Width of Shoulder	m	3	3
Width of Guardrail	m	1	1
Width of Median Shoulder	m	1	1
Width of Median	m	7	5
Super - elevation(normal)	%	2.5	2.5
Super - elevation(max)	%	6	6
Minimum Horizontal Radius	m	1,000	600
Minimum Clothoid Parameter	m	350	200
Longitudinal Slope(max)	%	4	5
Longitudinal Slope(min)	%	0.5	0.5
Stop Sight Distance	m	275	215
Clearance of Bridge	m	5	5

2.3.1.1 *Junctions and Exits/Entrances*

There will be a total of five junctions and exits/entrances on the COK Malkara-Çanakkale Section. The distances between the intersections and exits/entrances that are foreseen are given below.

Table 2-2 Malkara-Çanakkale Motorway Junctions ad Toll Stations

No	Junction Name	Distance Between Junctions (km)	Motorway km	Connection to
1	Tekirdağ Batı – Malkara	33.5	107+760	State Road D110
2	Malkara – Bolayır/Evreşe	39.6	147+387	State Road D550
3	Bolayır/Evreşe – Gelibolu Kuzey	15.3	162+648	State Road D550
4	Gelibolu Kuzey – Gelibolu Güney	15.6	178+279	State Road D550
5	Gelibolu Güney – Çanakkale 1	8.4	183+822	State Road D200
6	Çanakkale 1 – Çanakkale 2	6.8	190+600	State Road D200

Figure 2-4 *Location of the six junctions*

Figure 2-5 *Details of the Junctions 1 and 2*

2.3.1.2 *Viaducts*

Four viaducts are planned to be in the Malkara-Çanakkale Motorway Section as given below:

Table 2-3 *Malkara-Çanakkale Motorway Section Viaducts*

Name	Starting km	Ending km	Length (m)
Viaduct 6 (Passing over Köprübaşı River Valley)	115+320	116+399	1078
Viaduct 7 (Passing over Koca River)	147+975	148+158	183
Viaduct 8 (Passing over Paşova River)	168+306	169+169	862
Viaduct 1 (Unknown)	187+470	188+038	568

Figure 2-6 *Malkara-Çanakkale Motorway Section – Viaduct 6 (Passing over Köprübaşı River Valley)*

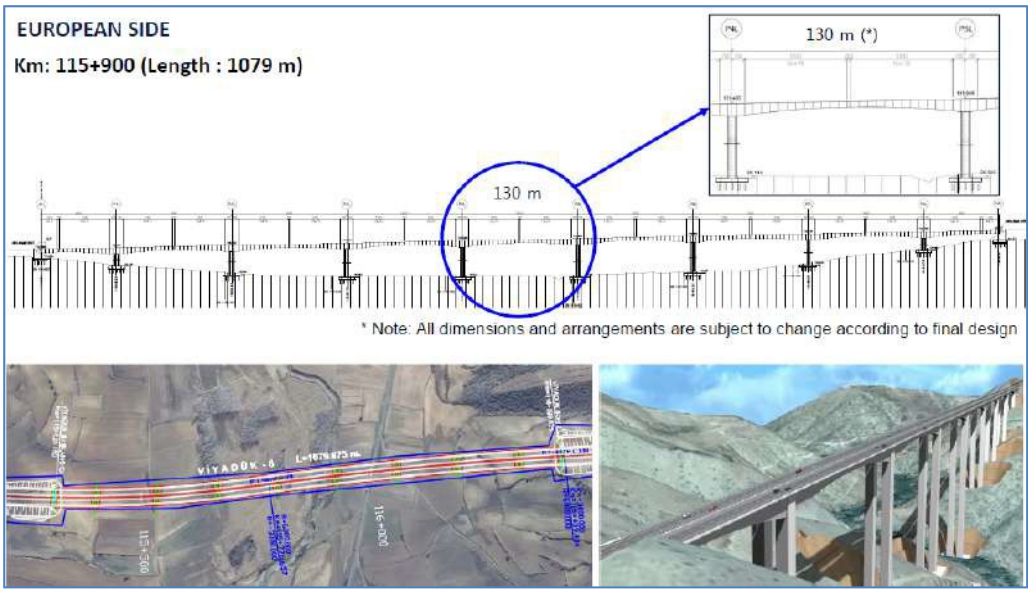


Figure 2-7 *Malkara-Çanakkale Motorway Section – Viaduct 7 (Passing over Koca River)*

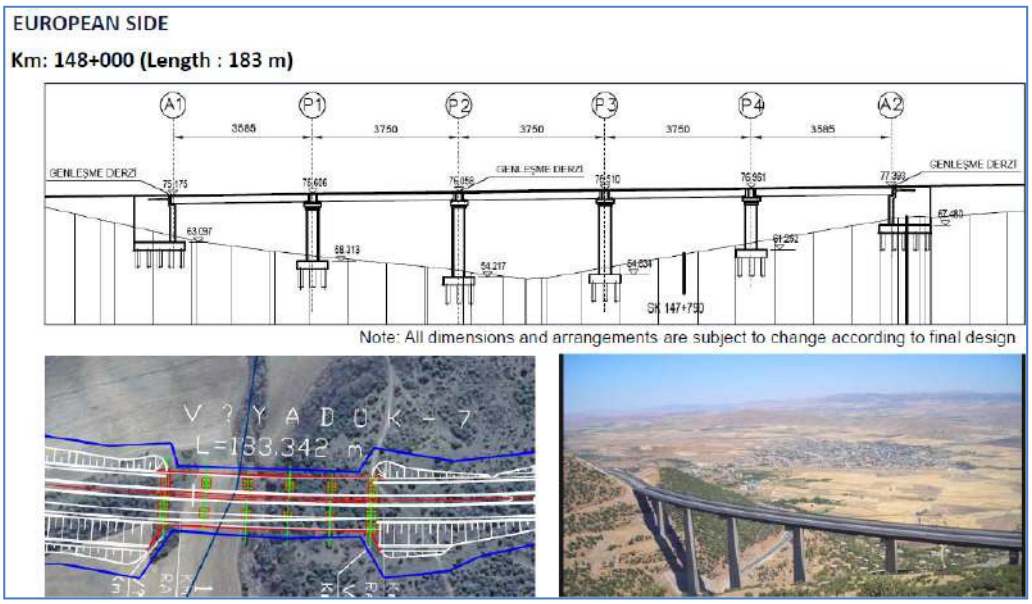


Figure 2-8 *Malkara-Çanakkale Motorway Section – Viaduct 8 (Passing over Paşova River)*

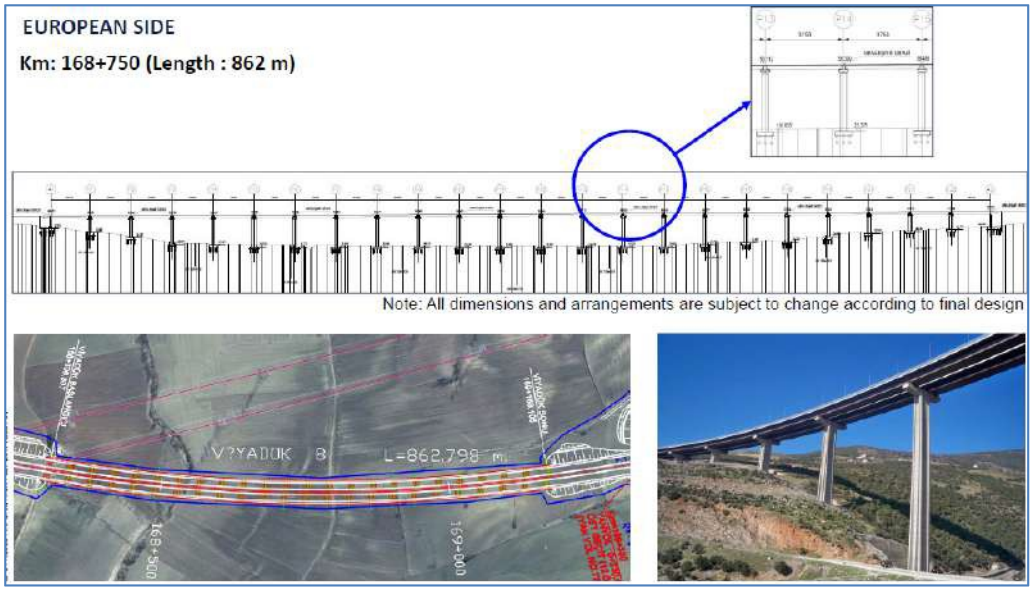
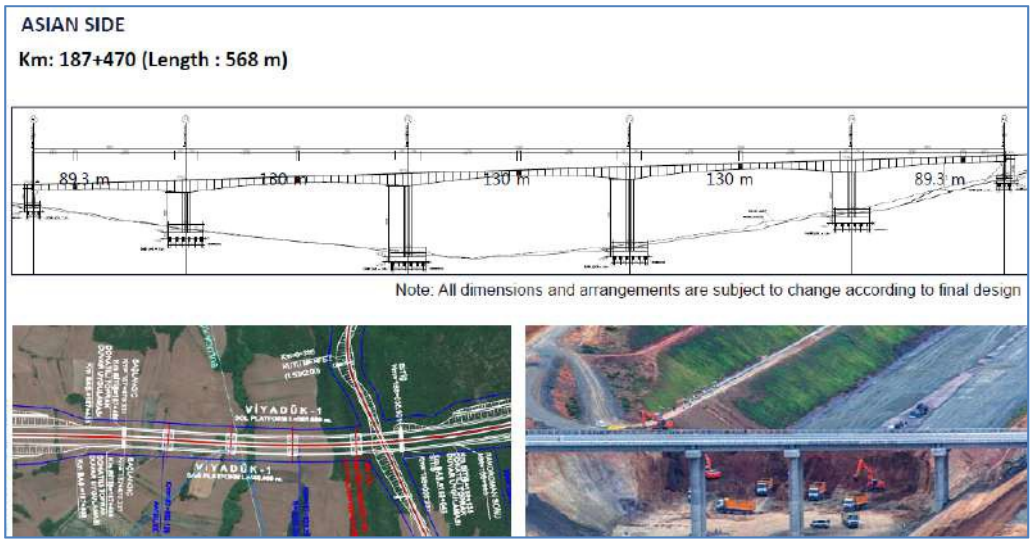


Figure 2-9 *Malkara-Çanakkale Motorway Section – Viaduct 1*



2.3.1.3 *Overpasses*

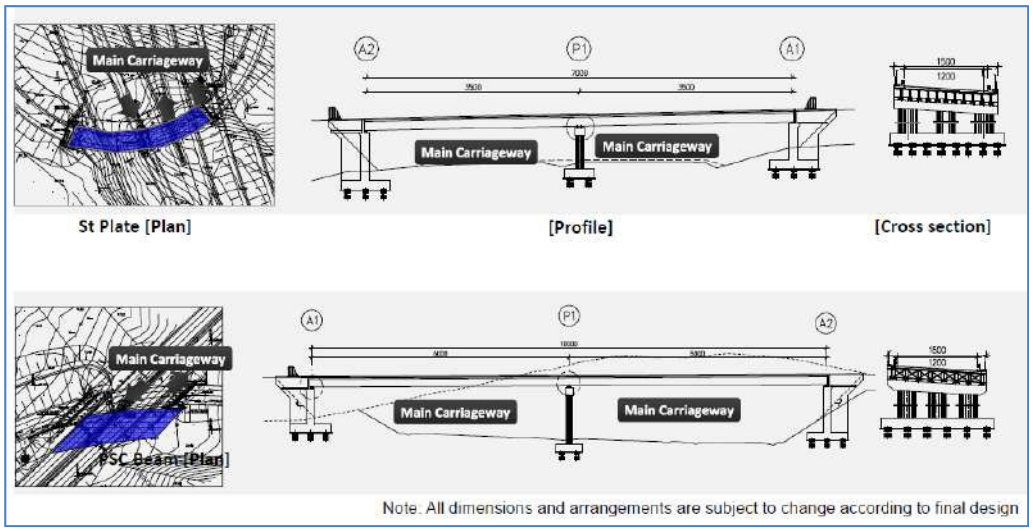
There are 36 roadway overpasses planned for the Malkara-Çanakkale Section, details are given below:

Table 2-4 *Malkara-Çanakkale Motorway Section Overpasses*

No	km	Size (mxm)	Details	No	km	Size (mxm)	Details
1	107+760	2(13.75X 55)	Malkara Junc. - 1 Bridge	19	161+179	50X169	D550 State Road
2	108+135	12X60	Ballı Road	20	161+503	12X60	Güneyli-Gelibolu Road
3	114+632	12X50	Balabancık Road	21	162+648	2(13.75 X70)	Gelibolu North Junc. -1 Bridge

4	119+497	12X70	Çimendere Road	22	166+422	12X50	Ocaklı Gelibolu Road
5	120+902	12X50	Cropland Road	23	169+330	12X50	Mollamustafapaşa Farm Road
6	122+235	12X60	Çokal Road	24	171+784	12X50	Kavaklı-Gelibolu Road
7	133+765	12X50	Cropland Road	25	172+550	12X50	Kavaklı Road
8	137+362	12X50	Cropland Road	26	174+120	12X50	Fındıklı Topçu Road
9	140+980	12X60	Kavakköy Road	27	177+799	12X60	Munipbey Farm Road
10	141+817	12X50	Kavakköy-Ortaköy Road	28	178+279	2(13.75 X55)	Gelibolu South Junc. -1 Bridge
11	143+011	12X50	Ortaköy Road	29	178+969	12X70	Bayırköy-Gelibolu Road
12	145+280	12X50	-	30	1+868	12x50	Malkara Jun. A
13	147+386	2(13.75X 55)	Bolayır-Evreşe Junc. -1 Road	31	0+257	2(13.75 X50)	Malkara Jun. 2 A
1+868	12x50	Malkara Jun. A	Koruköyü Road	32	0+271	2(13.75 X50)	Bolayır-Evreşe Jun. 2 A
0+257	2(13.75X 50)	Malkara Jun. 2 A	Koruköyü Road	33	0+274	2(13.75 X50)	Gelibolu South Jun 2 A
0+271	2(13.75X 50)	Bolayır-Evreşe Jun. 2 A	Koruköyü Road	34	187+110	12x50	B Class Road
17	157+236	12X50	Bolayır Road	35	191+163	15X110	U-Turn Steel Bridge
18	160+380	12X50	Cropland Road	36	10+969	22x85	Canakkale Junction

Figure 2-10 ***Malkara-Çanakkale Motorway Section – Sample of overpasses***



2.3.1.4 *Underpasses*

There are a total of 33 underpasses planned for the Malkara-Çanakkale Motorway. Of these, 13 will be constructed using pre-case concrete beams

(PSC Beams) and 20 will use box-type reinforced concrete (RC Box) details are shown in the following tables.

Table 2-5 ***Underpasses (PSC Beams)***

No.	km	Size (meter x meter)	Details
1	130+769	35x70	River Bridge
2	134+872	33.5x70	D120 State Road
3	154+084	35x25	Canal Bridge
4	155+586	35x30	Underpass Bridge
5	1+748	25.5x60	Gelibolu North Junction "A"
6	0+298	33x60	Gelibolu North Junction "Z"
7	179+532	30x90	Munipbey River Bridge
8	0+757	42.5x30	GSJ Munipbey River Bridge
9	159+081	43.7x30	GSJ Munipbey River Bridge
10	183+822	50x50	Çanakkale-1 Junction
11	4+678	35X43	Çanakkale-1 Junction
12	190+637	46x55	Çanakkale 2 Junction
13	159+081	43.7x30	GSJ Munipbey River Bridge

Figure 2-11 ***Malkara-Çanakkale Motorway Section – Sample of underpasses (PSC Beams)***

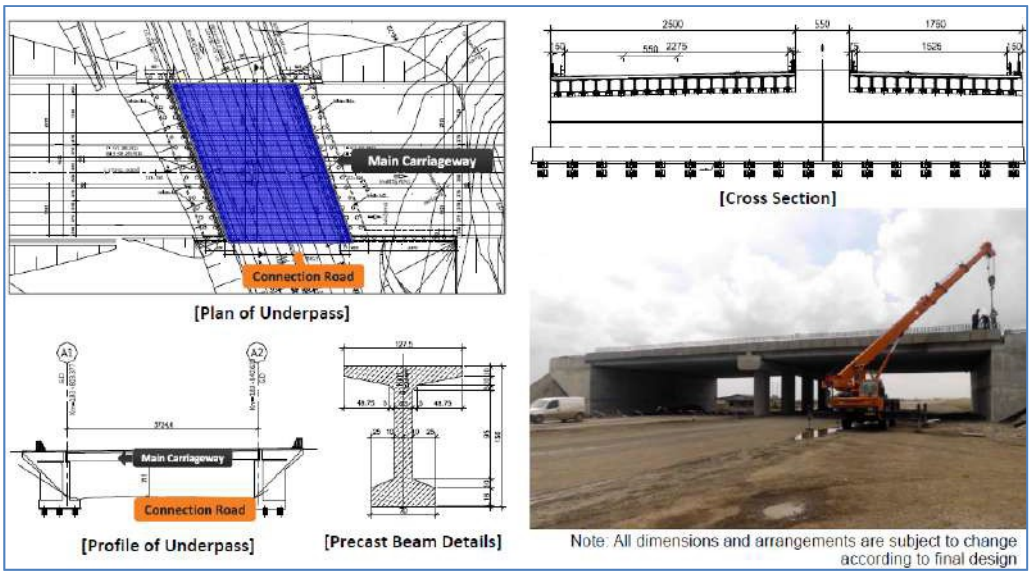
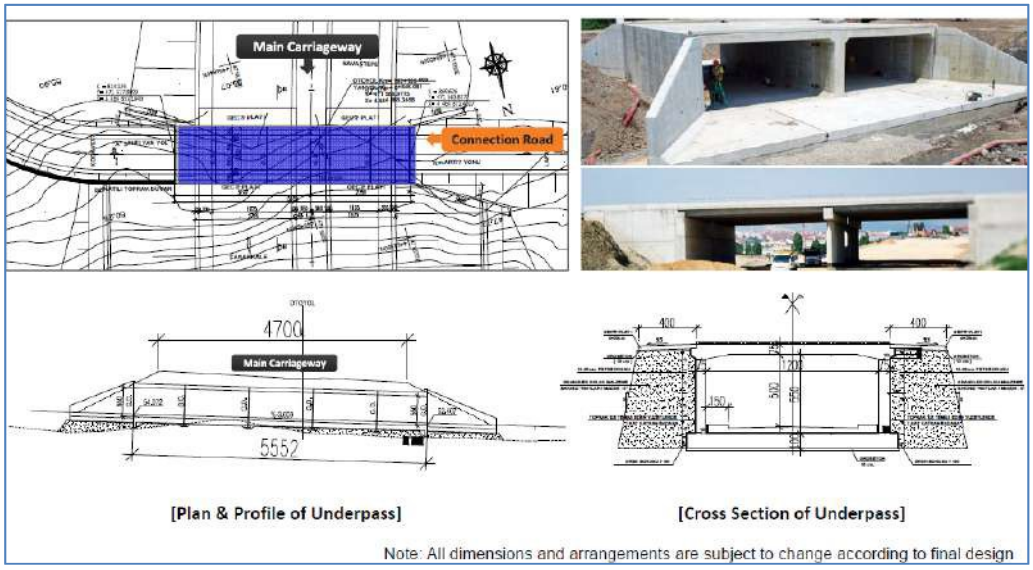


Table 2-6 ***Underpasses (RC Box)***

No.	km	Size (mxm)	Details
1	110+225	12x5.5	Ballı-Kavakçeşme Road
2	111+372	12x5.5	Balabancık-Ballı Village Road
3	112+597	9x5.5	Balabancık Road
4	113+939	9x5.86	Cropland Road

5	118+171	7x5.5	Cropland Road
6	123+148	7x5.5	Cropland Road
7	125+090	7x5.5	Cropland Road
8	127+512	9x5.5	Yüce-Çokal Road
9	136+500	7x5.5	Cropland Road
10	139+126	9x5.5	Cropland Road
11	164+709	12x5.5	-
12	179+453	12x5.5	Toll booth
13	179+765	9x5.5	Sütlüce Road
14	180+346	9x5.5	Sütlüce Road
15	183+105	12x5.5	A Class Road
16	185+770	7x5	C Class Road
17	189+783	12x5	A Class Road
18	0+232	12x5	Gelibolu North Junction connection road
19	145+028	12x5	Gelibolu North Junction connection road
20	1+879	12x5,5	Gelibolu South Junction connection road

Figure 2-12 ***Malkara-Çanakkale Motorway Section – sample of Underpasses (RC Box)***



2.3.1.5 *Tunnels*

There will be no tunnels in the Malkara-Çanakkale Section.

2.3.1.6 *Toll stations*

There are seven toll stations planned for the Malkara-Çanakkale Section, details are given below:

Table 2-7 *Malkara-Çanakkale Motorway Section Toll stations*

No.	Name	km
1	Malkara Junction Toll Station	107+760
2	Bolayir Evrese Junction Toll Station	147+386
3	Gelibolu North Junction Toll Station	162+648
4	Overhead Gantries Toll Collection Station	173+400
5	Overhead Gantries Toll Collection Station	180+640
6	Overhead Gantries Toll Collection Station	186+900
7	Çanakkale Junction 2	190+636

Figure 2-13 *Malkara-Çanakkale Motorway Section – Toll system*

2.3.1.7 *Service areas*

There are four Service areas/rest areas planned for the Malkara-Çanakkale Section, details are given below:

Table 2-8 *Malkara-Çanakkale Motorway serviceareas*

No	Location	Distance to previous rest area (km)	Area
1	113+500	13.1	50000 m²
2	140+500	27.0	160000 m²
3	175+2000	34.5	160000 m²
4	193+000	14	100000 m²

Service Area – Km 113 +500	(m²)
Total Area	50,000
Green areas	22,500

Asphalted surface	10,000
Parking Areas	13,500
KGM service building	1,500
Café+ restaurant	2,500

Service Area – km 140+500	**(m²)**
Total Area	160,000
Fueling Station (8x2 pumps + 420m2 market area)	6,000
Green areas	89,500
Asphalted surface	35,000
Parking Areas	24,500
KGM service building	2,500
Café+ restaurant	2,500

Service Area – km 175+000	**(m2)**
Total Area	160,000
Fueling Station (8x2 pumps + 420m2 market area)	6,000
Green areas	84,500
Asphalted surface	35,000
Parking Areas	24,500
KGM service building	2,500
Café+ restaurant	2,500
KGM Administrative Building	5,000

Service Area – km 193+000	**(m2)**
Total Area	100,000
Fueling Station (8x2 pumps + 420m2 market area)	6,000
Green areas	36,000
Asphalted surface	30,000
Parking Areas	23,000
KGM service building	2,500
Café+ restaurant	2,500

uring economic feasibility calculations of the Project, rental income from service areas is also assessed. **D Type:**

It is planned in this stage that each service area will be connected to public water supply.

In addition, there will be two Operation and Maintenance (O&M) areas:

Table 2-9 ***O&M areas for the project***

No	Location	Area Type
A	147+387	O&M Area, European Side
B	183+8220	O&M Area, Asian Side

Figure 2-14 Malkara-Çanakkale Motorway - Service and O&M areas

2.3.1.8 *Other Motorway construction information*

In addition to the structures aforementioned, construction of the Motorway involves building of 140 culverts and 5 retaining walls.

The general approach and structure of the motorway's pavement is described in the Figure 2-16 below.

Figure 2-15 *Malkara-Çanakkale Motorway – Sample of culvert and retaining walls*

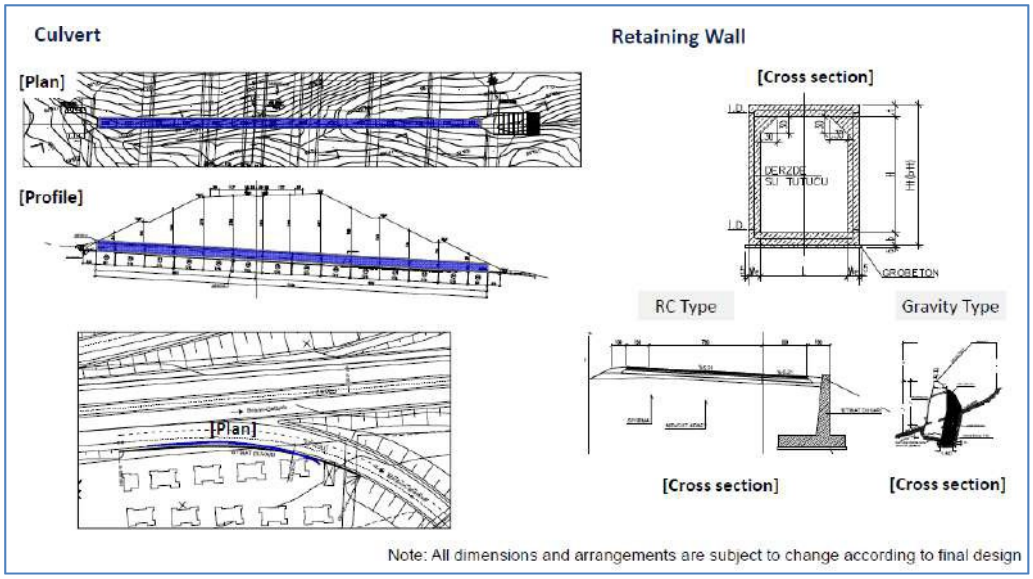
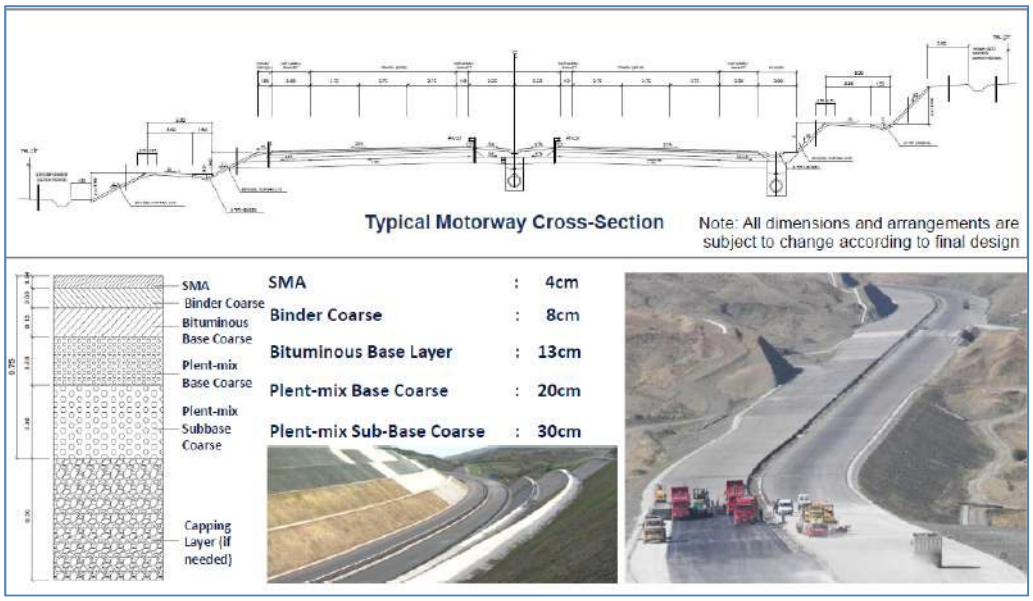


Figure 2-16 *Malkara-Çanakkale Motorway –Pavement structure*

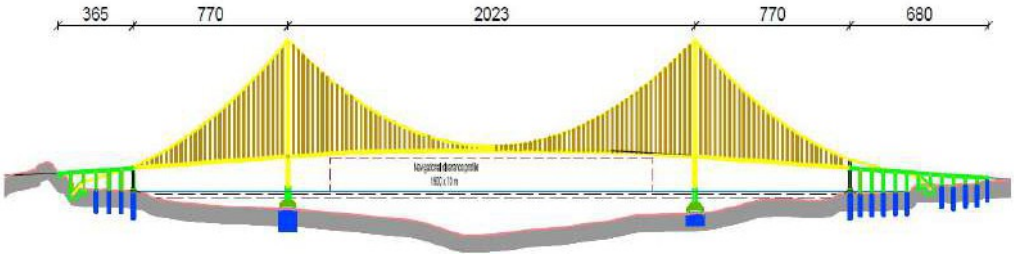


2.3.2 *Key Features of the 1915 Çanakkale Bridge*

An overview of the key Bridge elements is given below.The 1915 Çanakkale Bridge will be a suspension bridge to be built at the northern part of the Çanakkale Strait and will connect the European and Asian parts between Sütlüce and Lapseki.

The main design Works of the 1915 Canakkale Bridge will be accomplished by COWI. Offshore, nearshore and onshore geotechnical investigations were conducted in period May – August 2017, with laboratory tests results still ongoing.

Figure 2-17 *Representative Display of the Bridge*



With a planned mid-span length of 2023 m, the Bridge will be the longest suspension bridge in the world. There will be walkways to be used for maintenance on both sides of the bridge. The bridge platform will have a 44.8m width and a 3.5m height. The design life for 1915 Çanakkale Bridge will be 100 years.

Figure 2-18 *Overview of the 1915 Canakkale Bridge*

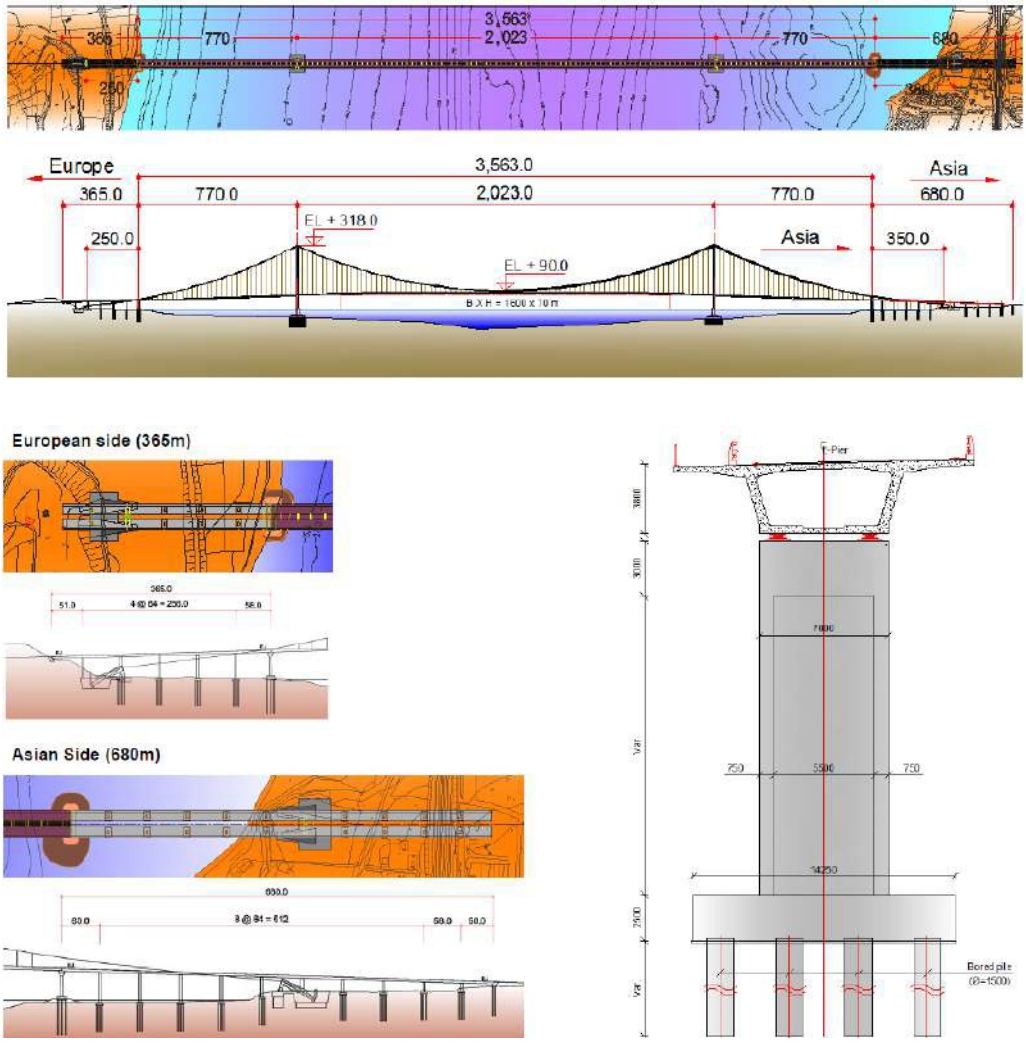
The preliminary design details of the Bridge are as shown in the following table and figure:

Table 2-10 *1915 Çanakkale Bridgecharacteristics*

Characteristics	Dimensions
Width of the Dardanelle Strait	3900 m
Main bridge	770 + 2,023 + 770 = 3,563m (6 Lane)
Approach bridge	European : 365m, Asian : 680m
Total Bridge Length	4608 m
Center Span	2023 m
Side Span:	2x770 m
Foundation	Caisson Type (Isolated)
Height of towers (above mean water level)	318 m
Tower type	H-Shape Steel Tower
Anchorage	Gravity Type Anchorage
Navigational clearance (width x height above water)	1600 m x 70 m
Deck	Twin box girder

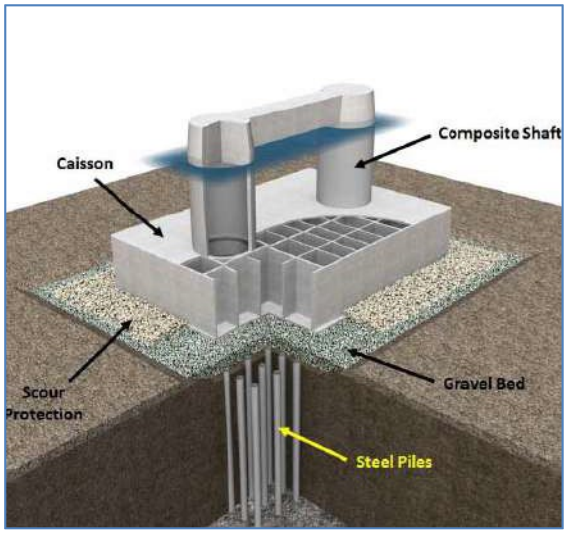
Cable	PPWS Cable
Cross Section	2x3 Lane / Traffic lane width min 3.65m / 1 Maintenance lane per direction of 3m
Design life	100 years
Design Code	International (Eurocode) / KGM Specifications

Figure 2-19 *1915 Canakkale Bridge – Plan and Profile*



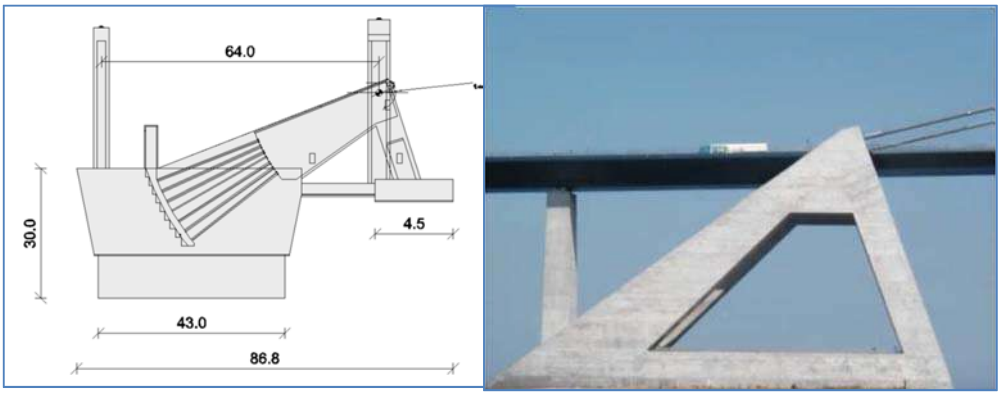
Tower foundation will be isolated, with the structure sitting on a gravel layer and improved ground. The caisson dimensions are designed to be 83.3 m x 74.0 m.

Figure 2-20 *1915 Canakkale Bridge – the tower foundation*



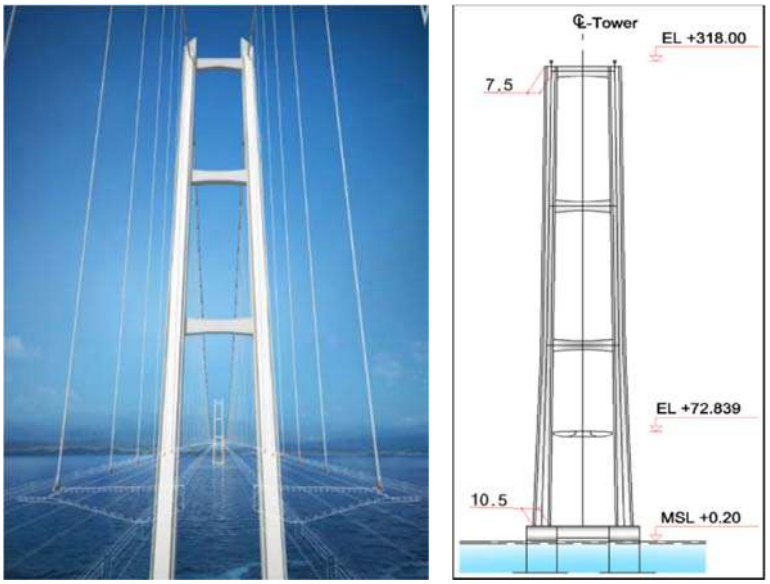
The Anchorage selected for the bridge is a gravity type, consisting of flat and massif block plus individual foundations for the two front legs (as shown in the Figure below)

Figure 2-21 *1915 Canakkale Bridge – the tower foundation*



The towers legs will be from steel (main steel grade S460), will have a high ductility capacity and will minimize the action forces in case of seismic events.

Figure 2-22 *1915 Canakkale Bridge – the towers legs*



The cables that will be used for the bridge construction will have the following characteristics:

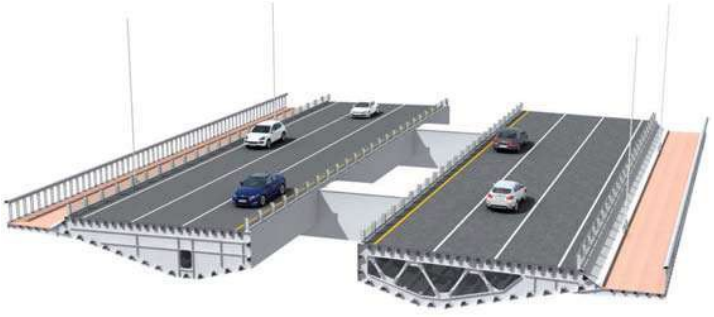
Table 2-11 *1915 Canakkale bridge - Cables characteristics*

Characteristics	Dimensions
Wire diameter	Φ5.75mm
Number of Strands	162 / 158
Tensile Strength	1960MPa
Void Ratio	19% / 17%

The deck will be made from steel and consist of twin box girder. The dimensions of the deck will be the following:

- Deck Width B = 45.06m
- Deck Height H = 3.50m
- Cross beam S = 24.00m

Figure 2-23 *1915 Canakkale bridge –overview of the deck*



A mainline toll plaza will be installed at the north end of the bridge, immediately south of Gelibolu South interchange.

2.3.3 Other Project Elements

During Construction phase there will be a number of temporary facilities erected, such as:

- construction camps
- compounds
- lay-down and storage areas
- concrete and asphalt plants.
- Batching plants
- Mechanic plants

2.4 CONSTRUCTION

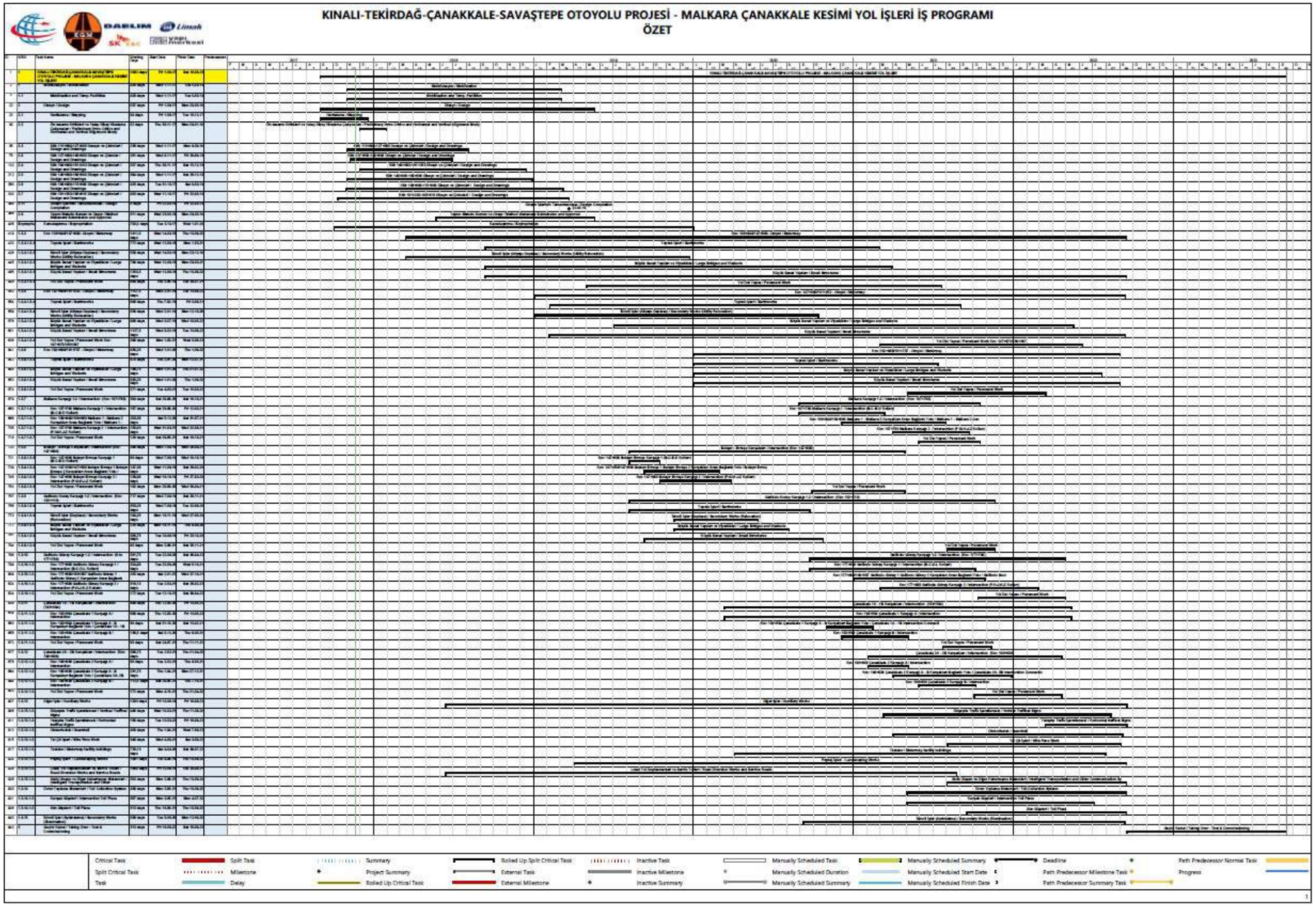
2.4.1 Overall Approach and Programme

Construction is currently estimated to last approximately 5,5 years. Details are provided in Figure 1-25 and Figure 1-26 below.

A "design freeze" means that no further changes can be made to the design. It is a cut off point for the engineers, because if they continue to change the design past a certain date, the Project will not be on time for the construction phase. For the purpose of the ESIA production, the Design Freeze was established at end of June 2017 for the bridge and end of July 2017 for the motorway.

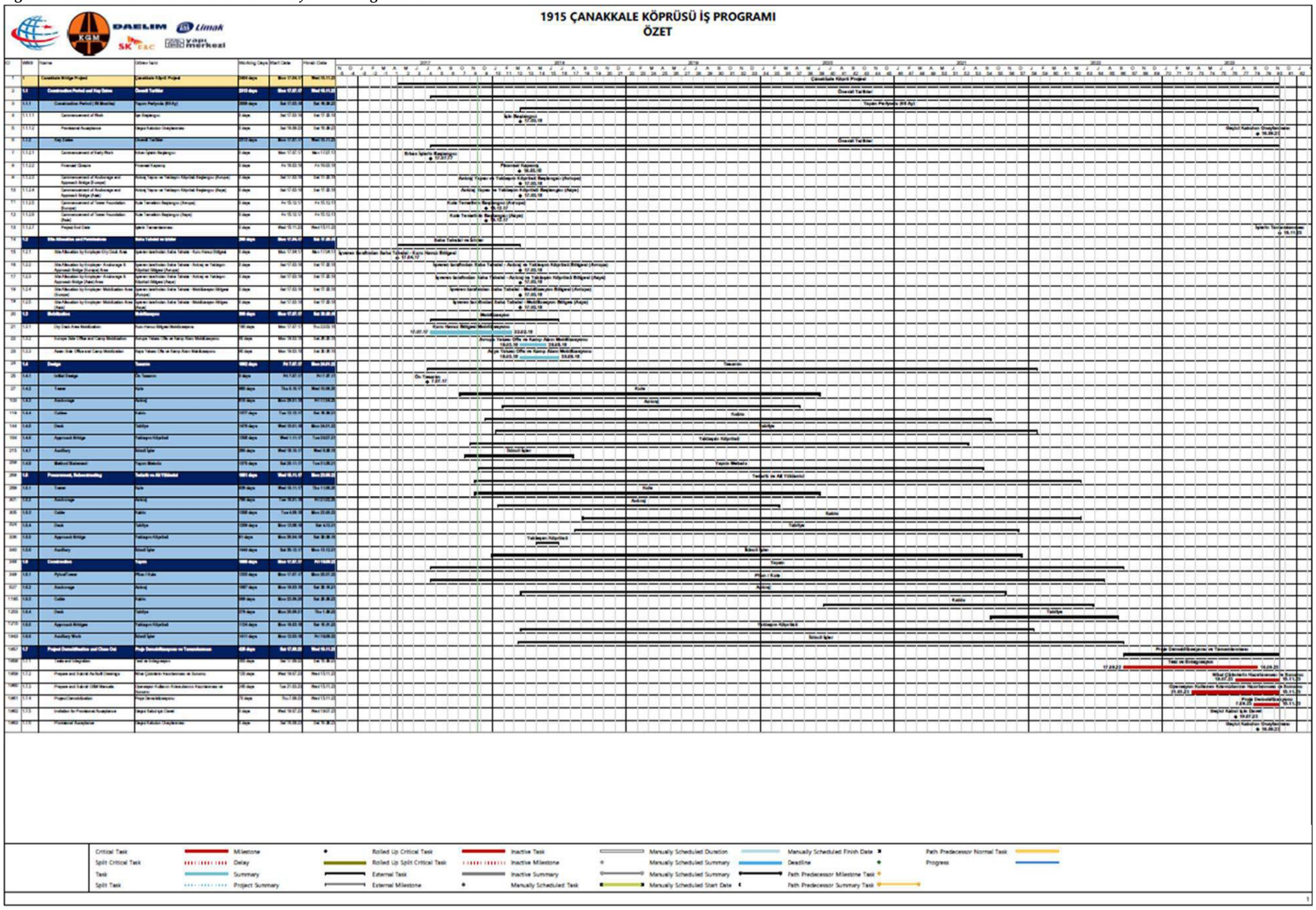
Excavated material is planned to be used in the filling operations wherever possible. When there is a surplus of excavated materials; excess material will need to be stored at designated storage areas. There will be usage of concrete, asphalt and additional filling materials which will be produced from borrow pits. More details are provided in Figure 1-27 below.

Figure 2-24 Indicative construction schedule for Motorway section



WBS	Task Name	Working Days	Start Date	Finish Date
1	Çanakkale Otoyol Projesi / Motorway Project	1893 days	Fri 01-09-17	Sat 16-09-23
1.1	Mobilizasyon / Mobilization	503 days	Wed 01-11-17	Mon 10-06-19
1.2	Dizayn / Design	548 days	Fri 01-09-17	Sat 01-06-19
1.3	Kamulaştırma / Expropriation	754 days	Fri 29-09-17	Mon 24-02-20
1.4	Km: 106+840/147+000- Otoyol / Motorway	1569 days	Tue 08-05-18	Wed 10-05-23
1.4.1	Toprak İşleri / Earthworks	962 days	Tue 06-11-18	Tue 30-11-21
1.4.2	İkincil İşler (Altyapı Deplase) / Secondary Works (Utility Relocation)	711 days	Tue 08-05-18	Wed 12-08-20
1.4.3	Büyük Sanat Yapıları ve Viyadükler / Large Bridges and Viaducts	1292 days	Tue 06-11-18	Tue 20-12-22
1.4.4	Küçük Sanat Yapıları / Small Structures	1413 days	Tue 06-11-18	Wed 10-05-23
1.4.5	Yol Üst Yapısı / Pavement Work	895 days	Thu 02-05-19	Wed 09-03-22
1.5	Km: 147+000/181+253 - Otoyol / Motorway	1226 days	Tue 26-02-19	Tue 24-01-23
1.5.1	Toprak İşleri / Earthworks	1002 days	Tue 02-04-19	Sat 11-06-22
1.5.2	İkincil İşler (Altyapı Deplase) / Secondary Works (Utility Relocation)	738 days	Tue 26-02-19	Sat 03-07-21
1.5.3	Büyük Sanat Yapıları ve Viyadükler / Large Bridges and Viaducts	750 days	Tue 27-08-19	Sat 15-01-22
1.5.4	Küçük Sanat Yapıları / Small Structures	1006 days	Tue 02-04-19	Thu 16-06-22
1.5.5	Yol Üst Yapısı / Pavement Work Km: 147+975/180+397	572 days	Mon 29-03-21	Tue 24-01-23
1.6	Km: 182+000/191+707 - Otoyol / Motorway	968 days	Tue 01-10-19	Tue 01-11-22
1.6.1	Toprak İşleri / Earthworks	651 days	Tue 25-02-20	Thu 24-03-22
1.6.2	Büyük Sanat Yapıları ve Viyadükler / Large Bridges and Viaducts	624 days	Tue 25-02-20	Mon 21-02-22
1.6.3	Küçük Sanat Yapıları / Small Structures	851 days	Tue 01-10-19	Fri 17-06-22
1.6.4	Yol Üst Yapısı / Pavement Work	413 days	Thu 08-07-21	Tue 01-11-22
1.7	Malkara Kavşağı 1-2 / Intersection (Km: 107+760)	502 days	Sat 08-05-21	Wed 14-12-22
1.7.1	Km: 107+760 Malkara Kavşağı 1 / Intersection (B-C-E-D Kolları)	155 days	Sat 08-05-21	Thu 04-11-21
1.7.2	Km: 106+840/109+000 Malkara 1 - Malkara 2 Kavşakları Arası Bağlantı Yolu / Malkara 1 - Malkara 2 Jun	265 days	Tue 01-06-21	Tue 05-04-22
1.7.3	Km: 107+760 Malkara Kavşağı 2 / Intersection (F-G-H-J-Z Kolları)	302 days	Wed 06-10-21	Thu 22-09-22
1.7.4	Yol Üst Yapısı / Pavement Work	165 days	Mon 06-06-22	Wed 14-12-22
1.8	Bolayır - Evreşe Kavşakları / Intersection (Km: 147+000)	775 days	Tue 01-10-19	Mon 21-03-22
1.8.1	Km: 147+000 Bolayır Evreşe Kavşağı 1 (B-C-E-D Kolları)	72 days	Tue 01-10-19	Sat 21-12-19
1.8.2	Km: 147+250/147+500 Bolayır Evreşe 1 Bolayır Evreşe 2 Kavşakları Arası Bağlantı Yolu / Bolayır Evreş	194 days	Tue 19-11-19	Tue 30-06-20
1.8.3	Km: 147+000 Bolayır Evreşe Kavşağı 2 / Intersection (F-G-H-J-Z Kolları)	187 days	Tue 03-03-20	Tue 06-10-20
1.8.4	Yol Üst Yapısı / Pavement Work	296 days	Sat 10-04-21	Mon 21-03-22
1.9	Gelibolu Kuzey Kavşağı 1-2 / Intersection (Km: 162+110)	1045 days	Tue 01-10-19	Mon 30-01-23
1.9.1	Toprak İşleri / Earthworks	491 days	Tue 01-10-19	Fri 23-04-21
1.9.2	İkincil İşler (Deplase) / Secondary Works (Relocation)	216.25 days	Fri 10-01-20	Fri 18-09-20
1.9.3	Büyük Sanat Yapıları ve Viyadükler / Large Bridges and Viaducts	312 days	Sat 11-01-20	Fri 08-01-21
1.9.4	Küçük Sanat Yapıları / Small Structures	486 days	Mon 04-11-19	Fri 21-05-21
1.9.5	Yol Üst Yapısı / Pavement Work	444 days	Tue 31-08-21	Mon 30-01-23
1.1	Gelibolu Güney Kavşağı 1-2 / Intersection (Km: 177+780)	559 days	Sat 24-04-21	Sat 04-02-23
1.10.1	Km: 177+880 Gelibolu Güney Kavşağı 1 / Intersection (B-C-D-L Kolları)	377 days	Sat 24-04-21	Thu 07-07-22
1.10.2	Km: 177+880/180+397 Gelibolu Güney 1 Gelibolu Güney 2 Kavşakları Arası Bağlantı Yolu / Gelibolu Sout	342 days	Thu 05-08-21	Wed 07-09-22
1.10.3	Km: 177+880 Gelibolu Güney Kavşağı 2 / Intersection (F-H-J-K-Z Kolları)	253 days	Mon 25-10-21	Mon 15-08-22
1.10.4	Yol Üst Yapısı / Pavement Work	299 days	Tue 22-02-22	Sat 04-02-23
1.11	Çanakkale 1A - 1B Kavşakları / Intersection (183+394)	841 days	Mon 02-03-20	Mon 07-11-22
1.11.1	Km: 183+394 Çanakkale 1 Kavşağı A / Intersection	362 days	Mon 02-03-20	Tue 27-04-21
1.11.2	Km: 183+394 Çanakkale 1 Kavşağı A - B Kavşakları Bağlantı Yolu / Çanakkale 1A - 1B Intersection Conn	113 days	Sat 02-01-21	Thu 13-05-21
1.11.3	Km: 183+394 Çanakkale 1 Kavşağı B / Intersection	170 days	Sat 06-02-21	Mon 23-08-21
1.11.4	Yol Üst Yapısı / Pavement Work	352 days	Thu 23-09-21	Mon 07-11-22
1.12	Çanakkale 2A - 2B Kavşakları / Intersection (Km: 190+636)	484 days	Wed 28-04-21	Sat 12-11-22
1.12.1	Km: 190+636 Çanakkale 2 Kavşağı A / Intersection	99 days	Wed 28-04-21	Fri 20-08-21
1.12.2	Km: 190+636 Çanakkale 2 Kavşağı A - B Kavşakları Bağlantı Yolu / Çanakkale 2A- 2B Intersection Conne	310 days	Sat 17-07-21	Wed 13-07-22
1.12.3	Km: 190+636 Çanakkale 2 Kavşağı B / Intersection	156 days	Wed 06-10-21	Tue 05-04-22
1.12.4	Yol Üst Yapısı / Pavement Work	207 days	Thu 17-03-22	Sat 12-11-22
1.13	Diğer İşler / Auxiliary Works	1020 days	Sat 25-04-20	Fri 28-07-23
1.13.1	Düşeyde Trafik İşaretlemesi / Vertical Traffical Signs	830 days	Sat 17-10-20	Mon 12-06-23
1.13.2	Yatayda Trafik İşaretlemesi / Horizontal traffical Signs	249 days	Wed 12-10-22	Fri 28-07-23
1.13.3	Otokorkuluk / Guardrail	580 days	Tue 13-07-21	Fri 19-05-23
1.13.4	Tel Çit İşleri / Wire Fens Work	472 days	Thu 09-12-21	Mon 12-06-23
1.13.5	Tesisler / Motorway facility buildings	786 days	Sat 23-01-21	Fri 28-07-23
1.13.6	Peyzaj İşleri / Landscaping Works	850 days	Tue 23-06-20	Fri 10-03-23
1.13.7	Lokal Yol Deplasmanları ve Servis Yolları / Road Diversion Works and Service Roads	900 days	Sat 25-04-20	Fri 10-03-23
1.13.8	Akıllı Ulaşım ve Diğer Haberleşme Sistemleri / Intelligent Transportation and Other Communication Sy	520 days	Sat 18-09-21	Wed 17-05-23
1.14	Ücret Toplama Sistemleri / Toll Collection System	521 days	Fri 24-09-21	Wed 24-05-23
1.14.1	Kavşak Gişeleri / Intersection Toll Plaza	448 days	Thu 09-12-21	Mon 15-05-23
1.14.2	Ana Gişeleri / Toll Plaza	521 days	Fri 24-09-21	Wed 24-05-23
1.15	İkincil İşler (Aydınlatma) / Secondary Works (Illumination)	700 days	Mon 09-11-20	Thu 02-02-23
1.16	Test, Kabul ve İşletmeye Alma / Test, Acceptance and Comisioning of the Works	365 days	Tue 19-07-22	Sat 16-09-23

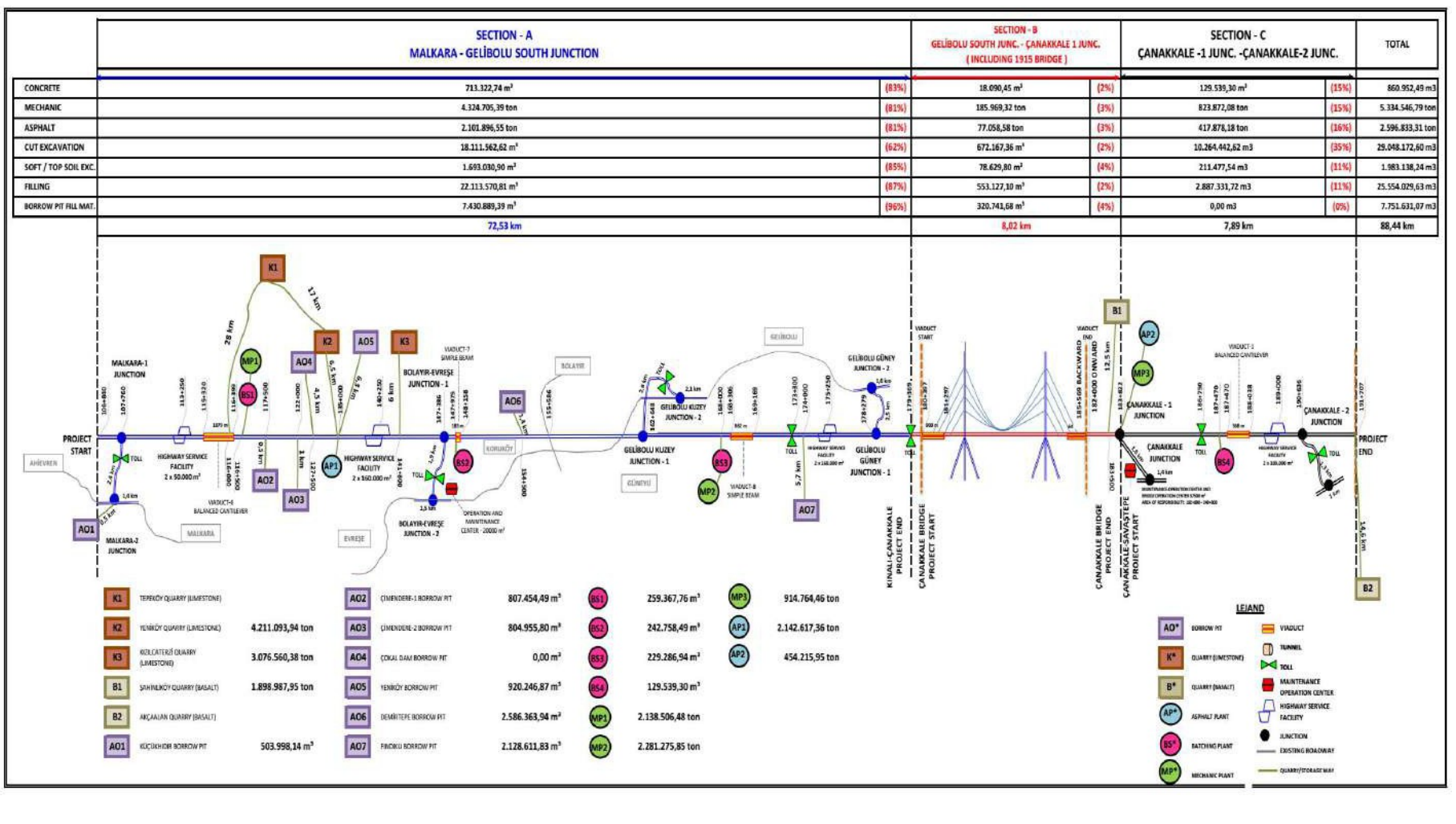
Figure 2-25 Indicative construction schedule for the Bridge section



WBS	Task Name	Duration	Start	Finish
1	**Canakkale Bridge Project**	**2344 days**	**Mon 17.04.17**	**Sat 16.09.23**
01-Jan	**Construction Period and Key Dates**	**2253 days**	**Mon 17.07.17**	**Sat 16.09.23**
01/01/2001	**Construction Period (66 Months)**	**2009 days**	**Sat 17.03.18**	**Sat 16.09.23**
1.1.1.1	Commencement of Work	0 days	Sat 17.03.18	Sat 17.03.18
1.1.1.2	Acceptance of Work	0 days	Sat 16.09.23	Sat 16.09.23
01/01/2002	**Key Dates**	**2253 days**	**Mon 17.07.17**	**Sat 16.09.23**
1.1.2.1	Commencement of Early Work	0 days	Mon 17.07.17	Mon 17.07.17
1.1.2.2	Financial Closure	0 days	Fri 16.03.18	Fri 16.03.18
1.1.2.3	Commencement of Anchorage and Approach Bridge (Europe)	0 days	Sat 17.03.18	Sat 17.03.18
1.1.2.4	Commencement of Anchorage and Approach Bridge (Asia)	0 days	Sat 17.03.18	Sat 17.03.18
1.1.2.5	Commencement of Tower Foundation (Europe)	0 days	Tue 16.01.18	Tue 16.01.18
1.1.2.6	Commencement of Tower Foundation (Asia)	0 days	Mon 1.01.18	Mon 1.01.18
1.1.2.7	Project End Date	0 days	Sat 16.09.23	Sat 16.09.23
01-Feb	**Site Allocation and Permissions**	**288 days**	**Mon 17.04.17**	**Sat 17.03.18**
01-Mar	**Mobilization**	**300 days**	**Mon 17.07.17**	**Sat 30.06.18**
01-Apr	**Design**	**1889 days**	**Fri 7.07.17**	**Fri 9.09.22**
01-May	**Procurement**	**1403 days**	**Mon 13.11.17**	**Thu 16.09.21**
01-Jun	**Construction**	**2162 days**	**Mon 17.07.17**	**Sat 17.06.23**
01/06/2001	**Pylon/Tower**	**1569 days**	**Mon 17.07.17**	**Wed 26.04.23**
1.6.1.1	**Tower Foundation**	**413 days**	**Mon 1.01.18**	**Wed 7.08.19**
1.6.1.2	**Caisson**	**713 days**	**Mon 17.07.17**	**Tue 24.12.19**
1.6.1.3	**Tower Erection**	**932 days**	**Wed 25.12.19**	**Wed 26.04.23**
01/06/2002	**Anchorage**	**1248 days**	**Mon 19.03.18**	**Thu 9.06.22**
1.6.2.1	**Europe Side**	**1248 days**	**Mon 19.03.18**	**Thu 9.06.22**
1.6.2.2	**Asia Side**	**1248 days**	**Mon 19.03.18**	**Thu 9.06.22**
01/06/2003	**Cable**	**706 days**	**Tue 24.11.20**	**Mon 27.03.23**
1.6.3.1	Tower Saddle	10 days	Tue 24.11.20	Wed 9.12.20
1.6.3.2	Temporary Structure Installation	25 days	Thu 10.12.20	Thu 21.01.21
1.6.3.3	Pull Back System	22 days	Fri 22.01.21	Wed 24.02.21
1.6.3.4	Pilot Rope	15 days	Thu 25.02.21	Tue 23.03.21
1.6.3.5	Hauling System	30 days	Thu 10.06.21	Mon 19.07.21
1.6.3.6	Catwalk System Rope	20 days	Wed 24.03.21	Tue 20.04.21
1.6.3.7	Catwalk System	25 days	Wed 21.04.21	Fri 21.05.21
1.6.3.8	Gallows Frame on Catwalk System	15 days	Sat 22.05.21	Wed 9.06.21
1.6.3.9	**Main Cable Installation (North)**	**121 days**	**Tue 20.07.21**	**Wed 15.12.21**
1.6.3.10	**Main Cable Installation (South)**	**121 days**	**Tue 20.07.21**	**Wed 15.12.21**
1.6.3.11	Dismantling of PPWS System	10 days	Thu 16.12.21	Wed 29.12.21
1.6.3.12	Compaction	62 days	Thu 30.12.21	Fri 11.03.22
1.6.3.13	Dismantling of Cross Bridge Etc	10 days	Sat 12.03.22	Wed 23.03.22
1.6.3.14	Cable Band	25 days	Thu 24.03.22	Thu 21.04.22
1.6.3.15	Hanger Rope	20 days	Fri 22.04.22	Sat 14.05.22
1.6.3.16	Wire Wrapping	35 days	Mon 3.10.22	Fri 11.11.22
1.6.3.17	Rubber Wrapping & Coaking	25 days	Fri 21.10.22	Fri 18.11.22
1.6.3.18	Hand Rope	30 days	Sat 19.11.22	Fri 23.12.22
1.6.3.19	Dismantling of Temp Structure	55 days	Sat 24.12.22	Sat 25.02.23
1.6.3.20	Erection of Tower Tip Cover	10 days	Mon 27.02.23	Thu 9.03.23
1.6.3.21	Installation of Water Proof Cover	15 days	Fri 10.03.23	Mon 27.03.23
01/06/2004	**Deck**	**329 days**	**Sat 14.05.22**	**Fri 2.06.23**
1.6.4.1	Lifting Gantries Installation	30 days	Sat 25.03.23	Sat 29.04.23
1.6.4.2	Unhindered Access	0 days	Sat 14.05.22	Sat 14.05.22
1.6.4.3	**Deck Erection by Floating Crane**	**20 days**	**Mon 16.05.22**	**Tue 7.06.22**
1.6.4.4	**Deck Erection by Lifting Gantry**	**100 days**	**Wed 8.06.22**	**Sat 1.10.22**
1.6.4.5	**Deck Welding**	**75 days**	**Wed 31.08.22**	**Fri 25.11.22**
1.6.4.6	Deck Painting	40 days	Sat 26.11.22	Wed 11.01.23
1.6.4.7	Hydraulic Buffers	30 days	Sat 14.01.23	Sun 12.02.23
1.6.4.8	Fire Hydrant System	60 days	Sat 31.12.22	Fri 10.03.23
1.6.4.9	Drainage System	60 days	Sat 31.12.22	Fri 10.03.23
1.6.4.10	Maintenance Vehicles	180 days	Sat 1.10.22	Sat 29.04.23
1.6.4.11	Bearing & Expansion Joint	30 days	Sat 26.11.22	Fri 30.12.22
1.6.4.12	Pavement	61 days	Mon 27.02.23	Mon 8.05.23
1.6.4.13	Crash Barrier	60 days	Sat 25.03.23	Fri 2.06.23
01/06/2005	**Approach Bridges**	**1274 days**	**Mon 19.03.18**	**Sat 9.07.22**
1.6.5.1	**Sub-structure (Europe Side)**	**658 days**	**Mon 19.03.18**	**Mon 15.06.20**
1.6.5.2	**Sub-structure (Asia Side)**	**596 days**	**Mon 19.03.18**	**Fri 3.04.20**
1.6.5.3	**Super-structure (Euro Side)**	**346 days**	**Tue 16.06.20**	**Sat 24.07.21**
1.6.5.4	**Super-structure (Asia Side)**	**398 days**	**Wed 31.03.21**	**Sat 9.07.22**
01/06/2006	**Auxiliary Work**	**1646 days**	**Mon 12.03.18**	**Sat 17.06.23**
1.6.6.1	Temporary Wharf (Europe Side)	60 days	Mon 2.04.18	Sat 9.06.18
1.6.6.2	Temporary Wharf (Asia Side)	60 days	Mon 12.03.18	Sat 19.05.18
1.6.6.3	**Electrical Works**	**120 days**	**Sat 10.12.22**	**Sat 29.04.23**
1.6.6.4	**Mechanical Works**	**439 days**	**Thu 2.12.21**	**Sat 29.04.23**
1.6.6.5	Landscaping Works	90 days	Sat 10.12.22	Sat 25.03.23
1.6.6.6	Final Inspection	15 days	Fri 2.06.23	Sat 17.06.23
01-Jul	**Tests & The Studies for Acceptance and Handover**	**365 days**	**Sat 17.09.22**	**Sat 16.09.23**

Figure 2-26 Raw materials & construction works for the Project

	SECTION - A MALKARA - GELİBOLU SOUTH JUNCTION		SECTION - B GELİBOLU SOUTH JUNC. - ÇANAKKALE 1 JUNC. (INCLUDING 1915 BRIDGE)		SECTION - C ÇANAKKALE -1 JUNC. -ÇANAKKALE-2 JUNC.		TOTAL
CONCRETE	713.322,74 m³	(83%)	18.090,45 m³	(2%)	129.539,30 m³	(15%)	860.952,49 m3
MECHANIC	4.324.705,39 ton	(81%)	185.969,32 ton	(3%)	823.872,08 ton	(15%)	5.334.546,79 ton
ASPHALT	2.101.896,55 ton	(81%)	77.058,58 ton	(3%)	417.878,18 ton	(16%)	2.596.833,31 ton
CUT EXCAVATION	18.111.562,62 m³	(62%)	672.167,36 m³	(2%)	10.264.442,62 m3	(35%)	29.048.172,60 m3
SOFT / TOP SOIL EXC.	1.693.030,90 m³	(85%)	78.629,80 m³	(4%)	211.477,54 m3	(11%)	1.983.138,24 m3
FILLING	22.113.570,81 m³	(87%)	553.127,10 m³	(2%)	2.887.331,72 m3	(11%)	25.554.029,63 m3
BORROW PIT FILL MAT.	7.430.889,39 m³	(96%)	320.741,68 m³	(4%)	0,00 m3	(0%)	7.751.631,07 m3
	72,53 km		8,02 km		7,89 km		88,44 km



2.4.2 *Infrastructure Relocation*

A number of infrastructure components are located in the planned right of way of the Motorway and Bridge and need to be relocated. In coordination with relevant authorities the following types of infrastructure will be relocated as needed:

- High and medium voltage transmission lines
- Electrical station
- Low transmission lines and illumination
- Gas pipelines
- Telephone and internet cables
- Water and Sewer pipes
- Ditches
- Irrigation channels and pounds

The details of exactly which infrastructure facilities are relocated (and when and how) will be elaborated in the future detailed designs by the main construction contractor.

Relocating infrastructure is likely to incur impacts on the public and businesses. The EPC Contractor will identify potential impacts on communities and businesses from these relocation works and identify measures to avoid, minimise or otherwise mitigate impacts and their effects. In line with COK's Stakeholder Engagement Plan and with the ESIA's Commitments Register, the affected communities and businesses will be informed in advance of any disruption to services.

2.4.3 *Early works*

Certain early construction works are required to be initiated before the actual start of the Project construction stage, and before the completion of the full Environmental and Social Impact Assessment package.

The early construction works to be performed consist of:

- Dry dock;
- Wet dock;
- Caisson;
- Dredging and Piling;

The Project including the early works is executed through a series of contracts with suppliers, for the provision of certain equipment and materials, and with

engineering, procurement and construction (EPC) Contractor for the execution of Project construction in the host countries.

The caissons built at the dry and wet docks will be then transferred to the final location of the 1915 Canakkale Bridge.

The construction workforce required for the early works execution will vary between 50 staff during dry dock sheet piles driving and excavation and 200 staff for the construction of the caisson.

2.4.3.1 *Dry Dock Works Activities*

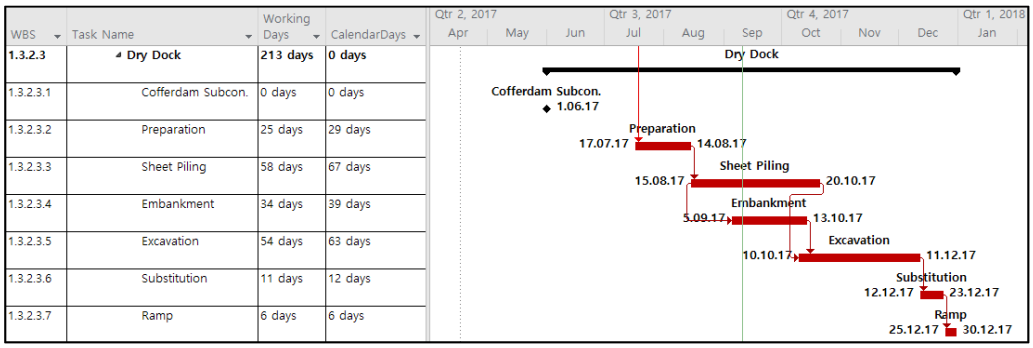
The dry dock area is part of a wider construction camp (that will be maintained throughout the entire Project construction stage) and includes construction offices and facilities for workers accommodation, canteen, fuel and construction materials storage and parking area. The total construction camp and dry dock area is approximately 6.2 ha, of which the dry dock itself occupies approximately 4.2 ha. The access to the site from the E87 motorwayis ensured through an existing unpaved road to be widened from 3 to 6 m as part of the Project. Construction works associated with ensuring the access to the dry dock area are not involving rerouting of any xisting utilities lines.

A summary of the main construction stages of the dry dock is presented below:

- Vegetation removal at the dry dock site area;
- Sheet piles installation and embankment works;
- Excavation and grading to required levels and sub - grade preparations;
- Access ramp construction;
- Stock piling of the suitable excavated soil for back-filling;
- Sheet piles extraction and dismantling.

The dry dock execution will result in the excavation of 314,000 m^3 of soil on a total area of approximately 40,000 m^2.
The construction phase of the dry docks was commenced in August 2017 based on a detailed design completed by the EPC Contractor.

Figure 2-27 Schedule for dry docks works



WBS	Task Name	Working Days	CalendarDays
1.3.2.3	Dry Dock	213 days	0 days
1.3.2.3.1	Cofferdam Subcon.	0 days	0 days
1.3.2.3.2	Preparation	25 days	29 days
1.3.2.3.3	Sheet Piling	58 days	67 days
1.3.2.3.4	Embankment	34 days	39 days
1.3.2.3.5	Excavation	54 days	63 days
1.3.2.3.6	Substitution	11 days	12 days
1.3.2.3.7	Ramp	6 days	6 days

A Batch, an Asphalt Plant and a Stone Crusher will be temporary installed on the European and Asian sides at a location that will be established at a later stage by the Main EPC Contractor.

The main dry dock components and location are represented in the figure below.

Figure 2-28 Dry Dock locationplan

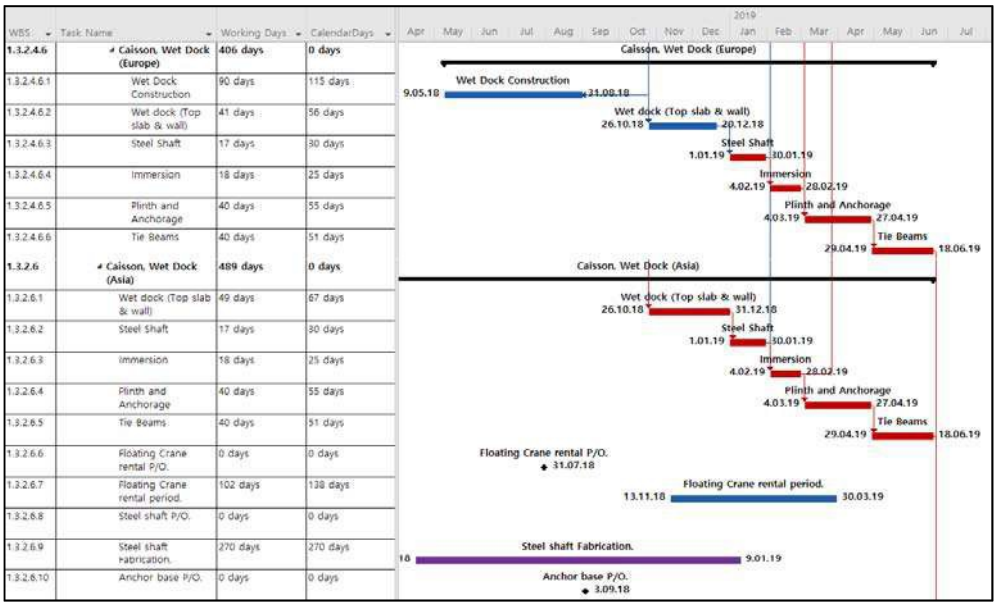
2.4.3.2 Wet Dock and Caisson Works Activities

The construction methodology proposed by the EPC Contractor for the wet dock works comprises the following activities:

- Pilling;
- Deck construction;
- Jetty construction;
- Caisson construction.

Main equipment required for the execution of these works include pile driving equipment, trailers, tower cranes and welding machines. The estimated total area required for the wet dock is 6,000 m^2.

Figure 2-29 *Schedule for the Wet Dock and Caisson construction and operation activities*



WBS	Task Name	Working Days	CalendarDays
1.3.2.4.6	Caisson, Wet Dock (Europe)	406 days	0 days
1.3.2.4.6.1	Wet Dock Construction	90 days	115 days
1.3.2.4.6.2	Wet dock (Top slab & wall)	41 days	56 days
1.3.2.4.6.3	Steel Shaft	17 days	30 days
1.3.2.4.6.4	Immersion	18 days	25 days
1.3.2.4.6.5	Plinth and Anchorage	40 days	55 days
1.3.2.4.6.6	Tie Beams	40 days	51 days
1.3.2.6	Caisson, Wet Dock (Asia)	489 days	0 days
1.3.2.6.1	Wet dock (Top slab & wall)	49 days	67 days
1.3.2.6.2	Steel Shaft	17 days	30 days
1.3.2.6.3	Immersion	18 days	25 days
1.3.2.6.4	Plinth and Anchorage	40 days	55 days
1.3.2.6.5	Tie Beams	40 days	51 days
1.3.2.6.6	Floating Crane rental P/O.	0 days	0 days
1.3.2.6.7	Floating Crane rental period.	102 days	138 days
1.3.2.6.8	Steel shaft P/O.	0 days	0 days
1.3.2.6.9	Steel shaft Fabrication.	270 days	270 days
1.3.2.6.10	Anchor base P/O.	0 days	0 days

Location of the wet and dry dock is represented in the figure below:

Figure 2-30 *WetDock location plan*

2.4.3.3 *Dredging and Piling Works Activities*

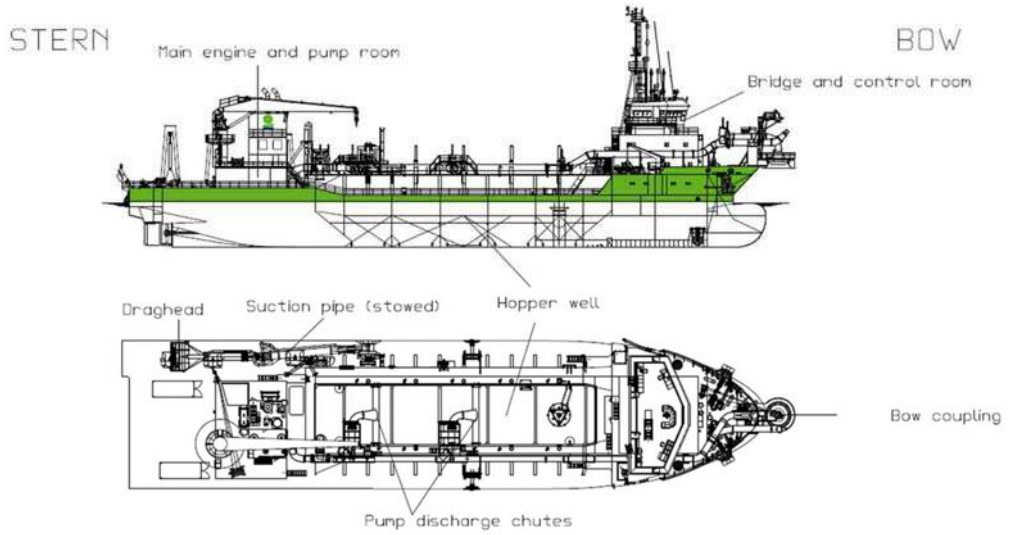
Construction methodology for this activity is presented in the following steps:

- Dredging;
- Pile driving;
- Gravel bedding; and

- Submerging.

A Trailing Suction Hopper Dredger (TSHD) is a self-propelled vessel which can dredge while sailing, thus filling its hopper well, and which can transport the dredged material. In this chapter the typical work cycle of a TSHD is described for dredging and dumping in the disposal area. The important features of the Trailing Suction Hopper Dredger are shown in the picture below:

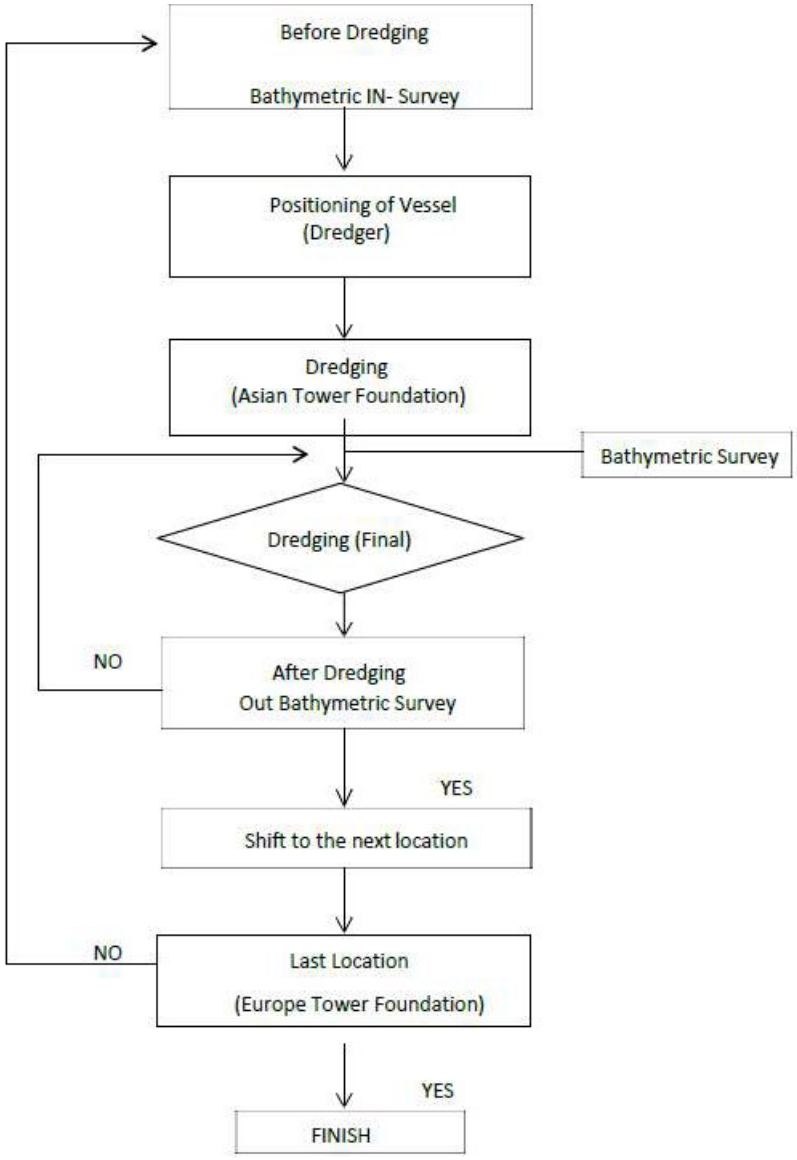
Figure 2-31 *Main features of a Trailing Suction Hopper Dredger (TSHD)*



The TSHD has the following characteristic main components, namely:
a) the trailing suction pipe(s) with a draghead & sometimes an underwater pump;
b) the hull housing a.o. the hopper well & the main engine and pump room(s), navigation
equipment and accommodation;
c) the optional equipment such as bow coupling system, degassing equipment.

A typical TSHD cycle for direct dumping consists of the following activities:
a) Sailing empty to borrow area
b) Dredging in borrow area
c) Sailing loaded to discharge area
d) Emptying hopper well (discharging cargo by opening bottom valves).

Figure 2-32 TSHD dredging works for tower foundations – flow chart



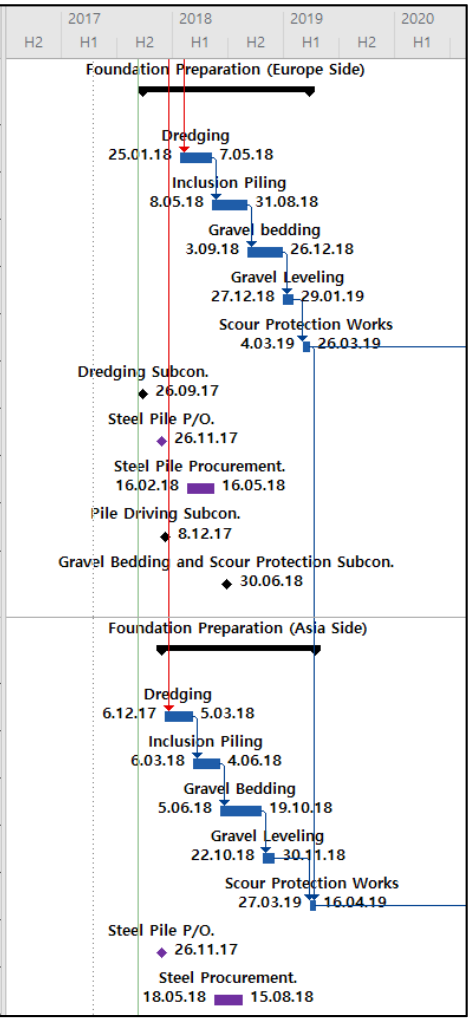
The Trailing Suction Hopper Dredger travels between sites by its own power. If the method of dredged material disposal is by dumping at sea, the dredger is usually self-contained and ready to begin work immediately upon arrival at the work site. In practice, formalities such as customs and immigration controls may be necessary. It may also be necessary to change crew, take on bunkers. Most often, position fixing and tide level measurement instrumentation will have to be installed and/or calibrated.

The contact with the seawater will occur only during the dredging and the pile driving works execution. Total excavated area will be approximately 31,000 m^2 and a volume of soil of approximately 103,000 will be removed.

The schedule for the execution of the dredging and piling works is presented below.

Figure 2-33 *Schedule for dredging and piling activities*

WBS	Task Name	Working Days	CalendarDays
1.3.2.1	**Foundation Preparation (Europe Side)**	**547 days**	**0 days**
1.3.2.1.1	Dredging	69 days	103 days
1.3.2.1.2	Inclusion Piling	91 days	116 days
1.3.2.1.3	Gravel bedding	81 days	115 days
1.3.2.1.4	Gravel Leveling	19 days	34 days
1.3.2.1.5	Scour Protection Works	15 days	23 days
1.3.2.1.6	Dredging Subcon.	0 days	0 days
1.3.2.1.7	Steel Pile P/O.	0 days	0 days
1.3.2.1.8	Steel Pile Procurement.	90 days	90 days
1.3.2.1.9	Pile Driving Subcon.	0 days	0 days
1.3.2.1.10	Gravel Bedding and Scour Protection Subcon.	0 days	0 days
1.3.2.2	**Foundation Preparation (Asia Side)**	**507 days**	**0 days**
1.3.2.2.1	Dredging	57 days	90 days
1.3.2.2.2	Inclusion Piling	66 days	91 days
1.3.2.2.3	Gravel Bedding	109 days	137 days
1.3.2.2.4	Gravel Leveling	27 days	40 days
1.3.2.2.5	Scour Protection Works	15 days	21 days
1.3.2.2.6	Steel Pile P/O.	0 days	0 days
1.3.2.2.7	Steel Procurement.	90 days	90 days



2.4.3.4 *Remediation Works*

The dry dock will be a temporary construction that will be dismantled at the end of construction stage and the area reinstated to the initial conditions using the soil and materials excavated at the initial construction stages as backfilling materials.

Both the Batch Plants and the wet dock are designed as temporary structures and will be dismantled at the end of construction.

Caissons and piles will be permanently submerged in the sea.

2.4.4 *Bridge*

2.4.4.1 *Bridge construction stage*

Bridge Construction stages are the following, also presented in the figures below:

1. Tower foundation
    - Dredging on foundation location

- Driving of Inclusion Piles
- Levelling Operation of Gravel Bed
- Towing of Caissons
- Immersion of Caisson
- Complete the Caisson work

2. Anchor the Block/Tower
    - Embankment in front of anchorage and levelling
    - Ground Improvement (for Europe anchorage only)
    - Installation of Diaphragm Wall
    - Excavation with Ring Beam supporting
    - Checking wall stability
    - Gravel replacement
    - Checking foundation stability
    - Construction of Bottom slab and walls
    - Construction of Top slab/Chamber
    - Installation of PT / T-anchorage
    - Check T-anchorage position
    - Shed concreting & Completion
3. Catwalk installation
    - Install the suspended system including working floor
4. Install the cables and the hanger rope
    - Install the Main Cable with PPWS Cable (wire bundle)
5. Deck erection
    - Deck is created on land and pushed onto the bridge posts with hydraulic jacks
    - Procurement / Delivery (girder fabrication, Loading & Transportation, Storage & Transport Erection Point)
    - Suspended part (floating crane, lofting device)
    - Key segment (set back system, closing girder erection)
    - Site Joint (temporary connection, permanent connection)
6. Completion the bridge
    - Surface Treatment
    - Pavement

Figure 2-34 *Bridge construction stages – tower foundation*

Figure 2-35 *Bridge construction stages – anchor block/tower*

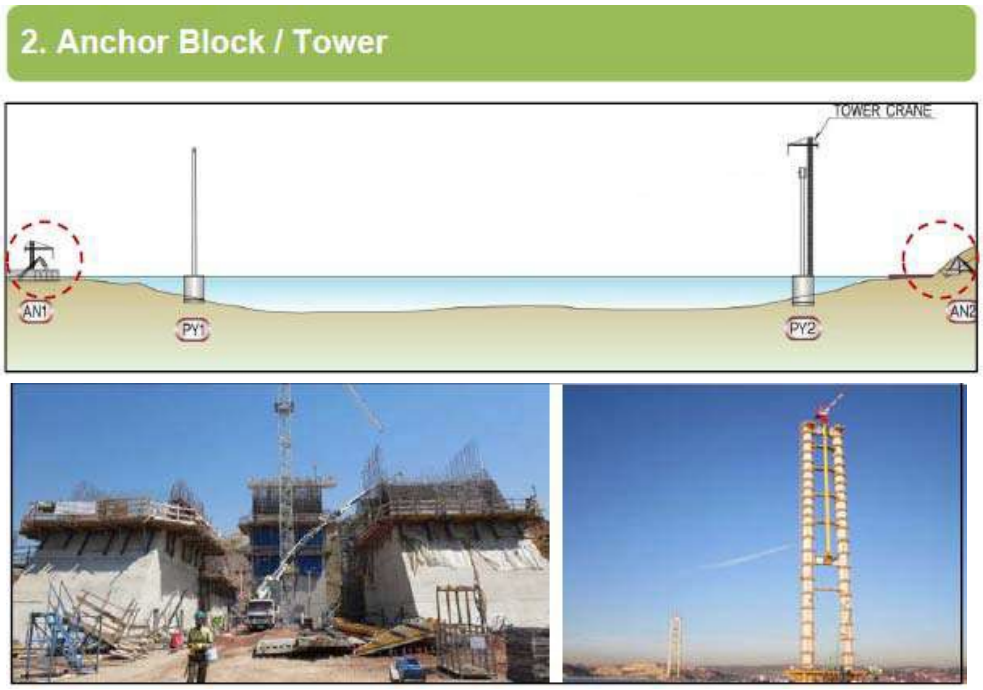


Figure 2-36 Bridge construction stages – catwalk installation

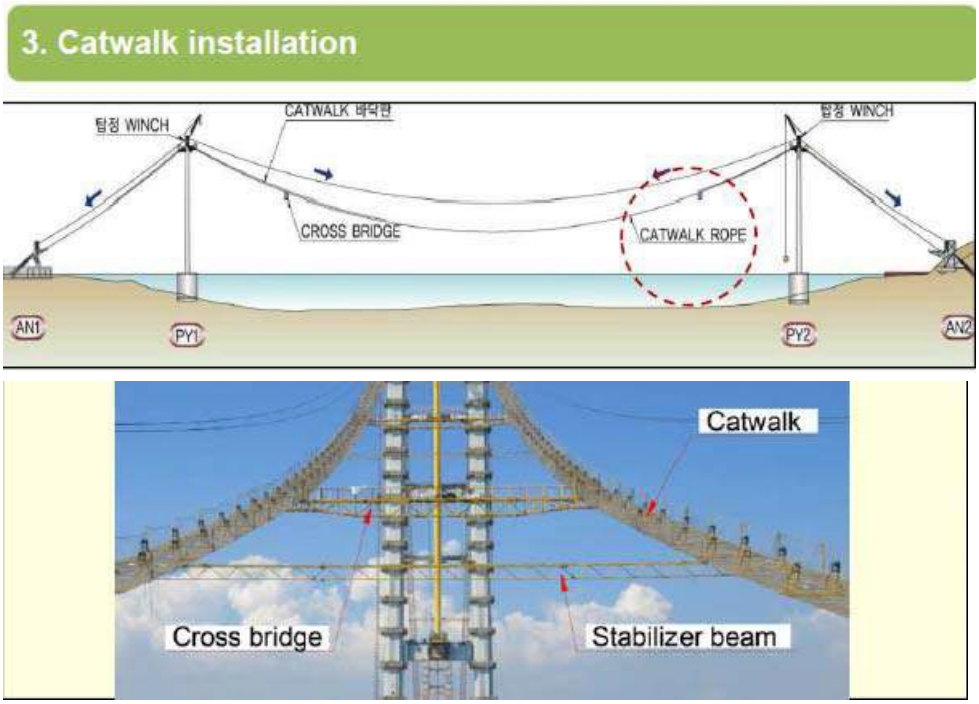


Figure 2-37 Bridge construction stages – install the cables & the hanger rope

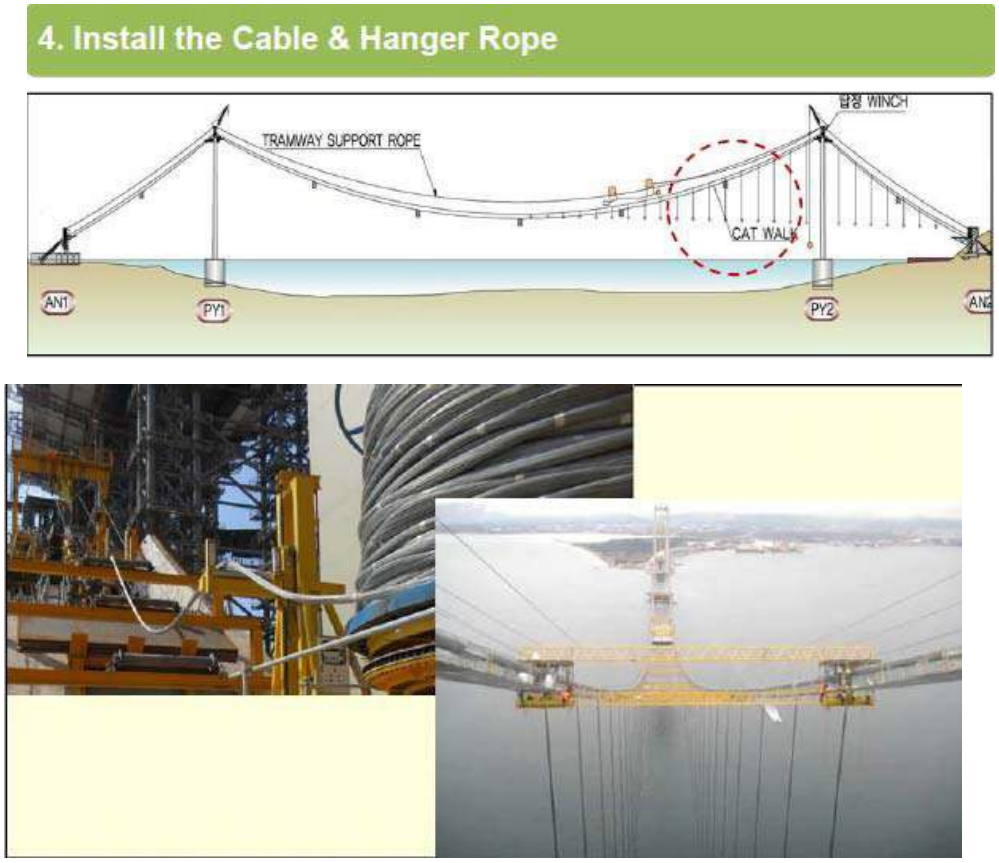


Figure 2-38 ***Bridge construction stages – deck erection***

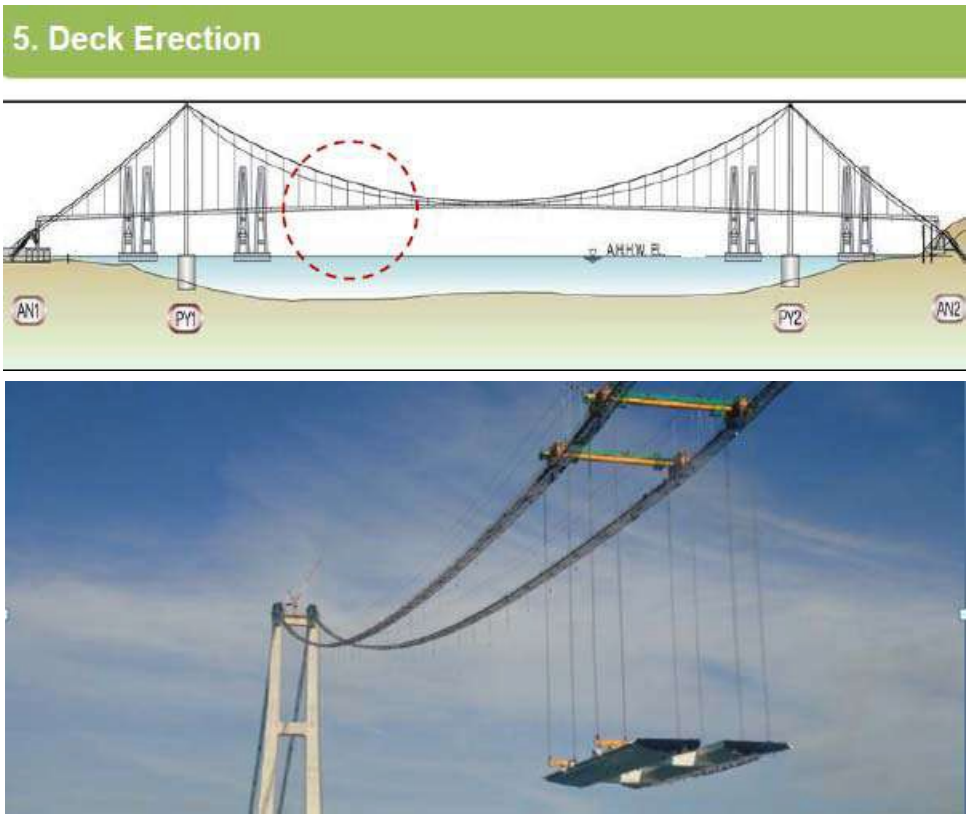


Figure 2-39 ***Bridge construction stages – completion of the bridge***

2.4.4.2 *Raw materials for the bridge*

The estimation of the construction materials that are necessary for construction of the bridge is the following:

Table 2-12 ***The raw materials quantity of major elements for 1915 Canakkale Bridge***

Clasiffication	Main Quantity	Unit
Suspension Bridge	38000	tones

Structural Steel	125000	tones
Concrete	483000	tones

2.4.4.3 *Equipment and machinery for the bridge*

The table below presents the estimative machineries and equipment necessary for the bridge construction, as is presented in the Construction method

Table 2-13 List of estimative machineries and equipment

Makine ve Ekipman Listesi / *Machinery and Equipment List*					
Activity	**No.**	**Makine ve Ekipman Cinsi /** *Type of Machinery or Equipment*	**Gücü/Kapasitesi** *Power/Capacity*	**Adet /set** *Pcs./set*	**Satın Alma / Leasing / Kiralama** *Owned / Leasing / Rent*
Common Equipment	1	Fork Lift	10ton	2	Rent
	2	Crawler Crane	300ton	2	Rent
	3	Truck Trailer	100ton	1	Rent
	4	Cargo Crane	15ton	2	Rent
	5	WATER TRUCK	20000LTR	2	Rent
	6	Barge	3000p	4	Rent
	7	Tug Boat	1000hp	1	Rent
	8	Anchor Boat	750hp	1	Rent
	9	Communication Boat	60 pax	2	Rent
Tower Foundation	10	Grab Bucket Dredger	7m³	1	Rent
	11	Setting Barge	6000 P	1	Rent
	12	Hydraulic Hammer	Delmag-200 or MHU 400	2	Rent
	13	Gravel Bedding Machine		1	Rent
	14	Immersion and Water Ballasting Facilities		1	Rent
Tower	15	Hoist	2ton	4	Rent
	16	Floating Crane	1200ton	2	Rent
	17	Tower Crane	60ton	2	Rent
Cable	18	Single Generl Winch	5ton, Φ18mm	4	Rent
	19	Single Generl Winch	10ton, Φ25mm	8	Rent
	20	Double General Winch	10ton, Φ25mm	4	Rent
	21	Driving Winch	37ton, Φ40mm	4	Rent
	22	Rope Unreeler	7ton, Φ40mm	4	Rent
	23	Compaction Machine	250ton, 6jaw	4	Rent
	24	Wrapping Machine	Dia 1,000mm	8	Rent
	25	Reeling Machine	O-wire (3mm)	4	Rent
Deck	26	Floating Crane	1200ton	1	Rent
	27	SPMT (Transporter)	1500ton	1	Rent
	28	Lifting Device	400ton	6	Rent
Viaduct	29	Crawler Crane	700ton	2	Rent
	30	Concrete Pump Car		3	Rent
	31	Drilling Rig	BG 50	1	Rent
	32	Vibro Hammer (2 Clamp)	150 KW	1	Rent
	33	Service Crane	100 ton	1	Rent
	34	Excavator	1 m3	4	Rent
Anchorage	35	Trench Cutter (BC Cutter)		2	Rent
	36	Bentonite Treatment Facilities		2	Rent
	37	S.C.W Equipment	3-Axis	1	Rent
	38	Excavator		4	Rent
	39	Dump Truck		5	Rent
	40	Concrete Pump Car		3	Rent
Dry Dock & Caisson	41	Tower Crane	24 Ton	4	Rent
	42	Long Boom Backhoe Dredger		1	Rent
	43	Excavator	1 m3	8	Rent
	44	Dump Truck		20	Rent
	45	Concrete Pump Car		10	Rent

2.4.4.4 *Bridge's Maintenance*

The maintenance of suspension bridge has been planned at the design stage of bridge. In order to secure more than 100 years of bridge life, the following maintenance works are considered: firstly corrosion and fatigue

protection is applied to main structures and secondly, various measurement equipment are planned which make maintenance of bridge easy and accurate. Especially main cable is planned using zinc coated wire, 3mm wire wrapping, elastomeric wrapping and dehumidification to protect corrosion.

Figure 2-40 *Planned maintenance works for the bridge*

Structure		Maintenance Item
Foundation	Steel Pile	Sacrificial corrosion thickness applied
	Composite Shaft	Anode Cathodic Protection
Tower	Steel	Paint Exterior & Interior
	Tower Saddle	Dehumidification
	Facility	Inside Lift Car, Maintenance Ladder
Cable	Inside	Zinc Coated Wire, Dehumidification
	Outside	3mm of Wire Wrapping + Elastomeric Wrapping
	Facility	Cable Inspection Car
Bridge Deck	Inside	Dehumidification, Painting
	Outside	Painting
	Facility	Maintenance Traveler (Outside) and Inspection Car (Inside)
Anchorage	Chamber	Dehumidification
Overall Bridge	Accident Protect	CCTV/ Wind Warning Sign
	Warning Light	Aerial Vehicles / Navigation / Fog
	Measurement	All data collecting and recording system
	BMS	Bridge Maintenance System

2.4.4.5 *Bridge's Lightning*

Road lightning: High pressure sodium lamp has been proposed considering that it is a long-lived light source which is the most excellent in the aspect of lumen against power dissipation, favorable in the aspect of maintenance management, suitable for expressways, and has a high transparency in fog.

Aerial Vehicles Warning Light: The bridge will be provided with a combination of high, medium, and low luminosity. Luminosity of warning light (flashing white light type) at Tower Top will ensure the safety of Aircraft

Aesthetic Lighting

The blue color which is the national color of Turkey was selected as the main theme color in the outdoor lighting. Display direction was set to symbolize the miracle of the blue eye that sees the history, the present and the future of Republic of Turkey.

Through various lights including strong colored lights representing gun salutes as well as muted noble lighting, the display can be changed to differentiate itself during normal times and during events.

Other lightning

Depending on the results of the shearwater surveys (See Biodiversity Section) floodlights in the supporting towers basis and extra lightning on the main supporting cables will be considered. The former will also serve as warning for passing naval traffic.

Figure 2-41 *1915 Canakkale Bridge - Main night scenery*

2.4.4.6 *Marine Traffic Safety*

Buoys are positioned in the waters to mark the working area and a navigation channel for the public sea traffic. The locations of buoys will be determined in detailed design stage to secure the navigation channel.

Construction marine vessels have a responsibility to stay well clear of large vessels. They are prohibited from impeding the passage of big ships in channels.

In order to prevent from collision with other vessels within project area or vicinity with 3rd party vessels, following measures need to be carried out:

- Use correct navigation aids.(update chart, GPS, radar, etc.)
- Continuous radio-watch
- Each operation have to be reported to Port Authority, proper communication and each vessel passing or crossing keep distance and should slow down.

- Respect the applicable shipping trade regulations; navigation control, correct signing, lighting and signalisation.
- Be aware of the strong and treacherous currents; assisting tug is available for critical manoeuvres.
- All vessels utilized on site shall be in good and sound condition.
- Vessels shall make sure that the access to the channel / sailing route / traffic lane is clear before entering
- Proper communication with other vessel and with the port authorities.

According to the Marine safety for Tower Foundation procedure, the management action and strategies for underwater noise are the following:

- Noise levels in the water shall be measured and necessary mitigation measures shall be taken to reduce the noise level to allowable limits;
- The high-level noise activities shall be initially started with low noise (soft start) to allow that nearby fauna escapes from the region;
- Peak Sound Pressure Levels (SPL) during off-shore construction activities (piling etc.) shall be monitored to ensure that they do not exceed the 206-dB peak threshold for harm to fish at 10 meters distance. Thus, noise is unlikely to adversely affect the sea life commonly sighted in Dardanelle Sea. To minimize noise impact;
- High maintenance standard of equipment. Engines and thrusters shall be continually maintained to minimize underwater noise and vibrations;
- Will be limited to 23:00-05:00 the hours of operation;
- If porpoises or dolphins are detected within 500 m of the piling (before sheet piling operation or during sheet piling operation), operations will not be commenced;
- Piles will drive when the current is reduced in areas of strong current to minimize the number of fish exposed to adverse levels of underwater sound.

2.4.5 Motorway construction

Typical construction activities will include site clearance works; excavation and movement of spoil; embankment construction; construction of the various elements of the Motorway (main Motorway, access roads, viaducts, bridges, underpasses, 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.).

Table 2-14 General components of a main construction site

• **Accommodation and other**	
Foreman dormitories/wards	Car park area and greenery
Workers dormitories	Supervision buildings
Social areas/facilities	Units for technicians
Office buildings	Infirmary

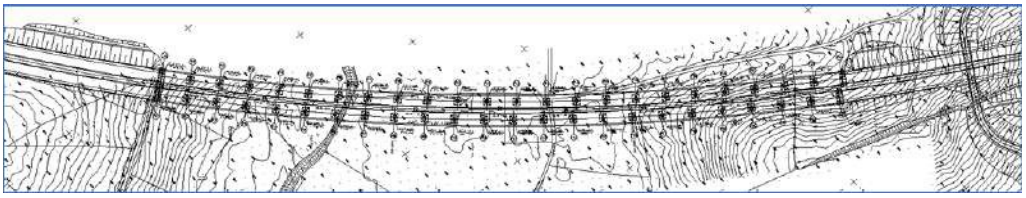
Canteen	Guardhouse
Laundry - places of worship – canteen	Emergency assembly area
	Playground (basketball, football)
• **Construction Facilities**	
Aggregates storage	Manufacturing plant for prefabricated beams
Concrete production unit	Hot and cold mix area
Laboratory	Machine park with storage, workshop, loading room, recreation – maintenance, waste (non-solid) basin, storage area for oxygen tubes
Storage area of pre-stressed beams	
• **Supply Facilities**	
Generator	Transformer building
Lightning system	Antenna area
Drinking water tank	Wastewater treatment plant
Storage area for hazardous goods	Storage tank for fuels
Waste storage areas	Hazardous wastes storage area

The components will vary on the needs of the relevant Section and location. The table below provides all information which is currently available for the planned construction sites.

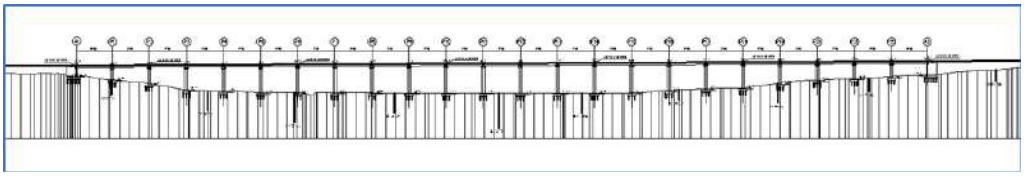
Conventional construction techniques and methodology will be used for the Road Section. For the large viaducts in this section, incremental launching method is planned to be used. Viaduct's construction works will take the following steps:

- Ground works of foundations;
- Piling works ;
- Pouring lean concrete;
- RC works of foundations;
- RC works of Piers and Abutments;
- Installation of Prestressed Beams;
- Approach slap construction;
- Deck construction;
- Water insulation works;
- Backfilling;
- Finishing & Accessories.

Plan drawing of KM: 168+750 – Viaduct



Profile drawing of KM: 168+750 – Viaduct



Cross section drawing of KM: 168+750 – Viaduct

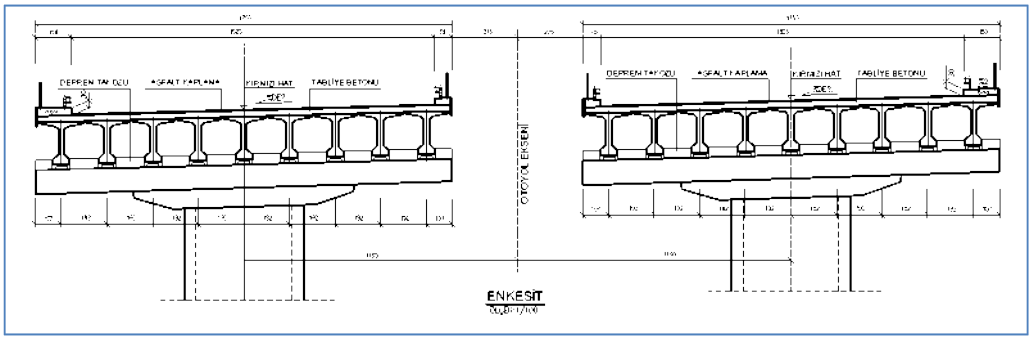
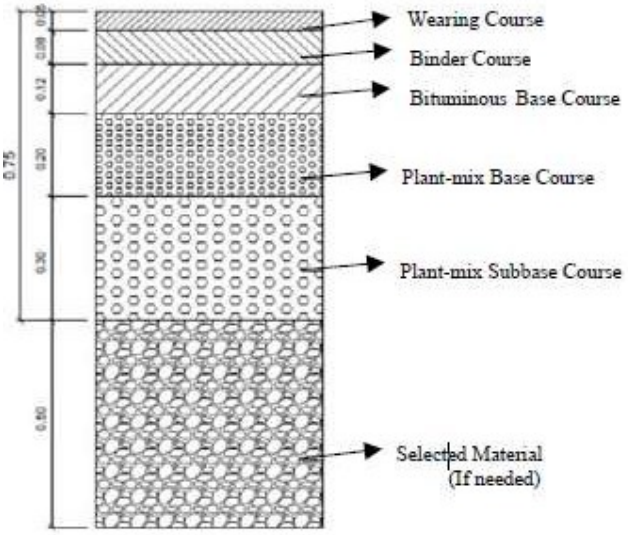


Figure 2-42 *Incremental Launching Method (Illustrative Example)*

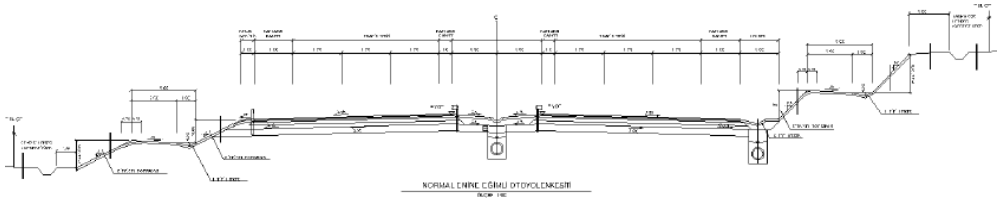
After the completion of earthworks, pavement works will start from the level of subgrade. Thicknesses of each layer are the following:



Pavement Layers

Pavement works will respect the following steps:

- Plant-mix subbase construction
- Base construction
- Bituminous base construction
- Binder Course
- Wearing Course



Drainage works starts at the beginning of the earthwork activity and it lasts untill the finish date of the pavement activity.

2.4.6 Construction Equipment

The general construction equipment used for all sections is provided in the following three tables. The assumed maximum equipment load needed for one single work location is described below each table, to give an impression of how many vehicles and equipment will be used in peak work times.

The table below shows an estimate of the total quantities of major earth-work equipment types that will be employed for the construction of the roadway. It is assumed that on one earthwork work site, a maximum of 2 dozers, 4 excavators, 2 loaders, 6 trucks, 1 grader, 2 rollers, and 1 water spraying machine will run at the same time.

For the quarries it is planned to use approximately 10 crushers, of which some will be used for several quarries at different times. The crushers will have different capacities ranging from 200 ton/hour to 400 ton/hour.

It is foreseen to use one asphalt plant (typical capacity of 240 ton/hour) and 15 mechanical plants (500 ton/hour) also at different locations and different time. In addition, one mobile crusher (capacity 150 ton/hour) and one mobile mechanical plant (capacity 400 ton/hour) will be used if needed.

TThe concrete will be prepared in an estimated one concrete plant located on the Motorway (149+000) and transported with trans-mixers to be placed no later than 1 hour after its production. One mobile plant will be used if necessary. Additionally concrete plants which serve the Bridge construction will also be used. Across the Project approximately 450.000 m³ of concrete will be needed.

Table 2-15 Estimated Earth Work and Quarries Equipment

WORK DESCRIPTION	MACHINERY DESCRIPTION	QUANTITY
EARTH WORKS	MERCEDES 4145K 8X4 + HİDROSANER 24M3 DUMP TRUCK	154.00
	CATERPILLAR D7E CRAWLER DOZER	5.00
	CATERPILLAR D8T CRAWLER DOZER	6.00
	CATERPILLAR 336D2L CRAWLER EXCAVATOR	9.00
	CATERPILLAR 349D2L CRAWLER EXCAVATOR	17.00
	CAT 950H RUBBER-WHEELED LOADER	4.00
	CATERPILLAR 966H RUBBER-WHEELED LOADER	4.00
	MERCEDES 3342K + DOGAN TANKER 20.000L - WATER TRUCK	5.00
	CATERPILLAR 140M MOTOR GREYDER	6.00
	CATERPILLER CS74B SOIL COMPACTOR	10.00
QUARRY	GELEN MAKİNA 550 T/H MECHANICAL PLANT	4.00
	ATLAS COPCO SMARTROC T35 - DRILLING MACHINE	4.00
	CATERPILLAR 966H RUBBER-WHEELED LOADER	2.00

Source: COK, December 2017

Table 2-16 Estimated Excavation and filling-laying- compaction Equipment

Name of Equipment	Performance (m3/h)	Fuel Consumption (lt/h)	Work Environment
Caterpillar 349d2l Crawler Excavator	75 m³/sa	44.00	Excavation in Rock
Caterpillar D8t Crawler Dozer	300 m³/sa	33.20	Excavation in Rock
Caterpillar 140m Motor Greyder	600 m³/sa	14.60	Excavation in Rock
Atlas Copco Smartroc T35	150 m³/sa	18.93	Excavation in Rock
Caterpillar 349d2l Crawler Excavator	122 m³/sa	44.00	Excavation in Soft Ground
Caterpillar D8t Crawler Dozer	300 m³/sa	33.20	Excavation in Soft Ground
Caterpillar 140m Motor Greyder	600 m³/sa	14.60	Excavation in Soft Ground
Caterpillar D7e Crawler Dozer	300 m³/sa	26.00	Filling - Laying - Compaction
Caterpillar 140m Motor Greyder	600 m³/sa	14.60	Filling - Laying - Compaction
Caterpiller Cs74b Soil Compactor	300 m³/sa	14.18	Filling - Laying - Compaction
Mercedes 3342k + Tanker 20.000l	600 m³/sa	7.30	Filling - Laying - Compaction

Source: COK, December 2017

Table 2-17 Estimated equipment for asphalt and concrete works

WORK DESCRIPTION	MACHINERY DESCRIPTION	QUANTITY
ASPHALT WORKS	HAMM HD+140VV TANDEM ROLLER	4.00
	HAMM GRW280-12 PNEUMATIC ROLLER	5.00
	VOGELE SUP1900-3 ASPHALT PAVER PALLETIZED FINISHER	2.00
	VOGELE SUP2100-3 ASPHALT PAVER PALLETIZED FINISHER	3.00
	MERCEDES 3342K + OKUR ASPHALT SPREADER	2.00
	BENNINGHOVEN ECO 3000/240 ASPHALT PLANT	2.00
CONCRETE WORKS	MERCEDES 3342B + IMER 10M3 MIXER TRANSMIXER	28.00
	MERCEDES 3342K + PUTZMEISTER BSF 36-4.16H CONCRETE PUM	4.00
	MERCEDES 3342K + KARDELEN KD90000K6KL4 TRUCK CRANE	3.00
	SEMIX TURKMOBIL 100G MOBILE CONCRETE PLANT	4.00
	IVECO MP720E42 LOW-BED TRUCK	2.00

Source: COK, December 2017

2.4.7 *Temporary Construction Areas*

The general labor accommodation will be in a secure area located close to site. The camp will provide necessary sleeping and sanitary facilities. This facility will commensurate with the local requirements and will comply to all local standards and regulations. It will be totally self-sustainable with regards to power, fresh water and waste disposal. The complete site establishment will be monitored by company personnel.

There will be three camp areas for the project, two for bridge, and one for the motorway:

- one camp is located at Dry Dock area and has a capacity to accommodate 1000 people;
- one camp is located on Asian side of the bridge alignment. The camp has a capacity to accommodate 500 workers;
- one camp is for motorway and is located in European side, close to the location with one of the service area (km 149+000) Koruköy , with 400 –500 people capacity.

Figure 2-43 *Plan of the Dry dock construction camp*

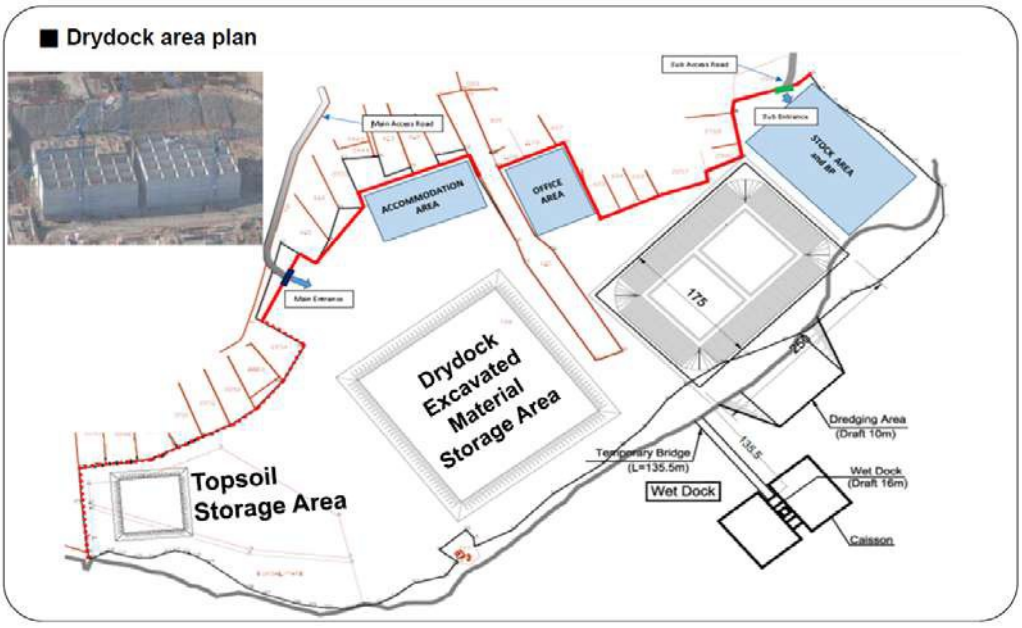


Figure 2-44 *Overview of the Asian camp for the bridge*

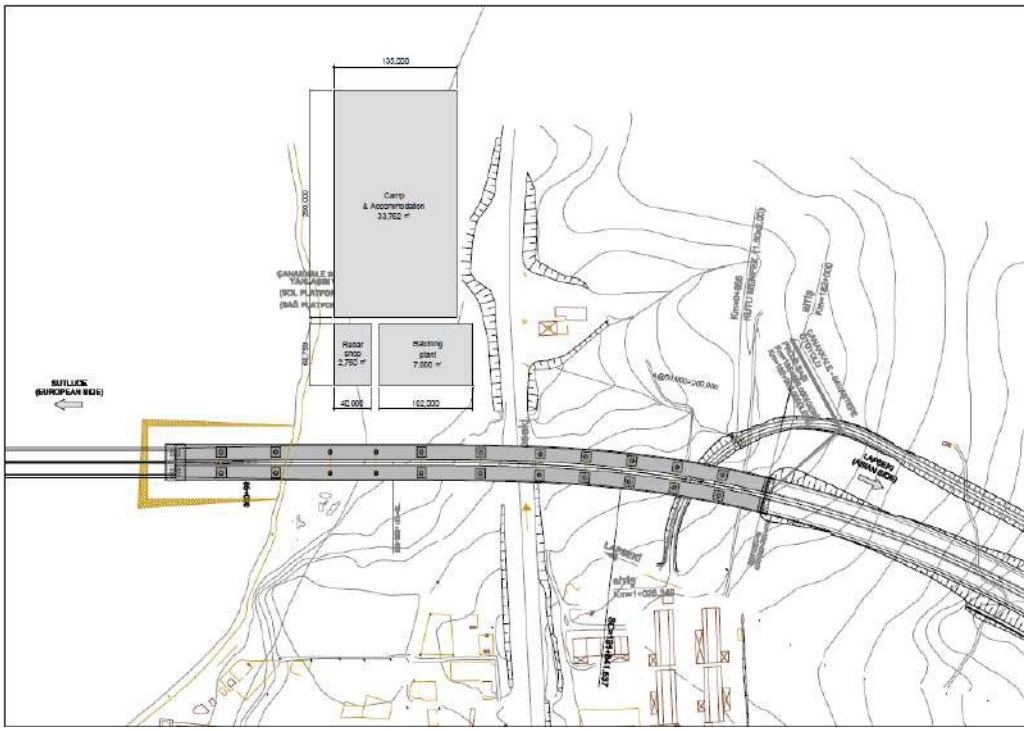


Figure 2-45 *Koruköy camp for the motorway section*

2.4.8 *Resource Requirements, Soil Disposal and Waste*

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 motorway and partly re-used as fill material. Additionally, a large quantity of dredging materials will results from the construction works for the bridge. This will be subject to extensive laboratory tests before being deposit in areas that will be indicated by authorities.

The Quarries that will be used and the other associated facilities (e.g power lines, substations, sewerage networks, sewerage/ wastewater treatment facilities , as well as detaile information on waste management (ie. which waste disposal facilities will be used) will be determined at later stages of the Project after a pre-approval from authorities.

Quantities and sources of materials used in construction, estimate of cut and fill balance, spoil generation and disposal, other wastes (demolition etc)

Figure 2-46 ***Rough estimation of the materials necessary for the Project***

	SECTION - A MALKARA - GELİBOLU SOUTH JUNCTION		SECTION - B GELİBOLU SOUTH JUNC. - ÇANAKKALE 1 JUNC. (INCLUDING 1915 BRIDGE)		SECTION - C ÇANAKKALE -1 JUNC. -ÇANAKKALE-2 JUNC.		TOTAL
CONCRETE	713.322,74 m³	(83%)	18.090,45 m³	(2%)	129.539,30 m³	(15%)	860.952,49 m3
MECHANIC	4.324.705,39 ton	(81%)	185.969,32 ton	(3%)	823.872,08 ton	(15%)	5.334.546,79 ton
ASPHALT	2.101.896,55 ton	(81%)	77.058,58 ton	(3%)	417.878,18 ton	(16%)	2.596.833,31 ton
CUT EXCAVATION	18.111.562,62 m³	(62%)	672.167,36 m³	(2%)	10.264.442,62 m3	(35%)	29.048.172,60 m3
SOFT / TOP SOIL EXC.	1.693.030,90 m³	(85%)	78.629,80 m³	(4%)	211.477,54 m3	(11%)	1.983.138,24 m3
FILLING	22.113.570,81 m³	(87%)	553.127,10 m³	(2%)	2.887.331,72 m3	(11%)	25.554.029,63 m3
BORROW PIT FILL MAT.	7.430.889,39 m³	(96%)	320.741,68 m³	(4%)	0,00 m3	(0%)	7.751.631,07 m3

2.4.9 Temporary Traffic Management

Due to the early design stage for the motorway, the information available in terms of construction related traffic is limited. However, it is foreseen to face temporary changes in management of other road traffic; diversions, road closures etc.

Depending on the type of the roads, permits will be required in a later stage to obtain the required approvals from the KGM or relevant municipalities.

2.4.9.1 On-Site Construction Traffic Management

In the current Project stage, the details of the on-site traffic are still being planned, and will be incorporated within the Transport Control and Site Access Procedure (TCSAP). The traffic procedures will include a wide range of measures such as drivers trainings, appropriate signing, speed limits, clear right-of-way, etc. These Procedures are designed to minimize the risk of accidents, emissions and noise due to traffic during both construction and operation phases. The Transport Control and Site Access Procedure apply to both on-site and off-site traffic and will be updated by COK's EPC contractor prior to the main start of construction.

2.4.9.2 Off-site Traffic Management during Construction

The traffic control during construction of the Motorway and its approach roads is still under planning and it will be in full accordance with KGM's Technical Specifications Section 154: *Traffic Control during Construction, Maintenance and Repair Works*, as well as the relevant Lender Requirements (listed in *section 4 below*). This Section 154 defines clearly responsibilities and sets-up standards with respect to signing, width of lanes, storing of construction equipment, maintenance and the experience of the traffic safety responsible. Further it sets up a Transport Control and Site Access Procedure which ensures recording of any issue and weekly safety meetings. The TCSAP will cover both on-site and off-site traffic management.

The TCSAP requires that appropriate warning and information signs during construction will be set up to indicate the construction work in progress with reflective signs and/or flashing lights, required for night visibility. The installation and maintenance of signs, signals, and other devices will be used to regulate traffic, including posted speed limits as appropriate, warnings of sharp turns, or other special road conditions.

Any adverse conditions, accidents and/or illegitimate incident will be recorded and monitored by the personnel in charge of traffic management during the construction phase.

The obligations under the TCSAP will contain, inter allia:

- Prevention and control of construction traffic related injuries and fatalities will be included in the adoption of safety measures that are protective of project workers and of road users, including those who

are most vulnerable to road traffic accidents, as required by the IFC General EHS Guidelines: Community Health and safety. The Project commits to follow these standards, which will be part of the Transport Control and Site Access Procedure, such as :Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project;

- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.;
- Minimizing pedestrian interaction with construction vehicles;
- Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present;
- Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns);
- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents;
- Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities such as worker camps close to project sites and arranging worker bus transport to minimizing external traffic;
- Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions.

2.4.10 Construction Employment

The construction workforce required for the Early Works execution will vary between 100 staff during dry dock sheet piles driving and excavation and 200 staff for the construction of the caisson.

The construction workforce for construction of the bridge is estimated to range between 1400 and 1700, while for the motorway's construction there will be employed approximate 1000 people. These figures include EPC staff plus the subcontractor's workforce.

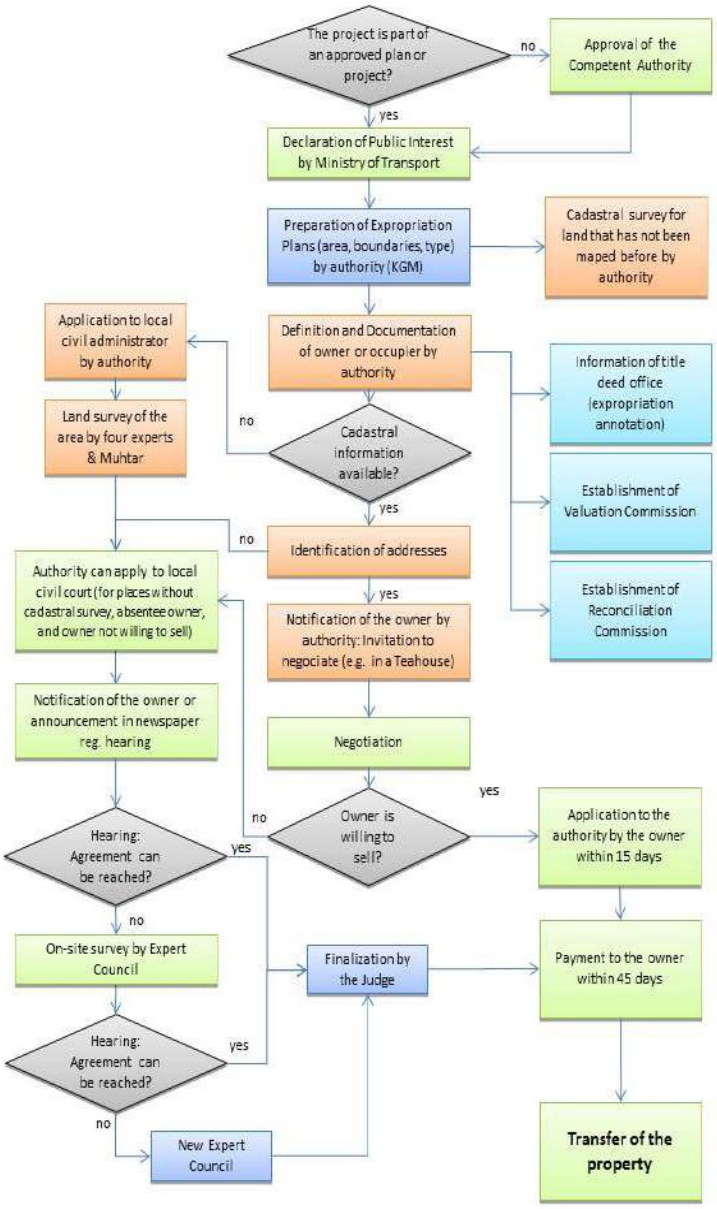
Around 250 personnel are expected to be employed during the early works phase, and approximately 1,000 on average and near 1.900 during peak times during the construction phase.[1] The workers will be mainly from Turkey's closest region. The subcontractors will be motivated and encouraged to prioritize hiring local people especially for the job position which are suitable for non-skilled personnel (e.g. administrative support, cleaning, canteen & accommodation, security guards, drivers, some operators, unskilled workers etc).

1 Deloitte, *Economic Impact of Canakkale 1915 Bridge and Motorway Project,* draft report, 23 August 2017

2.4.11 *Expropriation*

Expropriation plans are being to be carried out by KGM, based on the expropriation plans and properties evaluation which have been prepared as per the basic design documents, by following a compensation procedure similar with the one below:

Figure 2-47 Turkish expropriation procedure



According to the current estimation of the land to be taken for the project, the area subject to expropriation is 16,4 million m². The type of lands in terms of the ownership, which will be expropriated, is the following:

Expropriation plans are currently under KGM's preparation and have started to be implemented at the end of 2017 for the bridge and will start for the motorway at beginning of 2018.

Table 2-18 Expropriation land ownership

Type of Land	Area (million m^2)
Private Land	12,07
Pasture	0,66
Forest	2,50
Treasury	0,34
Other	0,8
Total	**16,37**

There will be about 2400 plots subject to expropriation by KGM.

A comprehensive assessment of the expropriation process has been carried out and is included in volume V – Land Acquisition Compensation and Resettlement Framework Policy of the ESIA.

COK recognises the gaps between the international requirements and the relevant Turkish laws concerning expropriation and compensation for the Canakkale Motorway and Bridge Project. Nevertheless, as explained in the Land Acquisition, Compensation and Resettlement Framework (LACRF), there are limitations on the extent to which COK A.S. can achieve alignment with these requirements due to the government-managed expropriation by the KGM. Among others, KGM policy is to keep plot-specific compensation information highly confidential, and to not permit any supplemental plot- or PAP-specific compensation measures.

As described in the LACRF, COK A.S. will implement, with the approval of KGM, a Community-Level Assistance Programme (CLAP). The overall objective of the CLAP is to meet the fundamental intentions of the international standards, namely that the persons affected by the Project should not be socio-economically worse off than before, and preferably in an improved situation. This CLAP will represent the Land Acquisition Compensation and Resettlement Pan.

2.4.12 HSE Management System

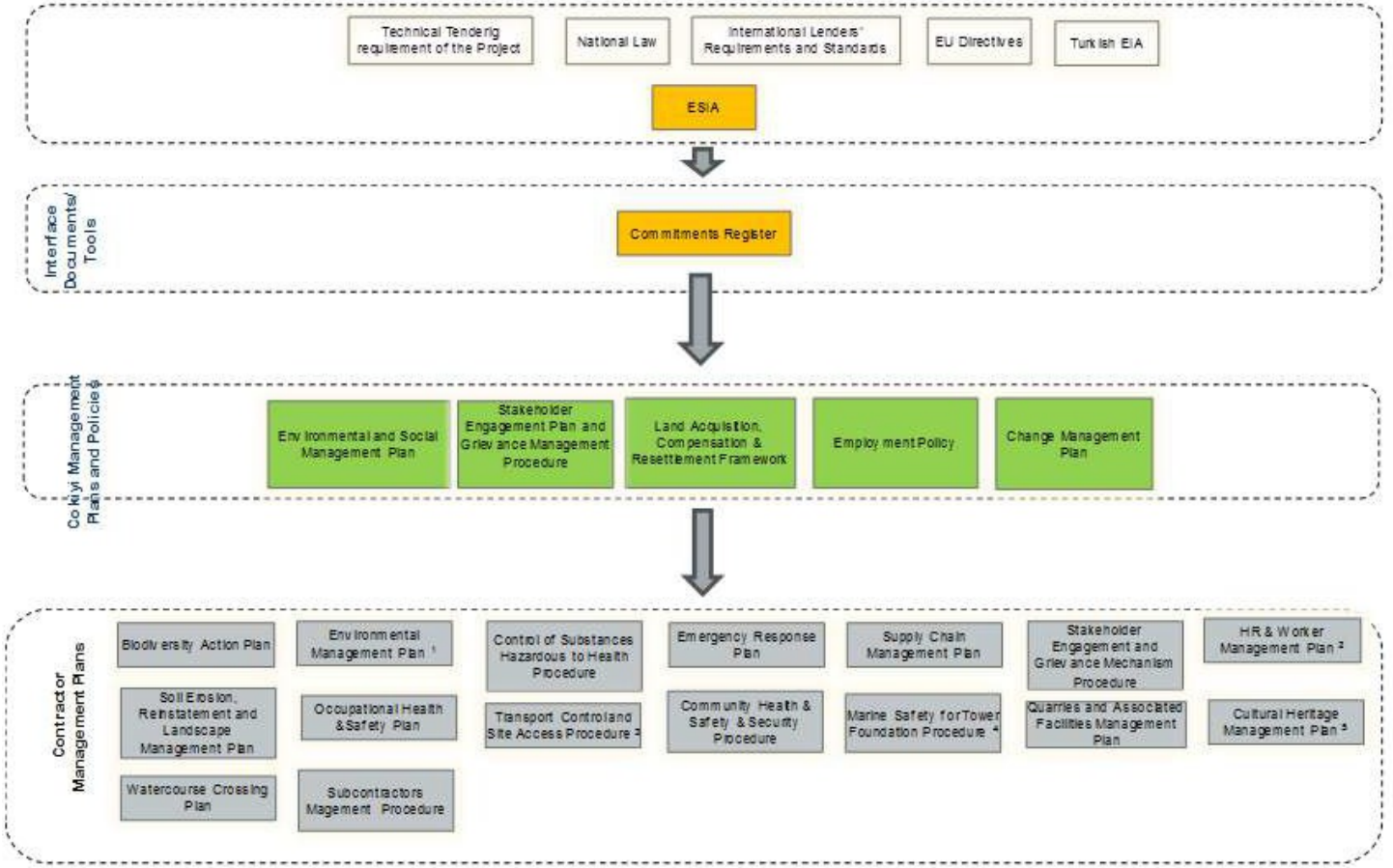
An Environmental and Social Management Plan (ESMP) was developed for the Project as is part of the current ESIA Study. The purpose of this ESMP is to:

- Provide an overview of the environmental, health and safety, socio-economic and cultural heritage (EHS) policies, regulations and standards applicable to the Project.
- Document and direct COK Personnel and guide EPC Contractors on how Project EHS risks are managed during the construction stage of the Project to conform with applicable EHS policies, regulations and standards and ensure the Project Commitments are attained.
- Clarify EHS compliance assurance roles and responsibilities during the construction stage of the Project;
- Ensure that adequate processes are in place to appropriately monitor construction activities against Project EHS policies, regulations and standards;
- Ensure reporting systems are developed and implemented to communicate EHS compliance performance to COK leadership;
- Facilitate continual improvement and EHS compliance assurance.

The ESMP provides an overview of the processes to identify, avoid, mitigate and manage Project EHS risk during the construction stage. The ESMP is the central document of the Project EHS management system and is supported by a series of subordinated EHS management plans and procedures implemented at Project and EPC Contractor levels:

- Project Environmental and Social Management Plans – see Figure 2-45 below - for an overview of the management plans that detail the processes implemented by COKYI to ensure Project policies, standards and commitments are attained during the construction stage of the Project and guide EPC Contractors on the requirements and management plans to be implemented for the Project as part of their EHS management system.
- Subcontractors Management Procedures for an overview of the EHS management plans to be put in place by the EPC Contractors to ensure implementation of the Project policies; standards and commitments during own Project construction activities. Besides other, the EPC contractor will have to develop an Environmental Management Plan which will also address Resource (water and energy). Commitments will cover the production and implement of policies, objectives and targets for resource efficiency during construction and operation, and integration of these policies into the ESMS. The programme to deliver those commitments is also captured in ESMP.

Figure 2-48 *Overview of the Project's ESMS Structure*



The EPC contractor has an HSE management system in place.This is in line with COK's HSE Policy the following objectives and targets:

- shall plan and establish objectives and strategies, plan activities in advance of implementation, monitor and continually endeavour to improve processes and eliminate non-conformity, accidents, environmental incidents, rework, wasted time and avoidable costs;
- shall ensure that all persons involved in the Project are aware of the HSE requirements and that they are properly experienced, trained, inducted and qualified for their duties before commencing work.
- shall emphasize its 'Safety First' philosophy for this Project.
- The management adopts the basic principle of protecting the environment and commits to set up pollution prevention and waste management requirements during construction activities.
- The Project Management Team is committed to construct the Project in a Safe manner; respecting the Environment, and to complete the Project on time - to the agreed completion date.
- The Project Management Team is committed to prevent the employment of young employees less than 18 years old.
- The ultimate aim of the SPV is to achieve, if not exceed, the expectations and satisfaction of the KGM and Client's Representative, as well as the beneficiaries (the end users); to make the citizens of Istanbul and Turkey proud of their world-class transportation facilities
- The SPV has currently under development an HSE Management Systems in accordance with the OHSAS 18001: 2007 & ISO 14001: 2004 for 1915 Çanakkale Bridge Project, to provide a more effective, encompassing and concise system conducive to modern-day International Construction practices.

2.5 ASSOCIATED FACILITIES

Quarries and Borrow Pits

The associated facilities are 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.

Activities associated with constructing and operating these facilities are also considered associated components of the Project for the purpose of the ESIA.

As the component is dependent on the Project, and vice versa, the Project is expected to have a high level of control on the environmental and social performances of the associated facilities.

Among others, the main associated facilities (AFs) to be considered in ESIA are the following (for which the current status of the project do not allow dedicated E&S assessment due to the insufficient information available in this stage):

- quarries;

- borrow pits;
- off-alignment infrastructure
- power lines and substations
- sewerage networks, sewerage/ wastewater treatment facilities.

The following AFs falls under the off-alignment infrastructure: national road infrastructure (including access roads), waste disposal areas, dredging disposal site. All the main Project's sites are in the imediatly vicinity of the existing motorway, therefore these will be easily connected, based on the KGM permissions. The only exception is Korukoy site which is not near the existing motorway. For this site, the Project includes rehabilitation and improvement of the existing road. All the off-alignement facilities will be permitted under the national legislation. No additional information is available at this stage, since the motorway detailed designed in ongoing.

There are a total of 12 limestone and basalt quarries and borrow pits located close to the Project route which are under consideration for potential use. COK has currently not yet decided which quarries/pits might be used, and a further option is to contract out the procurement/disposal of such materials to a third party contractor. In any case, the potential quarries presently under consideration are listed below:

- Tepeköy Quarry (Limesttone) – 28 km away from the proposed Project route. There is no need for construction an access road for transportation. Borrow pit is under operation at current situation.
- Yeniköy Quarry (Limestone) – 5.5 km away
- Kızılcaterazi Quarry (Limestone) – 6 km away
- Şahinliköy Quarry (Basalt) – 12.5 km away
- Akçaalan Quarry (Basalt) – 14.6 km away
- Küçükhıdır Borrow Pit – 2.9 km away
- Çimendere 1 Borrow Pit – 0.5 km away
- Çimendere 2 Borrow Pit – 1 km away
- Çokal Dam Borrow Pit – (127+500) 4.5 km. There is no need for construction an access road for transportation. Borrow pit is under operation at current situation.
- Yeniköy Borrow Pit – 6.3 km away
- Demirtepe Borrow Pit – 1.4 km away
- Fındıklı Borrow Pit – 5.7 km away

A total of 45 test pits, which represent whole highway route, not only Malkara – Canakkale section, have been studied in order to determine if the material from cutting activities can be used for filling activities or not; results of 42 test pits show that material from cutting activities can be used for filling activities.

The COK motorway section Malkara-Çanakkale represents only 88.5 km of the 324 km of the Kınalı-Balıkesir Motorway. According to the current information, the tender process for the rest of the Kınalı-Balıkesir Motorway was not yet initiated by KGM. However, the feasibility and the operation of

the Malkara-Çanakkale segment do not necessary depend on the realization of the entire motorway, since the Project would be fed by the projected increase in existing national roads traffic. Moreover, the 1915 Canakkale Bridge will represent an effective alternative for crossing the Dardanelles, by taking over the heavy trucks traffic which is currently handled by ferryboats. Therefore, the other sections of the highway do not fall under the definition of the Associated Facilities as being essential for the implementation of the Project.

Investigations about quarries and borrow pits to be selected for the Project are ongoing. A company has been assigned as the consultant for the permission procedures.

COK is in evaluation process for deciding which of the quarries and borrow pits will be used.

Figure 2-49 ***Ongoing assessment of potential quarries & borrow pits for the project***

The process for selecting and approving quarry and disposal sites which was followed by COK in collaboration with KGM was based on the following criteria:

- Already opened and permitted quarries have priority;
- Distance to the alignment;
- Landscape.
- Avoidance of dense forest areas or designed naturally or culturally valuable areas
- Technical tests are being made before any action taken with the permission.
- Distance to the residential areas
- Ownership of the land (public land is preferred).

The actions that will be taken by COK within the approval process to avoid potential risks are the following:

- COK will implement E&S studies in accordance with change management for quarries.
- Additional E&S Studies will be conducted by EPC Contractor and COK where needed in order to comply to the E&S

Requirements. The results of these studies will be communicated to the Lenders for review.

COK has identified the potential for impacts relating to traffic safety (both during construction and operation). Measures that should prevent, minimise and control risks to the community from traffic accidents during the operations phase, and which COK has committed to, include the following:

- Monitor driver behaviour, especially for routes that are subject to frequent
- accidents, and implement corrective actions to prevent recurrence.
- Improve local traffic signage in collaboration with the responsible local authorities and communities;
- Implement appropriate temporary traffic control planning during repair and maintenance works on the Motorway and Bridge;
- Coordinate with emergency responders to ensure that appropriate first aid is provided in the event of an accident;
- Control and maintain embedded control obstacles against ingress into the Motorway;
- Provide sufficient passages for vehicles and pedestrians crossing the highway to ensure entry is not at unauthorized points.

During the construction phase, identified risks to Community H&S include congestion on the existing road network caused by construction traffic, hazardous materials and unauthorised access (especially by children and young people) to roadways and construction sites.

For establishing the detailed designed, COK and EPC considers both Turkish and international standards including the IFC EHS Guidelines for Toll Roads. The Guideline recommendetions (e.g. provision of a safe corridor along the road alignment, emergency access /egress and construction areas, safe crossing points to support the community needs etc) will be taken in account when designing the relevant management plans under ESMP (e.g. Transport Control and Site Access Procedure, Community Health & Safety& Security Procedure, Stakeholder Engagement Plan).

COK will implement the E&S principles and design criteria to avoid / minimize the impacts as far as possible (based on typical risks associated with these types of facilities - e.g. traffic impacts, noise and air quality, loss of biodiversity, impacts to surface and ground waters etc.).

In terms of the schedule for finalizing the location / design of the associated facilities, the technical evaluation is ongoing. Samples are being sent to laboratories in order to be sure that material has the required quality. Once the available sites are determined, this will follow the change management

process within April 2018. Local permits will be taken once the technical evaluation is complete.

2.6 *OPERATIONS*

2.6.1 *Traffic forecast after Project implementation*

The traffic experts have developed a highly detailed traffic model of the concession corridor which also encompassed the highway network and key traffic patterns around the Sea of Marmara. The model has been calibrated and validated successfully to a 2016 base year. Macro-economic and transportation scenarios have been developed for forecast horizons of 2023 and 2033. In addition, it has been developed a logit route choice model to forecast cross-Dardanelles traffic and the relative shares of bridge and ferry under different scenarios.

The results of the modelling showed the following trends:

- cross-Dardanelles demand will increase to 2023 from current levels by 40% with an additional 10% from the induced demand generated by the bridge and new motorway connection between Europe and Asia
- the Bridge share in 2023 will be 58% (55% for light vehicles and 66% for heavy vehicles). The willingness to pay for time savings will increase in response to higher household income and consequently, in 2033, the experts forecast that the bridge share will be 62% (61% for light vehicles and 67% for heavy vehicles).

The motorway design is still in its early stages, therefore the information on the plans for changes in traffic management in the vicinity of the project were not made available for assessment.

2.6.2 *Emergency Planning*

Emergency planning is one of the key elements of the design. As part of the ESMS, COK will develop a Pollution Prevention and Emergency Response management plan which will establish the responses in the event of different types of incident– breakdown, spills, fire, explosion, flood, earthquake etc.

A similar plan will be prepared by the EPC Contractor, which will detail and bring site-specific actions in case of such accidents or events.

2.6.3 Operations and Maintenance

COK A.Ş. is responsible as BOT contractor to manage, operate, maintain, and repair the new Motorway and bridge 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 described in the Section 2.3 above.

A Maintenance Programme will be developed and implemented by COK A.Ş. as per the BOT Contract to assure that specified conditions are met upon the hand-back of the 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,
- defines the outline of the decisions to be made in case of deviations from required standards and
- procedures pertaining to response to unpredictable incidents.

All results will be compiled in an Annual Report submitted to KGM.

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

The following types of activities will be carried out by the O&M Contractor:

- Traffic and Safety operation:
    - Route patrolling;
    - Operation and maintenance of traffic and safety call centre;
    - Emergency operations and traffic management after accident and incident;
    - Road closure management for maintenance activities.
- Maintenance:
    - Routine maintenance, cleaning and limited repair of the motorway, interchanges and connecting roads including the related structures, infrastructures, ancillaries, drainage system (asphalt and concrete pavement patching and crack filling, repair and replacement of curbs, repair of fences, repair of

guardrails, repair of horizontal and vertical signage, unblocking of drainages system);
    - Maintenance, including watering, trimming and mowing of non-decorative green areas;
    - Winter maintenance with preventive and corrective activities;
    - Operation and routine maintenance, cleaning and repair of the toll related structures, infrastructures, building, facilities, ancillaries;
    - Maintenance of infrastructure (including Bridge and viaducts);
    - Maintenance of energised equipment;
    - Routine inspections for all motorway assets;
    - E&M equipment maintenance.

- Tolling operation:

    - Cash collection and money management in toll lanes (until the cash delivery to cash in transit company at the toll plaza);
    - Operation and maintenance of toll back office, including user data management (vehicle classification, license plate number, toll plaza lane entry / exit corrections, Illegal Passes etc);
    - Traffic management at toll plazas.

2.6.4 Operational Employment

Employees will be required for the operation of the toll collection and service facilities, the maintenance of the 1918 Canakkale Bridge and the Motorway, and as environmental health and safety staff such as the Emergency Response Team (ERT). According to the current estimate of COK A.Ş., the average number of FTE (Full Time Equivalent) to be employed is expected to range between 300 and 400 FTEs throughout the years, including all contractors. These estimates will be further developed during detailed design and implementation. Many of the persons will be employed by the O&M Contractor.

2.6.5 Toll Collection

A 'closed' toll system with a mainline toll plaza immediately north of Gelibolu South, and ramp plazas intercepting vehicles entering or exiting the motorway at Gelibolu North, Bolayir and Malkara junctions. Tolls are charged per kilometre travelled on the mainline motorway (70.52 km) and along some access roads (8.27 km), for a total tolled distance 78.788. The section betweenÇanakkale 1 and Çanakkale 2 junctions is untolled and no toll revenue or revenue guarantee payment will accrue to COK.

Different maximum toll rates are set for the motorway and bridge sections. Tolls are collected in both directions. VAT is charged at 18% on motorway section.

Tolls are set at 2016 Euro prices. The motorway section toll for cars is EUR 0.05/km. Tolls are converted into Turkish Lira at the bid rate on 1st January of each year, as announced by the Central Bank of Turkey. Moreover,

tolls are revised annually in line with Eurozone CPI and converted to TL at the EUR/TL rate applicable for the 1st of Januaryofeach year.
This is the 'Harmonised Index of Consumer Prices' (HICP) of the European CentralBank (ECB).

Unusually for Turkish concessions, the ratios of the tolls charged to different toll classes ('toll ratios' or IC-PCU) vary between the motorway and bridge sections. Bridge tolls are relatively high for larger trucks as compared with the motorway section.

There is a minimum revenue guarantee provided by KGM. It is the revenue generated by 45,000 car units for the Average Annual Daily Traffic (AADT) and is constant throughout the concession period. This traffic level is guaranteed for both the motorway and the bridge sections.

If actual traffic exceeds 45,000 car units, the surplus is split 70/30 between COK and KGM

Turkish motorway tolling is made by means of the HGS electronic tolling system which uses transponders on vehicles. This permits toll collection without vehicles stopping. A violation occurs when payment is not successfully collected from a passing vehicle.

Pedestrians and cyclists are still obliged to use the ferry as they are not allowed to access the bridges.

Table 2-19 Motorway Tolls

Toll class	Vehicle type	2016 Toll		Number of vehicles Axles	Car Equivalent Coefficient (IC-PCU factors)	
		Bridge (€)	Motorway (€/Km)		Bridge	Motorway
Class 1	2-axle vehicles with axle distance < 3.20 m. (cars, small trucks, vans, minibuses)	15.00	0.050	2	1	1
Class 2	2-axle vehicles with axle distance > 3.20 m (van, pick-up, midibus, bus, truck)	20.25	0.080	2*	1.35	1.60
Class 3	3-axle vehicles (buses, trucks and trailers – classes 1 and 2 with one extra axle)	37.50	0.095	3	2.50	1.90
Class 4	4 or 5-axle vehicles (buses, trucks and trailers)	45.00	0.126	4 – 5	3.00	2.52
Class 5	6- or more axle vehicles (tractor and trailers)	82.50	0.159	≥ 6	5.50	3.18
Class 6	Motorcycles	3.75	0.0125	0	0.25	0.25

Source: Leigh/Fisher Traffic Study

A mainline toll plaza will be installed at the north end of the bridge, immediately south of Gelibolu South interchange. Tolls here are charged per crossing. VAT charged for the bridge section is 8%.

Tolls are set at 2016 Euro prices and are subject to annual revisions. The bridge section toll is EUR 15.00 per car crossing. More details are provided above under Section 2.3.1.

2.7 *PROJECT JUSTIFICATION*

Total cost in the Çanakkale 1915 Bridge and the 80 km-length motorway project is around ~€3.0 billion. Bridge toll excluding motorway is planned to be 15 euro plus VAT per car and the government guarantee is for 45,000 car per day, which means in case of insufficient traffic, the operator is able to get a daily compensation.

Çanakkale 1915 Bridge and Motorway Project, including direct, indirect and induced impacts, is expected to generate €14.5 billion total economic activity, contribute €11.2 billion to GVA, create 285k employment and generate additional €2.5 billion tax revenues from the first construction expenditure in 2017 to end of concession period in 20341.

Demographic and economic structures and transportation nodes all together point out that:

- Despite the Region's proximity to the most developed and populated cities, which are located in the wider hinterland, the development of the region is not above Turkey average while it is seriously lagging behind the wider hinterland.
- The Project connects two sides of the Dardanelles stimulating better interaction for agriculture, industry and service sectors between the provinces of the Region.
- The region has a strong potential for further growth waiting to be unleashed with the increased accessibility and improved transportation alternatives.

The Project is targeted at both long-distance traffic flows (e.g. from Anatolia / Asia into Europe (via Greece and Bulgaria etc.)), relatively localized traffic in the Istanbul – Izmir industrial belt, and leisure / tourist traffic. Additionally, the Project is expected to catalyze traffic flows in the two surrounding provinces (typically referred to as induced traffic). It will serve as an alternative to traditional inter-continental connectivity via Istanbul and the Straits of Bosporus and provide a number of connectivity benefits including:

- Time savings and enhanced overall efficiency of Turkey's highway network;
- Improved access from Europe and Istanbul (Turkey's commercial hub) towards the Aegean Sea region and the Middle East;
- Alternative connectivity between Western (European) side of Turkey and Izmir (3rd largest city in Turkey);
- In conjunction with the Gebze - Izmir and the Northern Marmara.

One of the primary reasons for the gap between the project area and its wider hinterland is the lack of a proper logistics and transportation infrastructure,

1 Deloitte, *Economic Impact of Canakkale 1915 Bridge and Motorway Project,* draft report, 23 August 2017

which would enable efficient and effective transfer of goods, services and people.

The Project is not only connecting the two sides of the Dardanelles but also the agricultural lands, concentrated industrial zones and attractive tourism points.

There are a considerable number of world-renowned ancient and historical sites, 38 blue flag beaches, numerous marinas, 12 thermal tourism centers, 6 national parks and popular islands in the region which is a very powerful candidate for being center of attraction both for foreign and domestic tourists through tourism activities that are different from each other but mutually complementary. It is expected that if the increase in accessibility and the enrichment of transportation channels are supported by accurate and proactive tourism policies, the region will grow economically faster and realize its potential.

The 1915 Canakkale Bridge will allow people to cross the Dardanelles in 3 minutes by car rather than 1 hour by ferry drive (including the waiting time for loading and unloading). Moreover, the Project is expected to shorten distance with providing new and improved road transport option. Furthermore, construction of Çanakkale 1915 Bridge will provide a motorway crossing through Dardanelles, where will be an alternative route for the road transportation between Europe and Asia. This alternative route is expected to save considerable distance for the users who currently use the bridges on Bosphorus to transport between Thrace and Aegean regions.

For now, the ferries crossing the Dardanelles operate every half an hour. Due to the vehicle capacity limitation of ferries, there are long queues during peak seasons addition to religious and national holiday, festivals, etc. and in case of missing the ferry, there are at least 30 minutes waiting time to catch next one. Cancellations of ferry crossing are most likely seen in bad weather conditions like fog, extreme rain and wind. Therefore, using ferries crossing the Dardanelles may create unexpected delays, which makes the ferry not a fully reliable transport option.

From this point of view, the project will provide a reliable transportation option since it will not be affected by bad weather conditions nor will it causes queues and waiting times as ferries do. Reliability will improve logistics operations further for the businesses in the region and increase household welfare by eliminating unexpected delays.

In addition to tax revenues, the Project will create new employment opportunities, and stimulate the business growth with increased number of firms operating in the region as well as with better accessibility to other regions through market expansion. These all together will increase the income and consequently the consumption and the demand in the region, which then be resulted with the increased amount of income tax, corporate tax and other related taxes collected from the region.

2.8 PROJECT ALTERNATIVES

The local EIA states that some alternatives routes have been studied and will be further assessed, without providing factual information.

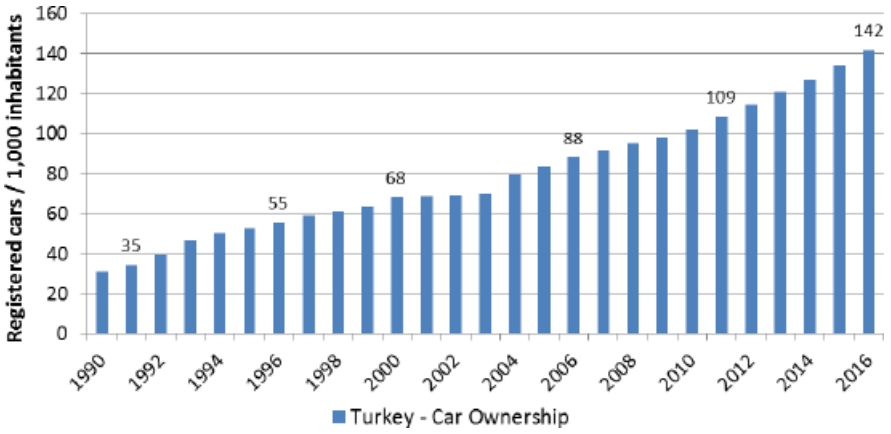
2.8.1 *Current traffic baseline*

Over the past 26 years Turkey's population has increased continuously at a compound average growth rate (CAGR) of 1.6% per annum, from almost 53 million in 1990 to approximately 80 million in 2016.
More than half of total Turkish inhabitants live in urban areas.

The study area of the project does not have a particularly high population density. One reason may be the lack of infrastructure investments in this area. However, it can be seen as a strategic location connecting Europe to Izmir and beyond, avoiding Istanbul and Bosphorus Strait.

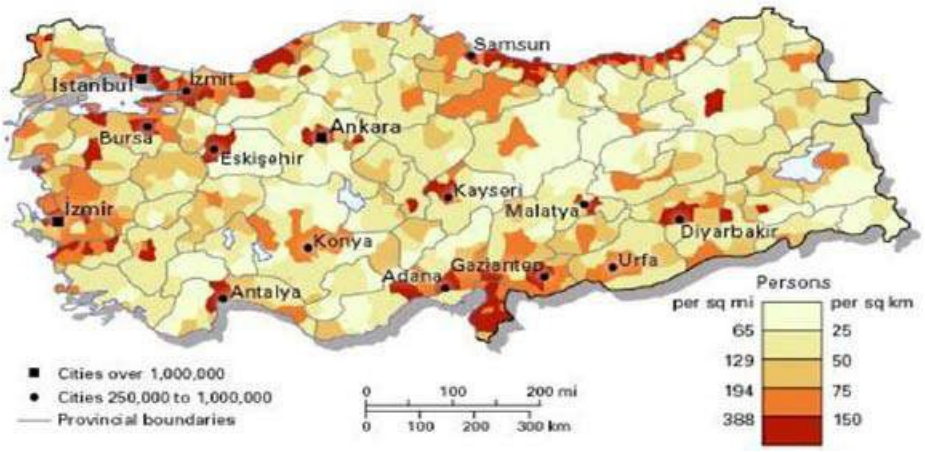
The number of registered cars in Turkey per 1,000 inhabitants has increased significantly over the last twenty-six years: the new millennium began with less the 70 cars per 1,000 people but by 2016 the level has reached more than 140 cars per 1,000 persons.

Figure 2-50 ***Car ownership trend of Turkey***



Source: LeighFisher on TurkStat

Figure 2-51 ***Population density in Turkey***



Source: LeighFisher, Encyclopaedia Britannica

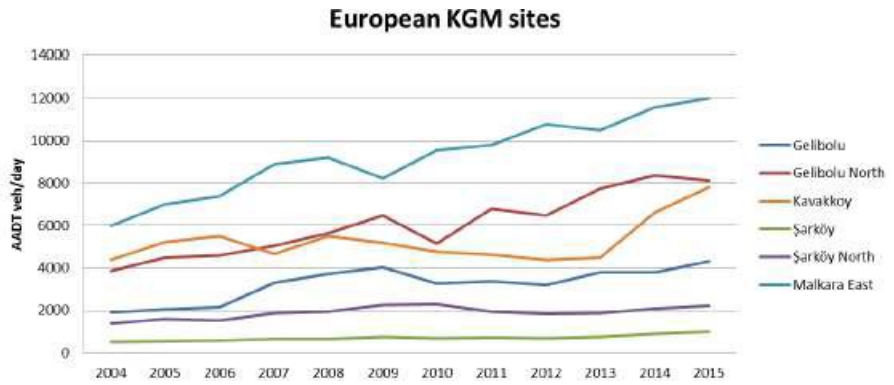
The project has six junctions Malkara, Bolayir, Gelibolu North, Gelibolu South, Çanakkale 1 and Çanakkale 2 (see detailed information in Section 2.3.1 above).

Figure 2-52 ***Traffic counters by KGM- in Project area***

Source: Leigh/Fisher – Traffic Study, July 2017

Considering the period 2004-2015, traffic at the European sites registered an average annual growth rate between 4.5% at Şarköy North and 7.7% at Gelibolu, with a simple average value of 6.2%.

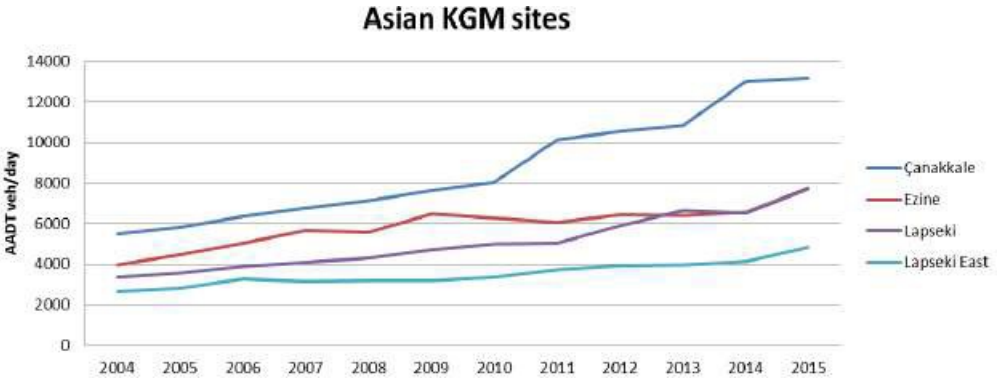
Figure 2-53 ***Traffic evolution- relevant for European side of the Project***



Source: Leigh/Fisher – Traffic Study, July 2017

Traffic at the Asian sites had an average annual growth rate between 5.5% at Lapseki East and 8.3% at Çanakkale, equivalent to a simple average value of 7.1%.

Figure 2-54 ***Traffic evolution- relevant for Asian side of the Project***



Source: Leigh/Fisher – Traffic Study, July 2017

The share of heavy vehicles varies between 20% and 30% of total vehicles. The sites with higher percentages of heavy vehicle, around 30 %, are Kavakkoy, Çanakkale, Lapseki and Lapseki East.

The traffic using the D 550 southbound mainly have origins in Edirne and Tekirdağ provinces (50%). Greece and Bulgaria produce a further 7%.

Southbound - Çanakkale province attracts around 60% of trips with Izmir, Bursa and Balikesir province around 20%. Ankara, Denizli and Aydin provinces, attract 5% of trips.

Northbound- Çanakkale province generates around 50% of trips. Long-distance trips are mainly generated in Izmir, Bursa, Balikesir and Manisa provinces.

Edirne, Tekirdağ provinces are the destinations of around 15% of trips. Greece and Bulgaria account for 5% of trips each.

The share of light vehicles along the D550 in North Gelibolu varied between the 67% in 2004 and 75% in 2016. The 21% traffic decrease in 2010 was probably due to the financial crisis.

Over the period 2004-2016, light and heavy vehicles had average growth rates of 7.9% and 4.3% per year respectively. Total (light and heavy) vehicles growth averaged 6.9% per year.

Figure 2-55 ***Traffic survey points for traffic study – Gelibolu North and Gelibolu South***

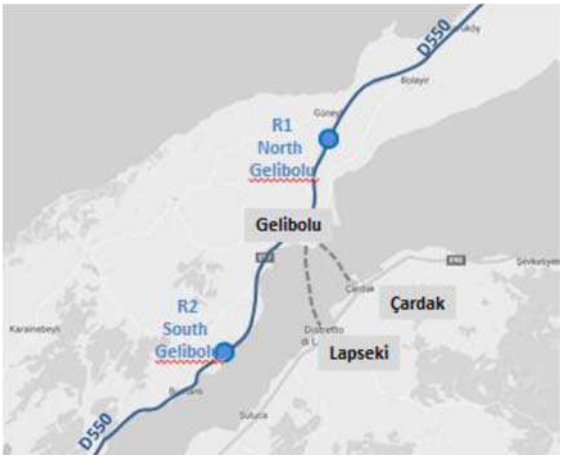
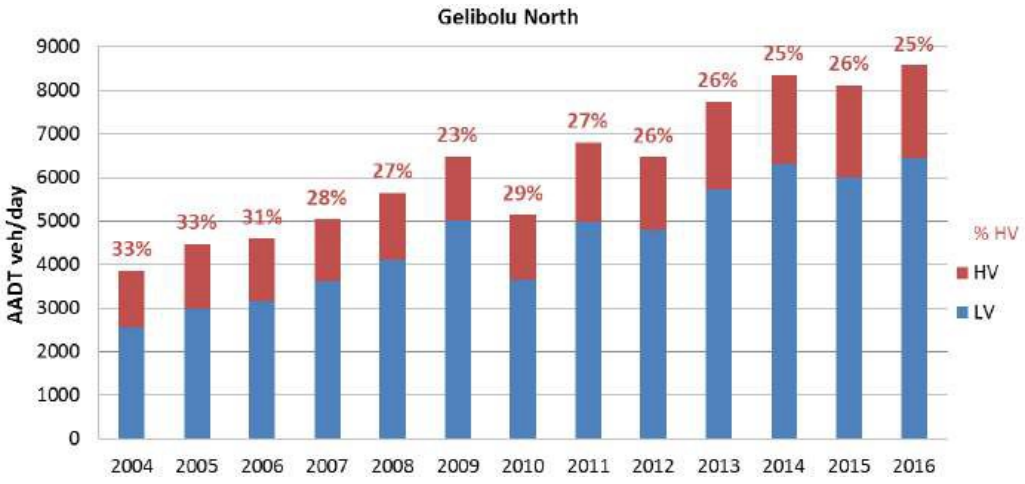


Figure 2-56 ***Evolution of Heavy vehicles/ Light vehicles traffic in Gelibolu North area within the last 12 years***



Source : Leigh/Fisher – Traffic Study, July 2017, initial source: KGM

Survey data collected by the experts in charge with elaboration of the Traffic study for the week 1 May to 7 May 2017, using automatic traffic counters, have been analysed to reproduce weekly and hourly profiles and resulted in following data:

- Average flows on the D-550 are 10,600 vehiclesper day at GeliboluNorth (27% heavy vehicles) and 4,400 vehiclesper day at GeliboluSouth (33% heavy vehicles);

- Weekly traffic shows higher volumes on Monday and during the weekend, reflecting tourist traffic;
- The percentage of heavy vehicles is higher on South Gelibolu section where it varies between 30% and 44%, with a significant decrease on Monday and a peak at the weekend while, on North Gelibolu section, the peak is on Wednesday
- The highest volumes recorded in the survey are at North Gelibolu, with 2,726 veh/hour on an average workday and 2,869 veh/hour at the weekend. Generally, hourly traffic is slightly higher during the weekend (North Gelibolu: 5,467 veh/hour bi-directional in the weekend and 5,245 veh/hour bi-directional in the workday).

The Dardanelles Strait is crossed by 4 ferry services: Çanakkale-Eceabat, Çanakkale-Kilitbahir, Lapseki-Gelibolu and Gelibolu-Çardak.

The Lapseki-Gelibolu route has 24-hour operations. The frequency is approximately 30 minutes during the daytime, less during night hours. The Eceabat-Çanakkale service is hourly. Journey times are around 15-20 mins., except for Çanakkale-Kilitbahir with 7 mins. crossing time due to the shorter distance.

Figure 2-57 ***Current Dardanelles ferry services***

Source: LeighFisher on Google Map

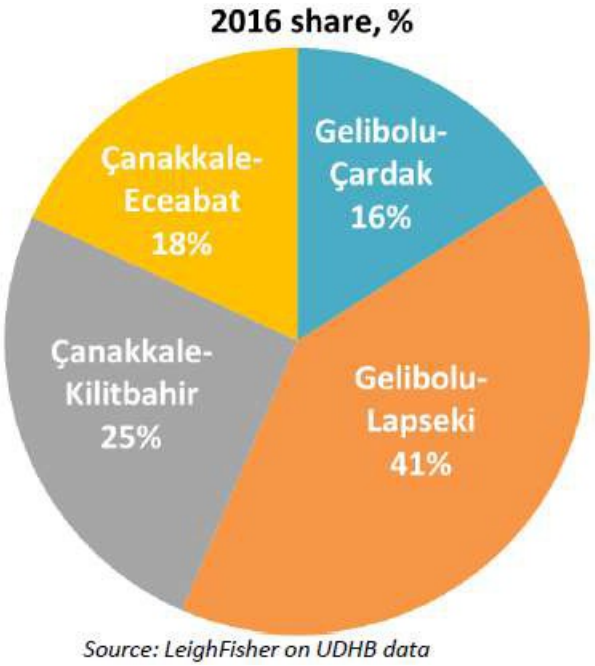
Table 2-20 ***Current Ferry's fees and capacities***

Ferry line	Ferry operator	Tariff for light vehicles TL	Tariff for trucks vehicles TL	Journey time (min)	Frequency	Capacity (N. of vehicles)
Çanakkale-Eceabat	Gestaş	35	40-135	15	60 min, 24h	62
Çanakkale-Kilitbahir	Gestaş	30	40-60	7	30 min., 8am-11:30pm. Only 3 departures after 11:30pm	62
Lapseki-Gelibolu	Gestaş	35	40-135	20	30 min, 7am-11pm. 60 min, 11pm-7am	86
Çardak-Gelibolu	Gelibolu Çardak Denizcilik	35	60-90	20	30 min, 24h	90-150

Source: LeighFisher on Gestaş website and RMT information.

According to traffic data from the UDHB (Ulaştırmadenizcilikve haberleşme bakanlığı), Turkish Ministry of transport, Maritime Affairs and Communications, the total Dardanelles ferry traffic was 2.7 million vehicles in 2016, an average of 7,300 vehicle/day. The service with the highest amount of vehicles is Gelibolu-Lapseki with 1.1 million of vehicles carried in 2016.

Figure 2-58 ***The shares of transported vehicles among the ferry services***



Source: LeighFisher on UDHB data

From 2012 to 2016, total traffic increased from 1.9 million to 2.7 million vehicles per year with a CAGR of 9.5%. The ferries traffic has significantly

increased during the last years, with the higher average growth rates (up to 10,4 per year).

Counts on ferries show that 52% of vehicles on Çardak-Gelibolu ferry service are heavy vehicles although the highest number of heavy vehicles is carried on the Lapseki-Gelibolu service.

The trip purpose with the highest share, 58%, is leisure, including shopping, personal business and tourism. Business and commuter purposes are around20% of traffic.

2.8.2 Zero alternative versus Motorway Concept

The Kınalı-Balıkesir Motorway which the Project is part of is an arterial road starting from Kinalı-european side of Istanbul Province traversing Tekirdağ Province, reaching the Gelibolu Peninsula crossing the Bridge between Sütlüce (European Side) and Şekerkaya (Asian Side) districts of Canakkale Province. The corridor heading towards the Balikesir province and finally connecting to the Gebze-İzmir Motorway west of Balikesir. A zero alternative versus the idea of the motorway concept can be compared as follows:

- The Kınalı-Balıkesir Motorway concept is the only alternative to having a direct access from Europe to Turkey Southwest which is an industrial area like Izmir and Aydin and contribute to the development of a large ring road around the Sea of Marmara networks and at the same time to promote the development of the Turkish Western Region;
- The presence of the motorway would contribute to mitigating the traffic problem in the City of Istanbul which is caused by the traffic flow from Europe. It would also represent an alternative to the traffic crossing of the Bosphorus Straits;
- The completion of the Motorway would reduce the traffic load in lower standard roads and improve the traffic safety in the area of influence.

The project design was prepared by KGM several years ago and no further information was provided related to the background of deciding for the project. However, reportedly, the main criteria which were initially considered at basic design stage are, among others, the following:

- avoidance of populated areas and agricultural lands,
- avoidance of the natural protected areas and cultural heritage sites
- national and international technical norms
- land topography
- marine and road traffic projections and forecasted demands, etc.

2.8.3

applicable design codes, as requested by KGM in the bidding documentation. Therefore, no significant geometric design alternatives were applicable for the

Project.***Design Alternatives***

The design alternatives available for the project were the geometric design, selection of bridge type, tower foundation, anchorage, deck type. The assessments are as follows:

- The following represents the geometric design conditions-criteria that is used by KGM ("Motorway Projects Engineering Services Criterion Report" and "Highway Design Book"). Some of the design elements are obtained in reference to the AASHTO Standard "A Policy on Geometric Design of Highways and Streets 6th Edition (2011)" or Japanese Standards. Due to the established standards for KGM Motorway projects there are not design alternatives regarding geometric design considerations for the Project. These are given below:

Figure 2-59 ***Geometic Design Conditions for the motorway***

Elements of Design		Unit	Motorway	Interchange Ramp		Remarks
				Loop	Others	
Design Speed		km/h	120	40	60	
Cross Sectional Elements						
Number of Lanes		-	3-lane per direction	1-lane per direction		
Carriageway Width		m	3.75	3.75		
Shoulder Width	Outer Shoulder	m	3.00	2.00		
	Inner Shoulder	m	1.00	1.00		
Mergin		m	1.00	1.00		
Median (excluding Shoulder)		m	5.00	3.00		
Widening at Curve Section		m	30 × n/R (>0.5m)			R<130m n: Number of lanes
ROW Width		m	15 m outside from edge of slope			
Normal Crossfall		---	2.5%			
Max. Superelevation		---	6.0%			
Slope Gradient	Fill Slope	---	H<1.5m: 1/4, 1.5m<H<3.0m: 1/3 3.0m<H<5.0m: 1/2 H>5.0m: Determined by Stability Analysis			
	Cut Slope	---	Determined by Stability Analysis			
Horizontal Alignment						
Min. Curve Radius		m	1,000	80	130	
Min. Transition Curve Parameter		m	350	60	80	
			R/3 < A < R			
Min. Curve Radius without Transition Curve		m	3,000	280	410	$^3\sqrt{(A^4/24S)}$, S=0.20
Min. Curve Radius without Super elevation		m	5,000	550	1,250	$R=V^2/127(i+f)$, i=2.5%, f=4.8%
Max. Length of Single Element Section		m	3,000			
Vertical Alignment						
Grade	Max.	---	4.0%	Ascending: 5% Descending: 6%		
	Min.	---	0.5%			
Min. Rate of Vertical Curvature	Crest	K	200	15	20	K=R/100
	Sag	K	100	7.5	10	Ditto
Stopping Sight Distance		m	275	60	80	
Vertical Clearance		m	5.00			
Interchange						
Carriageway Width		m	---	3.75		
Acceleration Lane to Main Highway	Min. Length	m	---	345		
	Type		---	Parallel		
Deceleration Lane from Main Highway	Min. Length	m	---	280		
	Type		---	Parallel		

- The Suspension bridge was assessed to be the most suitable design solution given the distance of the Canakkale Strait of some 4 km. The JICA report assessed the suspension bridge in terms meteorological conditions as well as seismic hazards
- The Tower foundation would need to consist of the caisson, two shafts and the tie beam. Due to the heavy marine traffics with large tankers/vessels, use of a dolphin or artificial items are not feasible for protection against collision protection
- Either a truss type or a twin-box type deck design can be considered to be a solution to withstand the potential wind stability issues
- The JICA study conducted a comparative study on the vertical alignment of the strait crossing bridge. The alternative options are (i) 4.0 % of vertical grade as maximum grade and (ii) 2.5 & of vertical grade as acceptable grade for deceleration on upgrades for a typical heavy truck, which is acceptable up to the half of the design speed. As a result of this comparative study, it was concluded that 2.5 % of vertical grade would be recommended in consideration of deceleration of heavy trucks and aesthetic point of view.

Dredging Methodology Selection

In order to construct pile and gravel bed, dredging shall be firstly carried out by using Grab on barge or Trailing Suction Hopper Dredgers (TSHD) methods. Brief descriptions are given below for two methods:

- A Trailing Suction Hopper Dredgers (TSHD) is a self-propelled hydraulic dredger that moves without anchor lines, pipelines and barges. The TSHD combines dredging, transport and disposal. The largest TSHDs are equipped with two suction pipes. At the end of each suction arm a drag head is connected. For dredging the drag heads are lowered to the sea bed. The dredger trails slowly and fills the hopper by pumping of the material. TSHDs are ideal for dredging large volumes of sand and silt. Modern trailing hopper suction dredgers equipped with drag head with high pressure water jets, are also suitable for dredging cohesive soils. Nevertheless, a hopper is not suitable for dredging rock.TSHD's have a maximum dredging depth up to ~155 m.
- Grab Dredgers (GD) is a hydraulic excavator mounted/positioned on a barge that is fixed/positioned by means of spuds or a system of winches, wires and anchors which load dredged material into barges moored alongside. These types of dredgers can dredge to depths of ~60m providing suitable hydro-mechanical hoisting equipment is available, but their rate of production is normally relatively low compared to other dredgers. The soil collected by grab, will be stocked in the Split Dump Barge and towed to the temporary loading jetty for unloading. If the dredged material is as hard as the clay-till it has to be pre-treated to excavate it efficiently.

Due to the reason that it has the most suitable, reasonably priced, efficient and highest technology for the work programme requirement, it was decided to perform the dredging operation with Trailing Suction Hopper Dredger (TSHD).

Selection process of the company who will perform the dredging work is about to be finalized by the EPC Contractor, DLSY JV.

Pilling Method selection

There are two possible methods can be applied to perform piling operation for offshore construction works as given below:

Inclusion pile will be inserted into the space provided within the pile driving guide and lowered through the guide onto the seabed and then:

- Option 1 - Diesel Hammer: The auxiliary pile will be inserted into the space provided within the pile driving guide and lowered through the guide onto the inclusion pile. The floating crane will lift off the hydraulic impact hammer and position on top of the auxiliary pile to perform piling operation through with auxiliary pile.
- Option 2 - Hydro Hammer: The floating crane will lift off the hydraulic impact hammer and position on top of the pile driving guide. The guide frame of the hammer will be positioned along the guides of the pile driving guide. Hammer will be lowered along the pile driving guide until the anvil sits firmly on top of the pile top.

Piling operation will be performed around -40m and -48m for European and Asian side respectively. Option 1 is not reliable and constructible to provide very low installation requirements. Option 1 also has significant ambient and undersea noise impact. Option 2 is the only feasible way for piling operation under this depth.

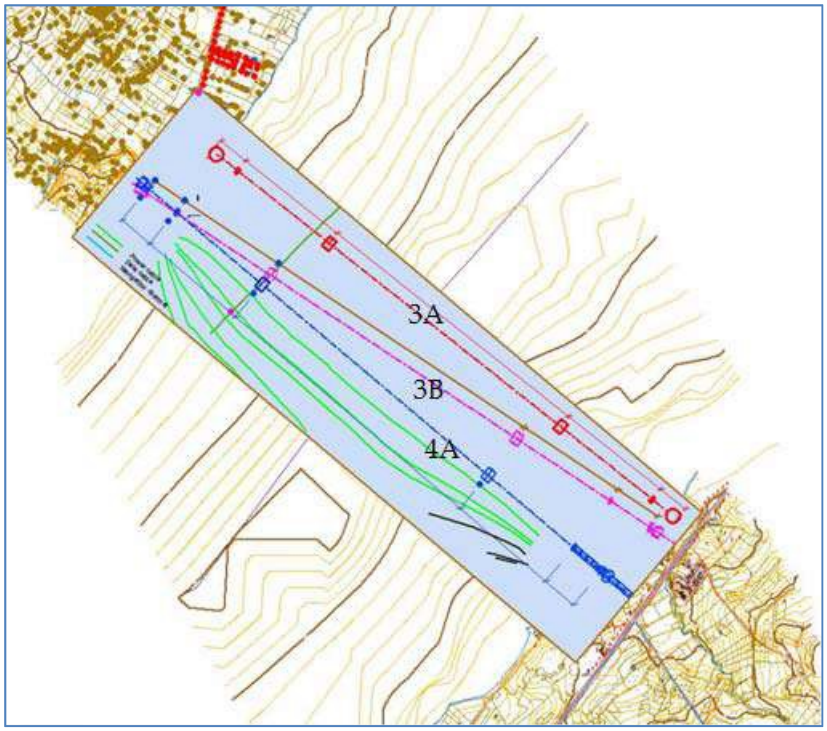
2.8.4 Siting Alternatives

- A feasibility study report provided information on the potential siting conditions that were used to define the Kınalı-Balıkesir Motorway corridor.
- The geometric design criteria provided above was one of the drivers for corridor selection together with land use conditions. Given that overall corridor selection, it can be seen that the selected siting runs close to the existing road in the region, represents the shortest route from Kinali to the Bridge connection.

2.8.5 Final Bridge alignment - selection

The initial project design was the Alternative 3B; however, from soil stability and geotechnical reasons, in May 2017 when reaching the detail design, this route was abandoned and instead, additional alternatives were considered, namely 3A and 4A, as presented in the picture below:

Figure 2-60 The 3 alternatives considered for the bridge alignment

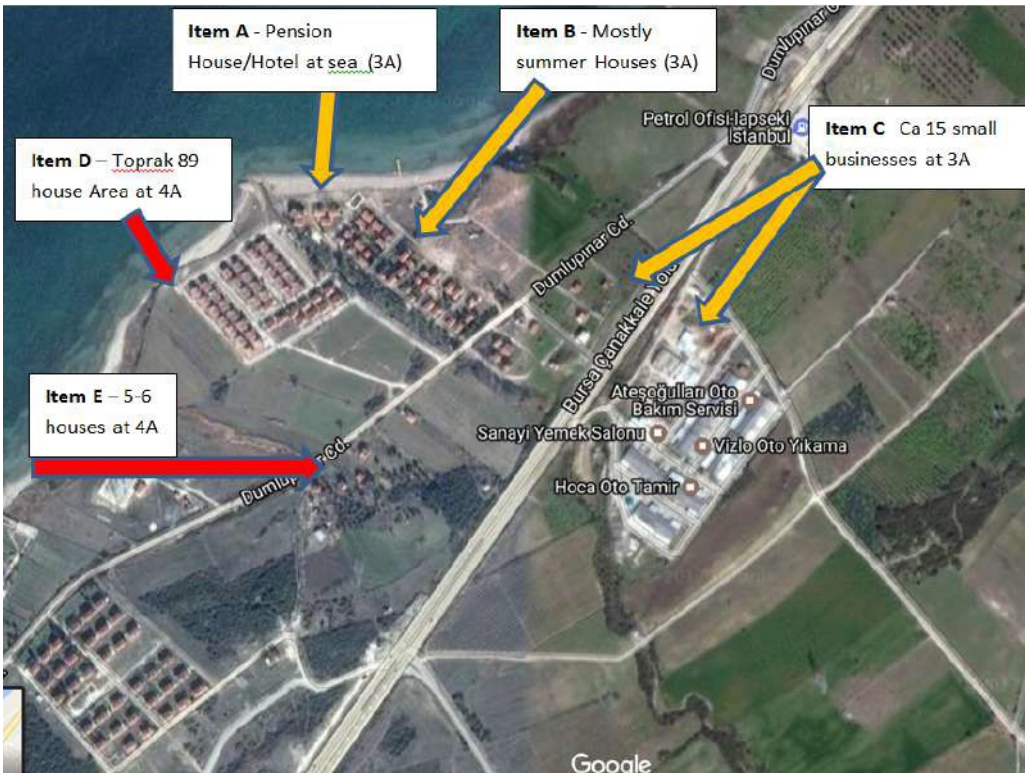


The following sensitivities in relation to the Alternatives 3A and 4A have been considered for the bridge alignment.

On the European side both of the alternatives go further away from the residential area that would be affected by the current alignment.

Regardless the alternative selected, the environmental issues will be similar to the original alignment (3B); the key points and pros/cons of the two alternatives are therefore related to social/resettlement topics. Key items of discussion are shown in the screen-shot based on google-earth, arrows showing the general subject areas.

Figure 2-61 Social/land use alternative high-level assessment



Alternative 3A specific aspects:

- Potential pension house/hotel by the sea, where the very small dock is seen from Google Earth (Item A). This is considered to be eligible for expropriation as it will come very close to the alignment.
- The line of houses further to the shore (Item B) are mostly summer houses and it is considered that these could be kept, but would require mitigation measures mainly addressing noise and dust issues (mainly during construction).
- Across the existing road (item C), an additional number of 5-6 houses and 10-15 (rough estimation) local businesses (car & tractor service workshops, car wash, bike sales shop, storage area of tyres, storage area for construction materials) which are accommodated in the industrial facility that would be impacted could fall within the direct footprint requiring resettlement. It is to be noted here that in the case of the local businesses, lenders will require that the loss of jobs (temporary during relocation, potentially some permanent) by the local employees is also considered and assessed. COK would then be expected to provide support for those employees to bridge the relocation time or to find new jobs.

Alternative 4A specific aspects:

- The Toprak 89 residential complex (item D) would be affected. This complex is made of fairly new houses out of which some are permanently inhabited with a beach on the shore, other houses are apparently mainly vacation homes. These houses are well maintained,

inhabited by people with a fairly good standard of living. Alternative 4A would impact at the minimum 24 of these expensive houses. These houses would come close to the alignment – but not within the footprint itself - and may therefore potentially not be eligible for resettlement by KGM (thus COK would need to compensate on their own). People living here are assumed to be well educated and with a good income and therefore might be more likely to undertake a more organized approach to opposition to the project (if the case) and at a minimum high expectations in respect of relocation/compensation measures.

- Across the existing road, an additional number of 5-6 houses (item E) are present that could be kept with similar mitigation measures mainly addressing noise and dust issues.

COK's designers final decision was to go further with the Alternative 3A due to technical, geological and environmental & social more favorable conditions.

2.9 EMBEDDED CONTROLS BY TURKISH EIA

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), are considered as part of the project design (prior to entering the impact assessment stage of the impact assessment process) and are the result of the local environmental permitting.

The impact assessments for individual topics assume that these controls are implemented and any mitigation measures would therefore be 'above and beyond' any existing / planned embedded controls.

The table below lists selected embedded controls that have been or will be applied to the Project design to limit the impacts of the Project and were indicated in the national EIA.

The full list of all the commitments (from National EIA as well as from the international ESIA) is part of the Commitments Refister which is annexed to ESMP.

Table 2-21 Selected embedded Design Controls by National EIA

COMMITMENT	PAGE	SECTION	CONTENT	REMARKS	COK/EPC COMMENTS
Materials from quarries shall be purchased/provided in accordance with Mining Law	4 / 25	Section 1.1* / Section 1.2.3*	LEGISLATION		It will be done accordingly.
In the scope of Circular Letter (03.03.2014 dated, 47644 numbered) of Ministry of Forestry and Water Affairs, mining activities for Project purposes (i.e. quarries), shall not be conducted on; 1) Forest areas which are located at 2 km distance from highways', state highways', province's or district's sights. 2) Areas located at 5 km distance from coastal lines (coastal lines which have sight to mentioned areas) 3) Protected Areas 4) Groundwater operational areas 5) Strict preservation zones and first degree preservation zones of drinking water sources like well, spring, catchment etc.	25	Section 1.2.3	LEGISLATION	"Strict preservation zones and first degree preservation zones" are defined in Water Pollution Control Regulation of Turkish Legislation.	Will be obeyed.
Generated topsoil shall be stored at appropriate area and shall be used in landscaping activities.	25	Section 1.2.4	PRECAUTION (TOPSOIL)		It is already started in Dry Dock area. Will be implemented at other sites as well.
Highway route intersects with	30	Section 1.4	APPROVAL		Will be done in

COMMITMENT	PAGE	SECTION	CONTENT	REMARKS	COK/EPC COMMENTS
General Directorate of TEIAS's 380 kv and 154 kv Energy Transmission Lines. So, to provide safe passage, all works shall be done by General Directorate of Highways and a protocol shall be signed with General Directorate of TEIAS in that manner.					coordination with KGM.
According to opinion letter of Canakkale Province, Municipality of Lapseki, planned maintenance area which is located in Lapseki district borders, shall be constructed outside of 126 Block, 87 Parcel	39	Section 2.4	OPINION		Will be considered.
In case of encountering a cultural asset during construction works, works shall be cancelled immediately and relevant Directorate of Museum shall be informed.	50	Section 2.6	PRECAUTION / (CULTURAL ASSET)		Will be obeyed.
Project route passes through preservation areas of Yenice-Gonen Dam, which is being used form drinking and utility water. Relevant precautions mentioned in Water Pollution Control Regulation shall be obeyed.	50	Section 2.6	LEGISLATION		Will be obeyed.
Route of the Project is planned close to Koca Cay Stream. So; Application Form for	52	Section 2.6	LEGISLATION / APPROVAL		Outside of project route.

COMMITMENT	PAGE	SECTION	CONTENT	REMARKS	COK/EPC COMMENTS
Activities Near Wetlands and Commitment Letter shall be filled in accordance with Regulation on Protection of Wetlands and shall be submitted to Balikesir Branch Office					
Before construction activities of the Project, Directorate of Provincial Food Agriculture and Livestock of Balıkesir, Çanakkale, İstanbul and Tekirdağ shall be made to prepare land screening and investigation reports.	55 / 184	Section 2.7.2 / Section 3.11	APPROVAL	As the Project route passes through agricultural and pasture areas.	Will be obeyed
The seeds of the endemic, rare and endangered species that can be found in the area of activity and in the immediate vicinity shall be transported to suitable habitats near the project area.	101	Section 2.13.1	PRECAUTION / (FLORA)		Will be obeyed.
Necessary precautions on topsoil management shall be taken	167	Section 3.7	PRECAUTION (TOPSOIL)		It is started to be taken in dry dock. Will be implemented where necessary.
Seeds of indigenous and threatened flora elements shall be collected	186	3.13	PRECAUTION (FLORA)		Will be checked and implemented if needed. So far no indigenous and threatened

COMMITMENT	PAGE	SECTION	CONTENT	REMARKS	COK/EPC COMMENTS
					element has found.
Ex-situ conservation shall be applied on flora elements	186	3.13	PRECAUTION (FLORA)		Will be checked and implemented if needed. So far no indigenous and threatened element has found.
Revegetation and landscaping works shall be conducted after construction activities to relevant areas.	186	3.13	PRECAUTION (FLORA/LANDSCAPE)		Will be done.
A biologist shall give training to Project personnel to protect fauna elements.	186	3.13	PRECAUTION (FAUNA)		Will be done.
Windbreaks and noise embankments shall be placed on locations where bees may be effected from construction and operation activities.	187	3.13	PRECAUTION (FAUNA)		Will be considered if necessary.
It shall be ensured that off-shore construction activities do not alter fish ovulation and migration	188	3.13	PRECAUTION (FAUNA)		Will be considered.
Project route passes through 7 ponds, which are being used for irrigation activities and Evreşe Kavak Plain Irrigation which are under construction. So, Project route shall be passed from outside of these irrigation ponds.	192	3.17	PRECAUTION (WATER RESOURCES		Will be checked during design stage.

COMMITMENT	PAGE	SECTION	CONTENT	REMARKS	COK/EPC COMMENTS
Project route passes through 11 irrigation areas and/or water transmission lines which are under control of State Hydraulic Works Region 25. So, design of the Project shall be made by taking these facilities into account and approval from State Hydraulic Works Region 25 shall be taken on that manner.	193	3.17	PRECAUTION (WATER RESOURCES		Will be considered in coordination with KGM.
Cemeteries which are in Project area shall be protected.	200	3.25	PRECAUTION (SOCIAL)		Will be protected.

3 SUMMARY OF STAKEHOLDER ENGAGEMENT TO DATE

3.1 INTRODUCTION

This Chapter summarizes information concerning all of the various stakeholder engagement activities performed to date as part of the Scoping and further development of the ESIA.

Please note that this Chapter solely describes stakeholder engagement activities conducted during the preparation of this Draft ESIA. All proposed *future* stakeholder meetings, notices, etc. are included in the Stakeholder Engagement Plan – SEP, which is prepared as *Volume VI* of this ESIA Package.

3.2 PREVIOUS CONSULTATION ACTIVITIES IN 2016

International best practice recommends the active engagement of stakeholders throughout the ESIA process, commencing with scoping. A number of activities were undertaken to determine the views of stakeholders on issues of concern that were then considered in scoping the ESIA, as described in the following.

During the 2016 Turkish EIA process for the overall motorway project, KGM undertook initial consultations and briefings with key Turkish agencies with regulatory and policy responsibilities relevant to the Project.

In addition, a total of five public consultation meetings were conducted in İstanbul/Silivri, Tekirdağ/Süleymanpaşa, Çanakkale/Gelibolu, Çanakkale/Çan and Balıkesir/Balya during the Turkish EIA process.

Based on publicly available information, the following NGOs expressed opinions about the Project:

- Çanakkale Ticaret ve Sanayi Odası (Çanakkale Chamber of Commerce and Industry);
- TÜRSAB (Association of Turkish Travel Agencies);
- Bursa Ticaret ve Sanayi Odası (Bursa Chamber of Commerce and Industry);
- Tekirdağ Ticaret ve Sanayi Odası (Tekirdağ Chamber of Commerce and Industry);
- Çanakkale Turistik Otelciler, İşletmeciler ve Yatırımcılar Birliği Derneği (Association of Çanakkale Touristic Hotel Keepers, Managers and Investors);
- Kaz Dağları Savunması (Defense of Kaz Mountains);
- İstanbul Kent Savunması (Defense of İstanbul City);
- Kuzey Ormanları Savunması (Defense of Northern Forests);

- TMMOB (Union of Chambers of Turkish Engineers and Architects) Şehir Plancıları Odası (Chamber of Urban Planners);
- TMMOB Çevre Mühendisleri Odası (TMMOB Chamber of Environmental Engineers);
- TMMOB Ziraat Mühendisleri Odası (TMMOB Chamber of Agriculture Engineers);
- Kaz Dağı Doğal ve Kültürel Varlıkları Koruma Derneği (Society on Protection of Kaz Mountains Natural and Cultural Assets);
- Emek ve Demokrasi Güçleri Çevre Platformu (Environmental Platform of Labor and Democracy Forces).

The aspects raised by these Non-Governmental Organisations (NGOs) are summarised below:

- although in pre-construction stage at the time of preparation of this ESIA document, the Project will indirectly lead to an increase in economic activities such as tourism, infrastructure services, agricultural and industry, real estate investments and employment levels;
- considering that transportation is the most important aspect of tourism, the 1915 Çanakkale Bridge will make a huge positive impact on the transportation segment in the Çanakkale region;
- the Project will involve loss of agricultural land owned by farmers in the region, who will lose their professions and migrate to metropoles;
- there are many Project uncertainties (e.g. disposal of excavation material);
- NGOs considered not enough information about the Project was disclosed;
- the Project will have an impact on nature and will promote rapid urbanisation, which is already an issue in the region;
- the Project will have cumulative impacts with İstanbul Third Airport and North Marmara Highway projects, also leading to increase of industrial and urbanisation pressure on Istanbul.

3.3 STAKEHOLDER ENGAGEMENT DURING SCOPING

Numerous Stakeholder Engagement activities have been undertaken as part of the ESIA Scoping work in May and June 2017.

3.3.1 Consultations with Government Agencies

National, provincial and local level Government agencies (5 agencies in total) on were consulted through face-to-face meetings held by the ESIA team

accompanied by representatives of KGM and one representative of the Project developer, COK A.Ş. During the meeting, the project components were presented along with the Project Information Document, Grievance Mechanism and Grievance Form in Turkish. The Project Information Document is presented in SEP. The Grievance Mechanism is presented in *Chapter 4* of the Stakeholder Engagement Plan (SEP) developed for the Project and the Grievance Form is provided in *Appendix 4* of the SEP.

The SEP is a standalone document and it constitutes the Volume VI of the ESIA.

During the discussions with the authorities, the following key issues were raised:

- positive impacts for the development of the region;
- need to improve the activities through which Project information is provided to enhance the democratic participation to the Project
- transportation projects are perceived by some people as a symbol and requirement of development;
- impact of the Project on agricultural land and activities;
- change of current farmers' access to their lands involving longer distances they would need to travel to access the respective plots;
- need for getting the relevant permits in accordance with Laws no.: 5403, 4342 and 1380 (agriculture related laws);
- impact of the bridge construction on fish considering the that the Dardanelles is one of the important fish migration routes (mid of April - mid of May) and fishing is an important source of income in Canakkale;
- change of the demographic structure of Çanakkale in short-term;
- increase of real estate prices in the region;
- noting the ecological value of the dry dock area.

Summaries of the discussions with the government authorities are provided in *Appendix 1* to the SEP.

3.3.2 Consultations with NGOs

One association (Kepez Fishermen Cooperative under the Association of Çanakkale Sea Products and Fishermen) and one academia (Çanakkale 18 Mart University, Department Of Environmental Engineering) were consulted through face-to-face meetings held by the ESIA team accompanied by representatives of KGM and one representative of the Project developer, COK A.Ş, in June 2017. During the meetings, they consultees were provided with the Project Information Document, Grievance Mechanism and Grievance Form in Turkish language.

During the discussions with these organisations, the following key issues were raised:

- location of the bridge is not being used for fishing activities but it is on a fish migration route;
- people of Çanakkale are aware about the Project and the bridge location but access to this information was generally in informal ways;
- urbanization and change of the demographic structure of Çanakkale in short-term.

Summaries of the discussions held are provided in *Appendix 1* to the SEP.

3.3.3 Consultations with Village Muhtars

Muhtars (village headmen) of three settlements (Yülüce, Koruköy, Sütlüce) located within a corridor of 1,000 m (500 m on each side of the motorway centerline) were contacted by the ESIA team by phone and a face-to-face meeting was set-up in the village tea house.

Out of the affected 29 settlements (see *Appendix 2* to the SEP), which were identified within or in close proximity to the Social Area of Influence, defined to be a corridor of 1,000 m width (500 m on each side of the motorway centreline) along the Project route, 15 settlements were identified to be included in the socio-economic baseline survey (Field Social Survey-FSS) conducted on 6-17 July 2017. Hardcopies of the Project Information Document (including a high-level map of the Project route), Grievance Form and Grievance Mechanism in Turkish were provided to the participants in the FSS activities. Additional hardcopies were provided to the Muhtar of the respective settlements to be made available to interested villagers.

During the discussions with the Muhtars and other male villagers present in the tea house, the following key issues were raised:

- expropriation process to be carried out by ensuring payment of sufficient land value;
- impact of the Project on the farm land which is irrigated and highly productive;
- lack of similarly productive land in the area to compensate loss of agricultural land for the Project.

Summaries of the discussions with the Muhtars are provided in *Appendix 1* to the SEP.

3.3.4 Consultation with the Public

The public present in the tea house when the discussions with Muhtars of Yülüce, Koruköy, Sütlüce were held were free to express their opinions of the

Project. Approximately 54 male participants attended the initial consultation discussions.

Additionally, a discussion with one female group (6 female residents) was organized in Koruköy in May 2017.

They mentioned that the existing motorway (D550/E87) had effects on their daily activities by fragmenting their land to the north of the village and blocking movement of animals to pasture lands. Consequently, it was understood that they would require certain underpasses at the new Motorway that would allow them, their farming machines and livestock to have access to the farms and pasturelands. They also mentioned that they would accept to be expropriated for the benefit of the Project on the condition of being paid fair values of their lands.

A summary of the discussion is provided in *Appendix 1* to the SEP.

These groups were provided with hardcopies of the Project Information Document, Grievance Form and Grievance Mechanism in Turkish. Additional hardcopies of these documents were left with the Muhtar to be disseminated to the wider community.

3.4 STAKEHOLDER ENGAGEMENT DURING ESIA PREPARATION

During the ESIA studies, two additional consultation meetings were carried out to inform the subsequent ESIA process. A summary of the consultation activities conducted to date and the results is provided here.

3.4.1 Consultations with Mayors

Two representatives of KGM, one COK A.Ş. representative and an ESIA expert attended discussions with the Mayor of Lapseki Municipality on 4 August 2017 and the Mayor of Gelibolu Municipality on 9 August 2017.

The above mentioned face-to-face engagement meetings were held in Turkish and were aimed at presenting the intention to develop the Project, describing its key components and providing hardcopies of Project Information Document, Grievance Mechanism and Grievance Form.

The following key issues were raised during the discussions:

- significant increase of real estate prices during the last four years, even in towns not directly affected by the Project; this trend is expected to continue;
- noting that expropriation activities will be a key issue for the Project;
- pressure of increasing residential areas onto the agricultural lands;
- noise pollution and CO_2 emissions;
- increase in population after the Project implementation;

- impact on fish migration to vibration and lighting;
- noise barrier requested in Evreşe region (Yüllüce and Çokal area) both for noise reduction and securing the bee crossings.

A summary of the discussion is provided in *Appendix 1* to the SEP.

The aspects raised during the consultation meetings have been addressed, as appropriate, in this ESIA Report in the chapter relevant for the respective topic.

3.4.2 Field Social Survey

A Field Social Survey (FSS) was undertaken between 6th and 17th July 2017 as part of the wider process of the ESIA.

The main objective of the FSS was to determine the areas affected by the Project, identify Project Affected Persons (PAPs) and vulnerabilities among these, collect socio-economic data and through these activities establish a baseline for the Project in advance of construction activities. The collected baseline data was integrated into the ESIA/ Socio-Economic Impact Assessment as well as the Stakeholder Engagement Plan (SEP).

Details of the FSS are provided in *Annex III.3.1* to *Volume III*; a brief summary of the type of engagement is given below.

In the course of the preparation of the FSS, the Muhtars of the 15 villages along the route, which were included in the scope of the FSS, were contacted by phone by the field social survey team leader to explain the planned survey.

The FSS included visits by a team of trained male and female interviewers to 15 villages, with the villages selected on the basis of their being most directly affected by the Motorway route or otherwise unique regarding land use/economy (such as villages by the sea). Interviews were held in the villages with the village Muhtars, local women, farmers as well as local fishermen. The representatives for interview were selected/recommended by the respective Muhtars. The following parties were interviewed as part of the FSS:

- 15 village headmen ("Muhtars");
- 125 people including women, elderly, young and seasonal workers interviewed through 18 focus group discussions;
- 386 participants interviewed through socioeconomic household surveys; and
- 386 participants interviewed through in-depth interviews.

Selected examples of the key issues raised during the FSS are summarised as follows (the full FSS is included as *Annex III.3* to *Volume III of this ESIA*):

- Most Muhtars and community members were aware about the Project but few had information about the specific Project route.
- The loss of agricultural land and the replacement value to be received during the expropriation process are perceived as the biggest impacts to this group.
- Villagers in Sütlüce were highly concerned that irrigated agricultural land will be expropriated. The common perception was that the expropriations to be carried out for the Project would take the most productive plots from their use. Villagers were also concerned that they would be expropriated only for the areas required for the Project, leaving wider plots of the respective owner inaccessible or of less value.
- Another perceived risk was that the project would make the region similar to Istanbul, namely with a high degree of urbanisation, and the daily life of the communities will deteriorate.
- In general, all residents and especially women were concerned about the noise impacts during the Project construction and operation.
- Since transportation from Istanbul and other big cities will be easier, people fear that the government will allow the establishment of huge touristic facilities in the region. Saroz Gulf will be zoned for housing and the coastal areas will be filled by the properties of rich people from Istanbul. Thus, as tourism in the region would increase rapidly, there would be a downturn in the agricultural activities. Rich people from Istanbul coming for holiday will populate the communities that have already been subject to huge out-migration.
- Property values have increased in the last 5 years and further increased about 10 times in the wider region, 20 times in the communities like Suluca and Sütlüce, where the feet of the 1915 Çanakkale Bridge will be built.
- There was a perception that the influx of workers for the construction activities may have social impacts on the affected communities.
- Women were concerned about the safety of children who may go out on the highway and could be involved in an accident.
- Despite minor differences in levels of subsistence, all 27 rural communities (excluding Lapseki and Gelibolu) depend on agriculture and husbandry for their livelihoods.
- 59 out of 386 households interviewed consist of only one person. Out of the 59, 44 were households where one woman was living alone.
- Within the scope of the field survey, the interviews with young people indicated that there are no places for social activities in the communities.

Research activities conducted in the 15 Survey Settlements and interviews with stakeholders covered by SEP reveal that there are some expectations of the people in terms of the opportunities provided by the project to the region. These are as follows:

- The project would solve or alleviate the traffic problem especially in the summers in the region since it connects the Asian and European parts of the region and resolves the need for ferries especially for vehicles.
- The project would enhance the commercial activities between Istanbul and surrounding area and the region by solving the problem of transportation of goods. The goods will be transferred between Anatolian and European sides in a faster and more economic way.
- The project would contribute significantly to the development of the region by:
  - enhancing the quality and quantity of tourism investments to the region;
  - encouraging private sector to invest more in the region, which would mean industrial development and more employment opportunities.

Many people emphasized the fact that access to particular services and goods is difficult in the region since the region is far from convenient transportation networks. The project would solve this accession problem of the region to the goods and services.

3.4.3 Project Website

Since June 2017, there has been a website available to the public, in Turkish language, on which Project-related information has been posted: http://www.1915canakkale.com/.

3.5 SUMMARY OF SCOPING FINDINGS

The Scoping process for the ESIA has been an ongoing since it commenced in May 2017. Over this period, the stakeholder engagement activities carried out to date have resulted in valuable lessons being gathered which will be taken forward in the SEP. From the engagement certain topics have been brought into focus to be addressed within the ESIA. A summary of key lessons to date are provided below.

3.5.1 Lessons-Learnt from to –date Stakeholder Engagement Process

Since commencement of the ESIA, a number of different approaches have been applied to provide information about the Project to the various stakeholders and to engage with them to obtain comments and feedback.

For example, large and small meetings and focus-group sessions/interviews were held, documents provided directly to individual stakeholders or through the community Muhtar's.

Several "lessons-learnt" can be identified with respect to what approaches have appeared to work well under the circumstances, and which have been less effective. Key points are described below; these have been considered during the preparation of the SEP (see separate document) and future plans

for effective and meaningful stakeholder engagement on this Project. The SEP also considered information needs raised by the public in the course of the FSS:

- All groups contacted during the FSS expressed their need for comprehensive and continuous information about the Project and related procedures (e.g. expropriation).
- Despite the distribution of the Project Information Leaflets and other information within the communities by the Muhtars, there could still be community members to feel not well informed about the Project. Furthermore, no grievances had been submitted in relation to the Project using the means described in the grievance procedure. For this reason, "Community Liaison Officers" should be assigned to help ensure that villagers are well informed about the Project and have the chance to provide their grievances in the manner most accessible to them throughout the lifetime of the Project.
- It is perceived that local people are often more comfortable in providing opinions in smaller meetings at villages compared to the big meetings at district centres. For this reason, increasing the number of meetings in villages will help to have a better interaction with the local people and get their opinions. These meetings can include ESIA disclosure meetings and regular meetings by the Community Liaison Officers.
- It is observed that the participants of the meetings in the tea houses were all men. In order to reach women and vulnerable people, small focus group meetings are planned in the next stages of consultation to be held during ESIA disclosure and regularly by Community Liaison Officers.

3.5.2 Changes in topic focus during Scoping Process

The planned structure and contents of the ESIA covers all key topics and areas of concern.

Nevertheless, based on the scoping and stakeholder comments, a few topics/concerns gained greater importance during the ESIA process and thus warranted the development of separate, stand-alone documents. A summary of these topics is given below.

Land Acquisition, Compensation and Resettlement Framework (LACRF)

A major issue raised during public consultation was the topic of land expropriation. The majority of the comments received from public to date are related with the process, timing and price of expropriation.

To address the issue of expropriation, the preparation of the Land Acquisition, Compensation and Resettlement Framework (LACRF) started in August 2017, as a separate study but in parallel and close cooperation with the ESIA.

The aim of the LACRF is to identify types of project affected people– especially vulnerable persons, potential impacts on these PAPs and potentially feasible mitigation measures. The LACRF is a standalone document that will be further developed and implemented in future stages. The LACRF will be disclosed with the ESIA Report as part of the overall "ESIA Package".

Other Public Concerns Raised/Issues Flagged during Scoping

Additional main issues raised (*inter alia*) and respective chapters where these are addressed in the current ESIA Report are given below:

- Socio-economic situation of the people (loss of agricultural land, potential severance to fields) addressed in *Volume III, Appendices3.1 Socio-Economic Impacts* and 3.2 *Displacement of Existing Land, Use, Property and People;*
- All topics related to the quarries and borrow pits are primarily addressed in *Volume III*, *Appendix 2.1 – Resources and Waste;*
- Potential hazards on the community during construction, and employment opportunities are addressed in *Volume III*, *Appendices 3.3 – Labour and Working Conditions* and *3.4 – Community Health and Safety*;
- Potential temporary impacts to marine environment (including fish) during construction of the Bridge ; this is addressed in *Volume III, Appendix 2.3 – The Water Environment* (regarding technical aspects of the Bay and marine conditions), as well as in *Appendix 2.4 – Biodiversity and Conservation and Appendix 3.1 Socio-Economic Impacts*;
- Loss of biodiversity and cultural heritage are addressed in *Volume III, Appendices 2.4 – Biodiversity and Conservation* and *3.5 - Archaeological and Built Heritage*;
- Elevated air and noise emissions are addressed in Volume III, *Appendices 2.5 – Air and Climatic Factors* and 2.6 – *Noise and Vibration*.

Stakeholder Engagement

The topic of stakeholder engagement is split between the ESIA Report and the standalone "Stakeholder Engagement Plan – SEP" document. The discussion in *Chapter 3* (i.e. this chapter) is limited solely to describing the *past* stakeholder engagement /public disclosure activities, whilst all of the *planned future* actions are compiled in the SEP document. The SEP document will be further developed and implemented in future stages, and the SEP is also being disclosed with this ESIA Report as part of the overall "ESIA Package".

3.6 STAKEHOLDER ENGAGEMENT DURING DRAFT FINAL ESIA DISCLOSURE

In line with international lender requirements, the Draft Final ESIA Report, Non-Technical Summary (NTS), SEP, Environmental and Social Management Plan (ESMP) and Guide to Land Acquisition (GLAC), ESIA Brochure, and Grievance Form were subject to public disclosure and comment for 30 days. The public disclosure period started on 8th January 2018 and ended on 7th February 2018.

Disclosure activities comprised two open-day type of events in Malkara and Canakkale and five public meetings held in Gelibolu, Sutluce, Lapseki, Umurbey and Bolayir. A total of 856 individuals were registered and approximately 100 more visited the events of the roadshow without registering.

The main topics of discussions during the disclosure roadshow were related to:

- the Project rationale (for example, the route, presence of a railroad in the design, technical characteristics, alternatives);
- expropriation (for example, valuation of different types of land, timing of the expropriation with regard to seasonal agricultural work-cycle, orphan lands, concerns about the significance of the private agricultural land to support the livelihood of project affected persons); most questions and comments related to expropriation were addressed by KGM representatives attending the events;
- construction (for example, presence of subcontractors, quarries and borrow pits location, number of construction workforce involved in the area, employment of local people);
- socio-economic impacts (for example, pressure on the local education and healthcare infrastructure as a result of incoming construction workforce, increased urbanization, impacts on tourism, impacts on the ferry operators and their employees);
- environmental impacts (for example, impacts on wildlife, impacts on population from noise levels, air emissions, impacts of the Project on fruit trees, impacts on the Kaz Daglari Mountains as a result of the wider Kınalı-Savaştepe Motorway Project).

The concerns listed above are addressed in this Final ESIA. The activities conducted to plan the disclosure events, the types of documents disclosed and the comments received during the 30-day disclosure period are presented in a standalone Consultation Report. *Annex A* to the Consultation Report comprises the *Stakeholder Register* and presents all comments and questions received during the disclosure period and how/where these are addressed in

the ESIA package. The Consultation Report is also subject to public disclosure through publication on the Project website and hardcopies provided to the Muhtar offices in the villages in the SAoI, to the municipalities of the three district centres (Malkara, Lapseki and Gelibolu) and the municipality of Canakkale City.

4 ADMINISTRATIVE FRAMEWORK

4.1 INSTITUTIONAL FRAMEWORK

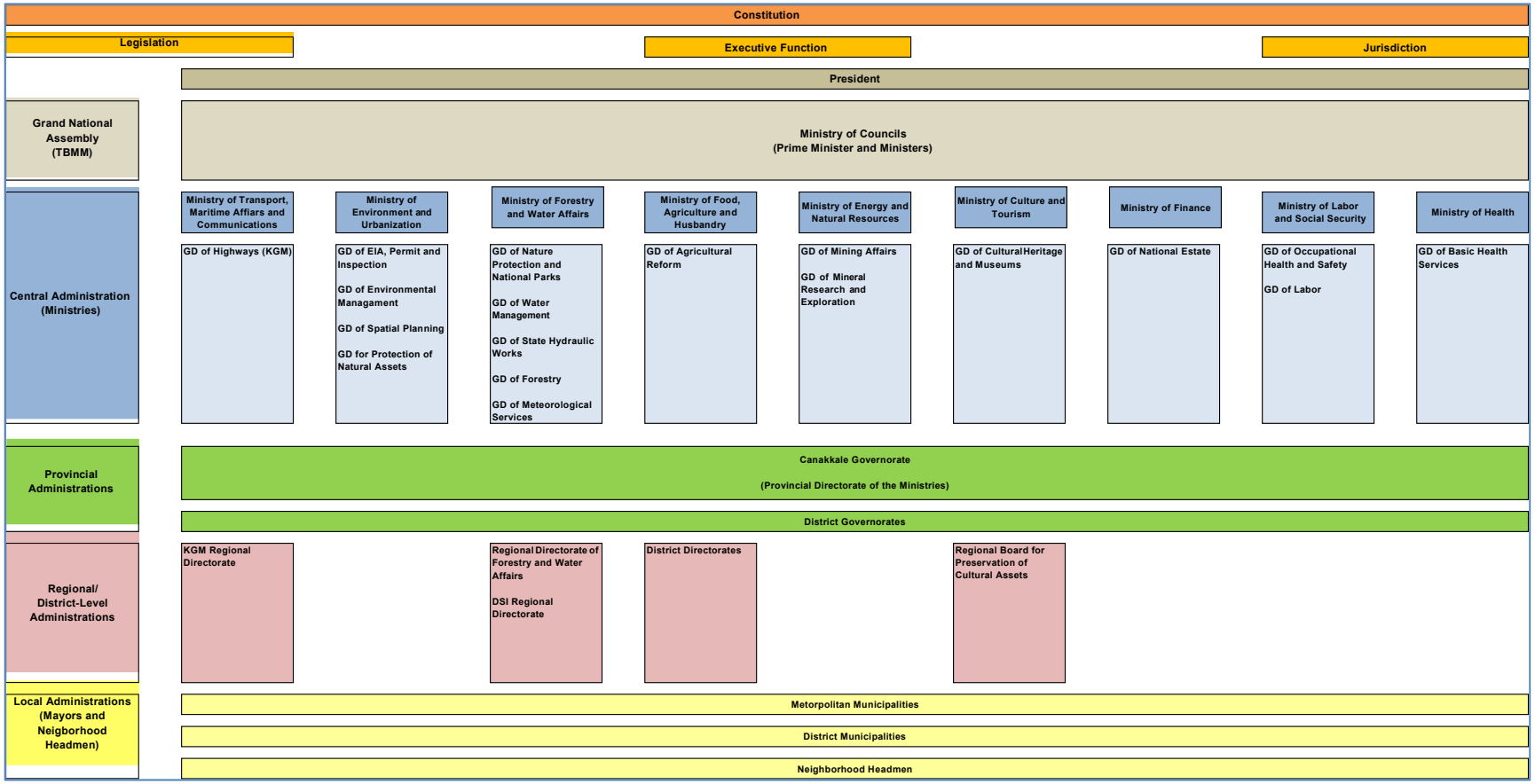
The administrative structure in Turkey is governed by central and local administrations. The central administration is organized so that the land mass of the country is divided into provinces and the provinces into further smaller divisions (i.e. districts, municipalities, villages/settlements) according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

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

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

The figure below presents the administrative layers with highlights on the most relevant for the Project.

Figure 4-1 *Institutional Framework in Turkey*



4.2 APPLICABLE TURKISH ENVIRONMENTAL AND SOCIAL LEGISLATION

Turkish Environmental Law (Law No: 2872), which came into force in 1983, handles environmental issues on a very broad scope. Under the Environmental Law, environmental regulations 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.

Complementary to the Environmental Law and its regulations, the laws listed below also govern the protection and conservation of the environment, prevention and control of pollution, implementation of measures for the prevention of pollution, health and safety and labor issues:

- Electricity Market Law (No: 6446)
- Energy Efficiency Law (No: 5627)
- Expropriation Law (No: 2942)
- Forestry Law (No:6831)
- Groundwater Law (No: 167)
- Labour Law (No:4857)
- Law on the Conservation of Cultural and Natural Assets (No:2863)
- Law on Improvement of Olive Cultivation and Budding of Wild Species (No:3573)
- Law on Soil Protection and Land Use (No:5403)
- Mining Law (No:3213)
- Municipality Law (No: 5393)
- National Parks Law (No: 2873)
- Pasture Law (No:4342)
- Public Health Law (No: 1593)
- Resettlement Law (No: 5543)
- Traffic Law (No:2918)

4.3 INTERNATIONAL CONVENTIONS

A list of relevant conventions ratified by Turkey and relevant for the environmental and social aspects is presented in the Annex B of the current report (e.g. ILO convention, MARPOL, UNESCO, Climate change, Biodiversity protection etc).

4.4 EIA PROCESS UNDER TURKISH EIA REGULATION

Under Article 10, Environmental Law sets out the general scope of 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 on February 7, 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 25.11.2014 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 MoEU ("Ministry") evaluates the need for a full EIA process 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;
    - Highways 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) in a way that they have a 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 full EIA process starts with submitting a brief report (EIA Application File), summarizing the characteristics of the Project and the impact area, and the potential environmental impacts and mitigation measures, prepared according to the format provided in Annex III of the EIA Regulation to the Ministry of Environment and Urbanization (MoEU).

Then the MoEU, General Directorate of EIA, Permit and Inspection forms a committee from related governmental and non-governmental agencies, which

also includes the Project owner and the consultant that would prepare the EIA report. With the formation of this committee the scoping phase starts.

This committee aims to define the scope of the EIA report to be prepared for the Project. The EIA scope is defined based on findings of the committee and the comments and suggestions received from a public participation meeting to be held at the Project site. The purpose of the meeting is to give information regarding the Project and take the opinion of the public and answer their questions regarding the Project.

In addition, the MoEU shall announce that the EIA process regarding the Project has been initiated and information regarding the EIA process may be obtained also via the internet. The scoping phase is completed with the issuance of the project specific EIA format by the MoEU.

The Motorway EIA Report for the entire Kınalı-Balıkesir Motorway was performed with taking in consideration the Guidelines developed by the Turkish Environmental Authority (MoEU), which set up general and project-specific requirements. A number of key provisions were identified as permitting requirements following the approval of the EIA study that must be implemented by the project developers. These provisions are summarised in the "Register of Commitments", attached as Annex C to this report; many of these commitments also apply specifically to the Motorway (and Bridge) of this Project and hence must be implemented by COK A.S.

4.5 EXPROPRIATION PROCESS UNDER TURKISH EXPROPRIATION LAW

There are a large number of laws and regulations relevant to the implementation of land acquisition, e.g.: Expropriation Law (No: 2942), Resettlement Law (No: 5543), Code of Civil Law (No: 4721), Cadastre Law (No: 3402), Forest Law (No: 6831), Environment Law (Law No: 2872), Municipalities Law (No: 5393), Pasture Law (No: 4342) and Village Law (No: 442) and several implementation regulations pertaining to the above-mentioned laws. Expropriation implementation activities based on Turkish laws and regulations can be summarized in line with the following stages:

- Project approval (public benefit decision);
- Preparation of expropriation plans;
- Identification of property owners and address investigation;
- Expropriation decision;
- Establishment of a "Valuation Commission" and the Valuation Process;
- Establishment of a "Negotiation Commission" and purchasing process,

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. COK does not have any responsibility or authority regarding the execution of expropriation works.

4.6 RESETTLEMENT PROCESS UNDER TURKISH RESETTLEMENT LAW

The Resettlement Law deals with the families applying to related governmental agencies in the project region and requesting government assisted resettlement. Law also covers the procedure of resettlement of immigrant families coming from other countries, as well as that of nomadic families.

Resettlement assistance of the government is provided to entitled families while expropriation compensation payments are paid to all individuals holding immovable properties in the project area. Three types of resettlement can be applied according to the choices and requests of affected families: agricultural resettlement, non-agricultural resettlement and physical resettlement. Entitlement criteria related with resettlement whose lands will be expropriated are defined in Resettlement Implementation Regulation. According to the Regulation, owners requesting the resettlement must be residing at the project affected area, and they must earn annually less than 18 times monthly minimum official wages, and they should be seen as a family and must not be a civil servant.

4.7 RELEVANT STANDARDS OF THE ESIA

Based on the information provided by the Client, the Project will need to adhere to the following standards (collectively referred to as the "Relevant Standards"):

- National (Turkish) environmental, social, employment, health& safety, laws and regulations;
- EBRD Policy and Performance Requirements (2014);
- EBRD Sub-sectoral Environmental and Social Guidelines (i.e. Building and Construction Activities, 2010)
- IFC Performance Standards (January 2012);
- IFC Environmental, Health, and Safety (EHS) General Guidelines;
- IFC Environmental, Health, and Safety Guidelines for Toll Roads;
- IFC/EBRD Worker's Accommodation: Processes and Standards;
- EIB Statement of Environmental and Social Principles and Standards (2009);
- OECD Revised Council Recommendation on Common Approaches on Environment and Officially Supported Credits;
- Equator Principles III (June 2013);
- EU environmental, social and OH&S Directives ;

- International Labour Organization (ILO)'s fundamental conventions concerning the abolition of child labour, the elimination of discrimination at the workplace and the elimination of forced and compulsory labor;
- International Standards (ISO 14001, OHSAS 18001, EBRD road safety audit requirements)
- International best practice regarding the mitigation of impacts and consideration of minorities and vulnerable persons.

5 ESIA METHODOLOGY

5.1 INTRODUCTION

This Chapter describes the ESIA methodology that has been followed for the Project. The key objectives of the ESIA were to assess the potential environmental and social impacts associated with the planning, construction, operation and decommissioning and closure phases of the Project and, to identify measures that can be adopted to avoid, minimise or offset adverse impacts and enhance beneficial impacts.

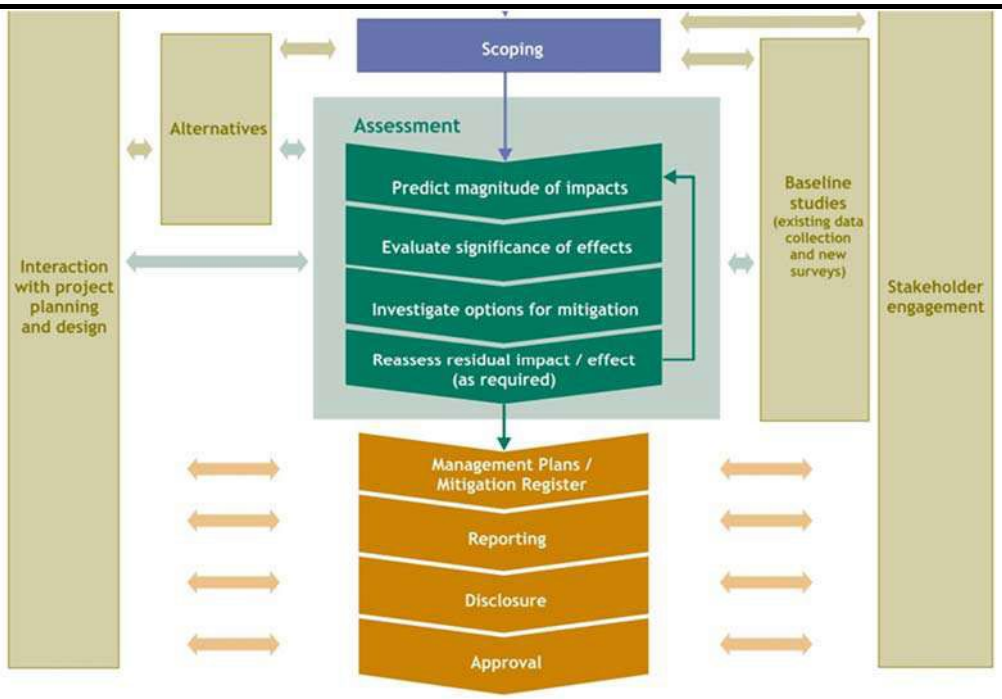
5.2 OVERVIEW OF THE ESIA PROCESS

To obtain development consent and the associated permits for construction and operation, the proposed Project is subject to the Environmental Impact Assessment (EIA) process, as specified in the *Chapter 4*).

In addition to following national law, COK is seeking funding from international finance institutions which are signatories to the Equator Principles. These principles specify ESIA requirements (or performance standards) from the International Finance Corporation (IFC). Accordingly, COK has committed to complying with both the Turkish EIA process, as well as IFC and EBRD requirements. The term ESIA will therefore be used to denote this dual-impact assessment process.

The key stages for this ESIA process are highlighted in *Figure* 5-*1.*

Figure 5-1 *Overview of the ESIA Process*



5.3 SCOPING

During the scoping phase, key potential environmental and social-economic impacts and sensitive receptors were identified, an impact assessment methodology was defined and the Terms of Reference (ToR) for the ESIA were developed. Issues that were raised by stakeholders during the scoping phase were taken into account in the ESIA ToR.

The Scoping Report was submitted in its first version to COK in June 2017 and was approved in September 2017. Annex II A of this Volume of the ESIA presents an overview of the of Scoping results for the Project.

5.4 BASELINE STUDIES

Primary and secondary environmental and social data was collected during the baseline studies in order to enhance understanding of the Project's receiving environment. The baseline highlighted the existing environmental and social issues and formed the background against which impacts were identified and evaluated. In particular, the baseline aims to provide information to enable the following:

- the identification of key conditions and sensitivities within the proposed Project area;

- the prediction and evaluation of possible impacts resulting from the proposed Project;
- the understanding of stakeholder concerns and analysis of perceptions and expectations; and
- the provision of a benchmark from which to assess future changes resulting from the proposed Project and monitor the effectiveness of mitigation measures.

5.5 *ALTERNATIVES AND INTERACTION WITH PROJECT PLANNING AND DESIGN*

Project alternatives were considered from an environmental and social perspective to investigate whether there were other viable options that would result in fewer significant impacts. According to verbal information from senior KGM personnel interviewed by COK, the alternative study by KGM was performed many years ago and there is curently very limited information on that process). Reportedly, the following criteria were considered when the project was initially designed:

- Avoiding populated areas to minimize expropriation;
- Avoid natural protected areas/ no go areas;
- Conform to topography and technical design specifications
- Micro-routing to avoid known archaeology areas etc…

Throughout the ESIA process, ERM interacted with COK's Project Planning and Design Team. Through this interaction, ERM was able to develop a formal Project description that is included as *Chapter 2* in the main ESIA report. The Project description was used to inform the impact assessment process and development of appropriate mitigation measures.

5.6 *IMPACT ASSESSMENT*

During the impact assessment phase, the ways in which the Project will interact with the physical, biological, cultural and social environments to produce impacts to resources/receptors were assessed. This involved a number of stages as set out below.

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

Each ESIA topic area (eg 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, eg social impacts, a more qualitative classification was necessary.

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

5.6.1.2 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 (for example, the Saros Bay Special Protected Area), 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.

5.6.1.3 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 5-2*.

Figure 5-2 *Impact Significance Matrix*

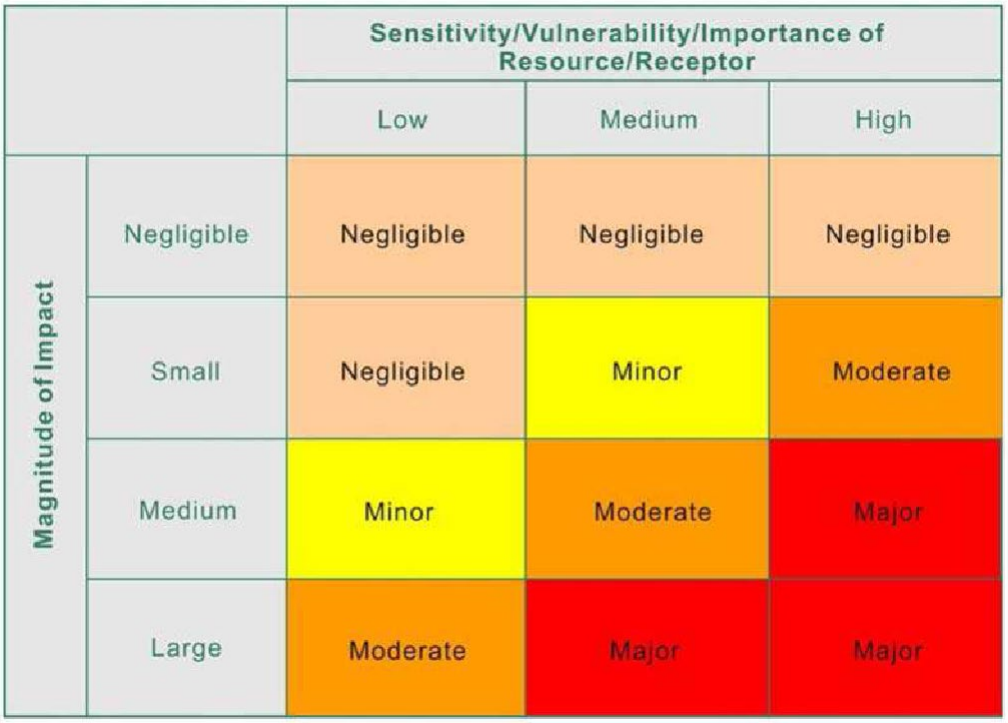


Table 5-1 provides context for what the various impact significance ratings signify.

Table 5-1 *Context of Impact Significance*

Significance Designation	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.

Significance Designation	Significance Context
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).

5.6.1.4 Identification of Mitigation Measures

Where significant impacts were identified (ie 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' (ALARP).

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 that is utilised in this ESIA is presented in *Figure 5-3.* 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.

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 (ie prior to the impact assessment stage of the ESIA Process). Accordingly, they are not described as mitigation measures in the individual topic assessment chapters.

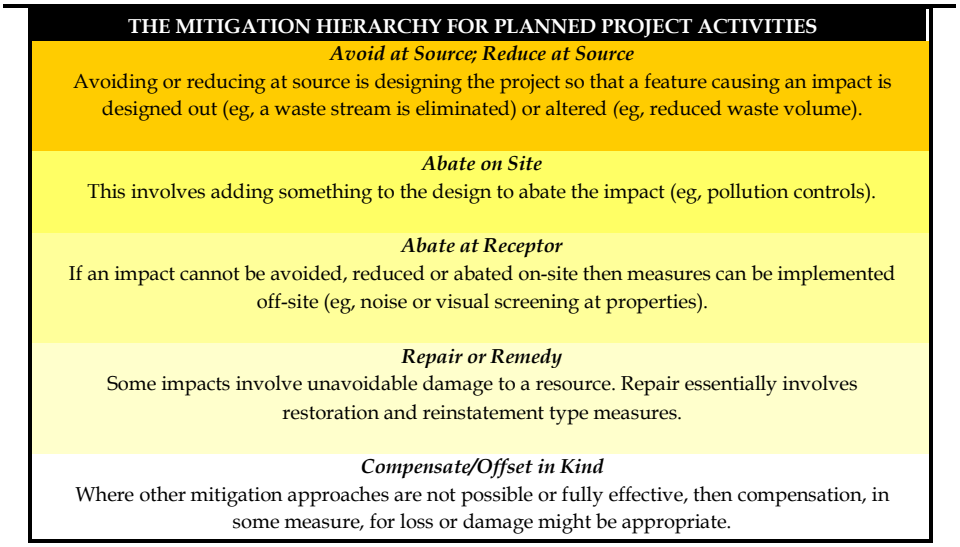
A mitigation workshop was held between ERM and COKYI the 21-22nd of September 2017. Proposed mitigation measures were discussed and agreed upon prior to finalisation of the ESIA.

All the mitigation measures outlined within the ESIA and those commitments made under the Turkish ESIA process have been collated and listed within the Commitments Register for the Project which is annexed to ESMP - *Volume IV* of this ESIA.

Volume IV of this ESIA outlines the Environmental and Social Management Plan (ESMP) for the project and presents an overview of how the mitigation

measures for this Project will be implemented by Project and its contractors during construction and operation.

Figure 5-3 *Hierarchy of Options for Mitigation*



5.6.1.5 *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.

5.6.1.6 *Cumulative Impacts*

Assessment of cumulative effects is an integral part of the ESIA process and ensures that all aspects of potential effects from the Project have been, or will be, addressed. Cumulative effects result from incremental changes caused by other past, present or reasonably foreseeable developments together with those from the construction and operation of the Project.

In most instances, past and present developments will have been captured in the baseline for the Project (for example, through noise measurements, traffic counts) and the normal practice of 'adding' impacts from the Project to the baseline will assess the cumulative effect.

The cumulative assessment approach is based on a consideration of the approval status or existence of the 'other' activity and the nature of information available to aid in predicting the magnitude of impact from the other activity.

Cumulative impacts are described in *Chapter 8*.

5.6.1.7 *Management Plans*

Following the assessment of impacts the ESMP has been developed as Chapter Volume IV to this ESIA and it outlines the management plans which will be developed for each topic area eg air quality management plan, noise management plan, social management plan, etc. These plans will set out how the mitigation measures will be put into practice, monitored and upheld. This included defining the responsibility, timing and reporting requirements associated with each measure.

5.6.1.8 *Disclosure*

This ESIA report will be disclosed on the Project and Lenders' websites to the interested stakeholders for an assumed period of 30 or 60 days, beginning (foreseeably) in November 2017. The aim of this engagement is to discuss the findings of the ESIA, in particular the impacts identified and the mitigation measures proposed to manage these.

Stakeholder views will be considered by COK, and the mitigation measures presented in the ESIA and the Project design may be revised where practicable and appropriate, in response to this feedback.

Once the ESIA has been finalised following such changes, it will be formally disclosed as a final draft to all stakeholders, and COK will seek 'sign-off' by affected community members and other stakeholders on their position in response to the proposed Project.

The final ESIA report will be submitted to the lenders in February 2018.

5.6.1.9 *Stakeholder Engagement*

Periodic engagement was undertaken with stakeholders throughout the ESIA process and stakeholders views have been incorporated into the assessment process. The engagement process conformed to the IFC's Performance Standards and EBRD's Performance Requirements and is described in more detail in *Chapter 3*. The stakeholder engagement plan developed for the Project (refer to *SEP*) provides a list of stakeholders that were consulted throughout the ESIA process.

5.6.1.10 *Identification of Mitigation and Enhancement Procedures*

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this IA, ERM has adopted the Mitigation Hierarchy as presented in *Figure 5.3* above and described below:

- Avoid at Source, Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing

activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).

- Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- Compensate in Kind, Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

6 SCOPE OF THE ESIA

6.1 SUMMARY OF SCOPING

This Chapter summarises the approach and results of the Scoping that was undertaken for this ESIA Project. *Chapter 3* presents information concerning all of the various stakeholder engagement activities performed to date as part of the Scoping and further development of the ESIA. The principal purpose of a scoping exercise is to identify the impacts of a proposed project which are considered likely to be significant, so that the ESIA assessment studies can be planned and focused on these important issues.

6.2 APPROACH TO SCOPING

Scoping is a crucial first step in an ESIA, designed to identify the likely significant impacts of the Project that will require investigation which then help define the detailed terms of reference for the assessment studies. It involves the systematic consideration of the potential for interaction between activities involved in developing the Project and aspects of the physical, natural, cultural, social and socio-economic environment that may be affected, consideration of which of these are likely to be significant and consultation with government and a range of external stakeholders to determine their views on the likely significant impacts.

The overall scope of work required for this ESIA was developed in the Summer of 2017 and determined the requirement for a full ESIA based on the requirements of the Equator Principles (1), the IFC Performance Standards (2) and relevant IFC EHS Guidelines (3) regarding the assessment and management of environmental and social impacts and risks.

6.2.1 *International Good Practice*

Based on the information provided by the Client, the Project is required to adhere to the international standards and Turkish Regulations as outlined in *Chapter 4* of this document.
The Lender Group has not been established to date; however, based on the specifications provided in the ToR, for the purpose of this assignment, it is proposed to consider the **EBRD and IFC standards as being the "governing" international lender standards**.

(1) http://www.equator-principles.com/

(2) http://www.ifc.org/wps/wcm/connect/115482804a0255db96fbffd1a5d13d27/PS_English_2012_Full-Document.pdf?MOD=AJPERES

(3) http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

The EBRD Performance Requirements (in particular PR1 - Assessment and Management of Environmental and Social Impacts and Issues) and the IFC Performance Standards (PS), in particular PS 1 (Assessment and Management of Environmental and Social Risks and Impacts), set out expectations and guidance for undertaking Environmental and Social 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.

In addition to PR1, the following EBRD PRs are relevant for the Project:

- PR1: Assessment and Management of Environmental and Social Impacts and Issues
- PR2: Labour and Working Conditions
- PR3: Resource Efficiency and Pollution Prevention and Control
- PR4: Health and Safety
- PR5 Land Acquisition, Involuntary Resettlement and Economic Displacement
- PR6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PR8: Cultural Heritage
- PR10: Information Disclosure and Stakeholder Engagement

IFC Performance Standards 2 to 8 provide guidance on specific environmental and social aspects:

- PS2: Labour and Working Conditions
- PS3: Resource Efficiency and Pollution Prevention
- PS4: Community Health, Safety and Security
- PS5: Land Acquisition and Involuntary Resettlement
- PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS8: Cultural Heritage.

PS 7 / PR7 (Indigenous peoples) are not applicable because there are no indigenous peoples in Turkey per EBRD and IFC definition. PR9 refers to Financial Intermediaries and does not apply to the Project.

The approach to scoping adopted for this Project has been influenced by the challenging programme for completion of the ESIA. This is dictated by the timetable for completion of the lending arrangements and financial closure, with consideration of the tight period provided by the KGM for construction of the Project.

Given the short timeframe, scoping was based on the professional experience of the ESIA Team informed by discussions with the wider Project team, with representative stakeholders and the provision of data about the Project, as well as an overview of the environment of the area expected to be influenced by its construction and operation.

In accordance with the international standards, the following matters have been considered during scoping:

- impacts have been assessed for construction, operations, non-routine operations including accidents and emergencies;
- where information was made available by COK (e.g. excepting quarries, borrow pits etc), the elements of the Project and all facilities, infrastructure and activities associated with the Project, including actions by third parties on which the Project depends, have been assessed, whether they are funded as part of the Project or by other parties;
- the assessment has addressed the potential impacts of the Project on the social, cultural and economic environment as well as the physical and natural environment (including impacts to health) ;
- cumulative impacts with other existing or planned developments have been addressed;
- the assessment has addressed positive or beneficial impacts as well as adverse effects and measures to enhance them will be proposed;
- the ESIA includes a Framework-level ESMP which will provide the basis of the Social and Environmental Management System to be further developed and implemented by COK and the EPC contractor;
- the ESIA includes a Land Acquisition and Compensation Resettlement Framework Policy to the procedures that will be followed and the actions that will be taken to mitigate adverse effects, compensate losses, and provide development benefits to persons and communities affected by the Project; and
- technically and financially feasible alternatives considered during the planning of the Project are discussed in the ESIA and the rationale for selecting the particular alternative has been documented based on information provided by the Client.

The ESIA has been based on Project information provided by COK, baseline information available from existing sources and further social and environmental information gathered during the assessment studies. A full description of the baseline is presented in *Volume III* Technical Appendices of the ESIA Report.

6.3 *RESULTS OF THE SCOPING EXERCISE*

The potential interactions between the Project and the resources and receptors were analysed during the ESIA Scoping using a modified Leopold matrix approach as outlined in *Table 6-1* (environmental) and *Table 6-2* (social) below. The matrix displays the key Project activities (through the relevant life cycle) against resources/receptors and allows a methodical identification of the potential interactions each Project activity may have on the range of resources/receptors within the Project Area of Influence (AoI).

A colour code was used to display the results of the analysis performed as indicated below:

(White)	An interaction is not reasonably expected.	Aspect "scoped out"
(Grey)	An interaction is reasonably possible but none of the resulting impacts are likely to lead to significant effects, and/or Interaction is addressed through embedded mitigation measures	Aspect "scoped out", but rationale is provided in relevant section of current report
(Black)	An interaction is reasonably possible and at least one of the resulting impacts is likely to lead to a (negative) effect that is significant. .	"Scoped in" – subject to impact assessment.
(Pink)	Impacts which are considered likely to be positive are colour coded using pink	"Scoped in" – subject to impact assessment.

Those interactions that are coloured *white* are 'scoped out' of further consideration in the impact assessment process and no discussion is warranted in the ESIA report to support the decision (owing to the obvious basis for identifying no potential interaction).

Those interactions that are coloured *grey* are also 'scoped out', but during the impact assessment process these potential interactions were reviewed to confirm that resulted impacts are not significant and/or are appropriately addressed through one or more embedded controls (explained in the Project Description section of the report *Chapter 2*).

Those interactions marked with *black* are subject and *pink* to impact assessment as part of the ESIA process.

Where additional mitigation measures are required - beyond the already planned embedded controls - these are proposed at the conclusion of the impact assessment for each topic.

Note:

- the Scoping exercise described here was an ongoing process throughout the ESIA implementation. As new information became available (eg about the Project activities, the receptors, impact interactions, or other factors), items that were previously considered of

little or no relevance and therefore scoped out may subsequently haven been scoped in.

- Impacts during decommissioning are considered outside the scope of this EISA.
- The evaluation of impacts for unplanned and accidental event takes into account the likelihood of the event occurring when determining the magnitude of the impact. Likelihood is determined as unlikely, possible, or likely based on professional judgement and quantitative information (eg statistical frequency) where available.

Table 6-1 *Scoping of Impacts on Environmental Resources*

Project stage/activity	Environmental Resources									
	Air Quality & Climate Risk	Geology , Soils & Contaminated Land	Groundwater	Surface water, Freshwater resources	Marine Water	Noise and Vibration	Terrestrial and Aquatic Biodiversity	Marine Biodiversity	Landscape and Visual (Aesthetics)	Resources & waste
CONSTRUCTION										
Motorway Corridor and Service Stations and Field Camps										
Sites and route clearing										
Construction of temporary access roads										
Earthworks (embankments and trenching construction)										
Assembling and welding (including bridges over water courses etc viaducts etc) and use of asphalt plants										
Borrow pits/Quarry mining										
Utilities eg water consumption										
Wastes disposal										
Construction traffic, materials shipping										
Bridge										
Dredging										
Dry dock construction										
Construction of bridge approach roads										
Bridge assembly										
Piling (drilling and pile-sinking, pole lifting and setting, alignment and attachment)										
Construction marine traffic										
OPERATION										
Motorway, bridge and service stations										

Operational Motorway and bridge traffic including lighting	
Service stations	
Maintenance	
Unplanned Events such as accidents and spills and leaks to be considered in the impact assessment for the relevant receptors eg water environment,	

Table 6-2 *Scoping of Impacts on Social Receptors*

Project stage/activity	Social / Socio-economic receptors								
	Socio Economics					Other Social Receptors			
	Local and Macro Economics	Community Demographics	Infrastructure and Serviices	Community Cultural Situation/ Social Cohesion	Ecosystem Services	Land Use and Livelihoods (formerly Displacement of Existing Land, Use, Property and People)	Worker Health and Safety (Labour & Working Conditions)	Community Health and Safety and Security	Archaeological and Cultural heritage
CONSTRUCTION									
Construction of motorway, bridge and service stations and Field Camps									
Land Acquisition (temp & perm) for Project components									
Construction & operation of dry docks, worker camps, access roads									
Employment of personnel and procurement of goods and services (from local market)									
Physical presence of construction workers									
Construction traffic (transportation of workers and materials)									
Pile driving of the foundations									
Operation of construction machinery, equipment and generators, hazardous materials									

Borrow pits/Quarry mining									
Wastes/ Wastewater handling and disposal									
OPERATION									
Operation of Motorway, bridge and service stations									
Employment of personnel and procurement of goods and services (from local market)									
Physical presence of the road and bridge (including impacts from lighting)									
Road and bridge traffic									
Service station operation									
Wastes handling and disposal mainly for service stations									
Maintenance of road and bridge									
Unplanned Events such as accidents and spills and leaks to be considered in the impact assessment for the relevant receptors eg Community, health and safety, infrastructure and services, ecosystem services etc,									

7 IMPACTS DURING CONSTRUCTION AND OPERATION

7.1 INTRODUCTION

This Chapter provides a summary of the major, moderate and positive impacts identified during the ESIA study for the construction of the Project. For more information on other impacts i.e. those of minor or lower significance see the relevant technical appendices to *Volume III* of this ESIA. The methodology used to identify and assess impacts is described in detail in *Section 5* of this ESIA Report Volume II.

As defined during the Scoping of the ESIA, the following Project activities are relevant for the construction phase:

- construction and operation of dry docks, worker camps, access roads;
- employment of personnel and procurement of goods and services (from local market);
- physical presence of construction workers;
- construction traffic (transportation of workers and materials);
- pile driving of the foundations;
- operation of construction machinery, equipment and generators, hazardous materials;
- borrow pits/quarry mining;
- wastes/ wastewater handling and disposal.

As this report is being written information on many of the specifics regarding quarries and waste management was not available. Therefore, a site-specific impact assessment could not be conducted exclusively for this section. Quarries that will be used and information on waste management (ie. which waste disposal facilities will be used) will be either determined later by COK or will be up to the EPC Contractor. The assessment of these topics will then be handled in accordance with the Design Change Management Plan and the applicable Management Plans under the ESMMP.

Around 250 personnel are expected to be employed during the early works phase, and approximately 1,000 on average and near 1.900 during peak times during the construction phase.[1]

The relevant activity for the operation phase is the maintenance of the road and bridge.

7.2 RESOURCES AND WASTE

7.2.1 Introduction

The full assessment of the impacts on the terrestrial water environment is presented in *Appendix 2.1* of *Volume III* of this ESIA Report. The Appendix presents a description of the resources and materials needed for the construction and operation of the Motorway-Bridge Project as well as the

1 Deloitte, *Economic Impact of Canakkale 1915 Bridge and Motorway Project,* draft report, 23 August 2017

wastes generation expected during construction and operation phases, assesses potential impacts and defines mitigation measures. The sections below summarise the findings of this assessment.

The relevant Area of Influence for this topic can be defined as:

- the primary Project site which encompasses a corridor of 1000 m (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;
- the extended Project area including access roads, quarries and construction camps realized due to the Project. The exact location of these was not known at the time of preparing this chapter, as these have not yet been selected by the designers/ Contractor.
- Waste disposal facilities and the roads associated with waste management (i.e. sanitary landfills, waste recycling facilities); these have not yet been selected by the designers/ Contractor.
- Material supply locations and the roads associated with transport; these have not yet been selected by the designers/ Contractor.
- Areal extent of receptors (i.e. soil, surface water and ground water) that may be impacted from supply and waste management operations; the specific receptors cannot yet be defined at this time.

Note Quarries that will be used and information on waste management (ie. which waste disposal facilities will be used) will be either determined at later stages of the Project by COK or will be up to the EPC Contractor.

The risk assessments and potential impacts will be carried out at a later stage that will include the expected traffic volumes and affected routes. Other impact assessments will be conducted including climate change from material extraction and construction material production. An ES site selection plan setting out the protocol for the selection of quarry, borrow pit and spoil disposal sites (and all other sites for off-site activities) will be undertaken. The site selection plan will include the procedures for conducting a due diligence on third party quarries. The EHS considerations that will need to be taken into account in the due diligence and 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 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 IFC guidelines.

7.2.2 Summary of Baseline Findings

For the construction of the Motorway-Bridge 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 motorway and partly re-used as fill material. Note: the handling of dredge spoil from the marine excavations is addressed in the *Appendix 2.3* of *Volume III*.

Arrangements for sourcing and transport of the majority of materials and equipment will be defined in detail by the EPC contractor before the initialization of the construction phase of the Project; in any case this will involve supply from local, national or international sources and use of transport by road, rail or sea. There will be various oversized or heavy load components needed for the construction of the major structures such as the Bridge or viaducts and these may require special transport arrangements.

A total amount of 0.86 million m^3 of concrete are estimated to be required for the Project construction. As explained above, at this stage in the Project design the specific quarries that will be utilised by the Project have not yet been selected. A total of 15 quarries are presently under consideration to be used for the Project. The construction material requirements have not been finalized since geotechnical investigations for the final design are still ongoing and the suitability of cut-fill requirements for the project have not been finalized and for this reason a range for the material requirement could not be assessed. However a preliminary estimate of 6.5 mio tons of aggregate will be needed for the Project. Despite this lack of information, COK A.S. indicated that the volume of these quarries seemed sufficient for the project requirements, however, the option of developing potentially new quarries was indicated to be a possibility.

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 HS, 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 IFC and Turkish regulatory requirements.

Given that the facilities themselves have not yet been selected, the access roads to the borrow pits and quarries are as well not yet defined.

The approximate earthwork volumes are: 29 million m^3 of cut volume and 25.5 million m^3 of fill volume. Based on the above estimates there will be a net surplus of material across the Project of approximately 3.5 million m^3 (i.e. more material will be excavated than needed for fill). Most of this material may be useful for construction of other parts of the Project (embankments, road base materials, etc.) and the aim will be to achieve a balance of cut and

fill material as far as possible. It should be noted that geotechnical assessment is being conducted for the final design stage and a more accurate number will be established. The soil quality will be tested in areas where potential sources of contamination may be expected to ensure proper usage as material for the cut and fill requirements (see *Chapter 2.2 Geology, Soils and Contaminated Land*).

Other typical construction wastes will be stored temporarily onsite in appropriate containers and then transferred to and disposed of (or treated) via licensed waste facilities located in vicinity of the Project. The waste facilities used during construction will be selected by the EPC contractor. The wastes that will be generated during the construction process include:

- Recyclable wastes: waste metals, plastics, cables, glass, paper (packaging material, clean air filters, clean containers, drums bins, crushed stone).
- Wastewater from construction camps and construction operations
- Non-hazardous waste from construction camps and construction operations (scrap metal, slightly contaminated discarded material)
- Hazardous waste (chemicals, additives, paints) generated from use of hazardous materials for road construction
- 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)
- Lubricants and oil from lorries or mechanical part of plant and storage tanks
- Medical waste
- Waste batteries and accumulators.

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); during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material); road litter, illegally dumped waste, or general solid waste from rest areas; animal carcasses; vegetation waste from right-of-way maintenance; and sediment and sludge from stormwater 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).

7.2.3 *Summary of Significant Impacts*

Significant impacts are summarised for the construction in *Table 7-1* and for operation in *Table 7-2.* Mitigation measures are identified in the tables below also.

For the assessment of impacts of minor or negligible significance see *Appendix 2.1* of *Volume III.*

Table 7-1 Significant Construction Resources and Waste Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact

1	Risk of destruction of habitats and vegetation during earthworks and resource extraction	**Major impact** on forest areas between 117+500 – 126+500 and 135+000 – 138+000, and locations of the new quarries that will be built for this Project	• COK A.S.. or EPC Contractor will establish a separate Quarry and Associated Facilities Management Plan as part of the Environmental Management Plan to ensure compliance with applicable Turkish environmental standards and IFC Guidelines for Construction Materials Extraction (IFC, 2007). The procedure will include criteria for selecting quarry and spoil disposal sites that integrates the relevant international requirements and include environmental and community HS factors like site sensitivity, travel routes, mining methods etc. in the decision-making process. In addition:
			  • A due diligence will be conducted for existing quarries to ensure permits are valid and operations are in compliance and international guidelines. Relevant suggestions will be made to improve current standards of the quarry. Quarries should be monitored frequently. Gaps identified based on 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 IFC guidelines.
			  • 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. Whenever possible, general preference will be given to using existing (fully licensed) quarries over opening new quarries
			• The IFC Guidelines for Construction Materials Extraction details the environmental issues during the operational, construction, a decommissioning phases of construction materials extraction primarily include air emissions, noise and vibrations, water as well as waste. Of particular importance will the 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 COK A.S. Transport Control and Site Access Procedure (for on-site and off-site) to be developed. These mitigation measures together with the existing permitting framework in Turkey will be used will be used to minimize the worst-case scenario impacts and allow for residual impact assessment.
			• COK A.S.. will establish a Control of Substance Hazardous to Health 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.
				Major

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
2	Disposal of excavated waste soil	**Major impact** on environment where the spoil is disposed	• COK A.S./ EPC will prepare an Soil Erosion, Reinstatement and Landscape Management Plan in accordance with Turkish laws, IFC guidelines and international environmental management systems. • Re-use of excavated soils in the Project area as far as possible and seek alternative uses of surplus spoil where practicable (eg landscaping and earth works for other projects) to minimise the requirements for off-site disposalCOK	**Moderate**
3	Hazardous waste generation during construction activities	**Major impact**, generated hazardous waste has potential to contaminate the environment	• According to provisions of the Water Products Law No 1380, hazardous waste generated during the construction of the Project shall not be discarded nor discharged in the surface water by COK A.S.. Hazardous wastes will be managed and disposed according to Waste Management Regulation. • COK A.S. will prepare Control of substances hazardous to Health Procedure including procedures for handling and storage of hazardous materials in accordance with manufacturer's instructions, regulations and best practices. In addition, training on the maintenance, handling, transport and disposal of hazardous materials and on emergency response management will be provided to onsite personnel. • Procedures for handling and storage of hazardous materials shall be in line with manufacturer's instructions. Fuels, oils and hazardous materials to be stored on a suitably sized impervious and bunded base. Hazardous wastes to be disposed of by licensed waste contractors.COK	**Moderate**

Table 7-2 Significant Operation Resources and Waste Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	Hazardous waste generation	**Major** impact may arise maintenance and clean-up activities of accidental spills during operation.	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 Environmental Management Plan (see ESMP). The procedures will take into account the Turkish regulations and IFC General EHS Guidelines (IFC, 2007) requirements. These measures will include inter alia the following: • Develop a plan available to all staff at service areas, toll booths etc. which shows where different types of wastes can be placed; • 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;	**Moderate**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			• 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 safety 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; • Provide recycling and trash bins at parking lots and rest areas to minimise road litters; • 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 • Follow practices given in IFC EHS toll road guidelines 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 construction material and waste generation, handling and disposal will be monitored during the construction and operation phase 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	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			• 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 note where the waste is being taken	

7.3 GEOLOGY, SOILS AND CONTAMINATED LAND

7.3.1 Introduction

The full assessment of the impacts on the terrestrial water environment is presented in *Appendix 2.2* of *Volume III* of this ESIA Report. The Appendix presents a detailed description of the geological and soil setting, assesses potential impacts and defines mitigation measures. The sections below summarise the findings of this assessment.

The following potential impacts were identified and assessed in the scoping phase of the assessment and subsequent review:

- increase in land instability/erosion risks;
- seismic activity associated risks;
- potential presence of contaminated land/dumpsites associated risks;
- impacts on surrounding soils/landscape from contaminated roadway runoff;
- loss of geological features of importance for science or of cultural significance.

7.3.2 Summary of Baseline Findings

Information was obtained to assess the significance of the impacts on the geological setting. Information was obtained on the site investigations, assessments, literature and regulatory framework. The geotechnical-geological assessment information provided for the ESIA is based on the preliminary design information gathered for the Project. Geological and geotechnical site investigations were conducted in 2013 to determine the geological and geotechnical properties of the Project site as part of their investigations for the overall project on behalf of KGM. Detailed geotechnical assessment is presently being carried out for the final design. The Preliminary design geotechnical-geological assessment included:

- geomorphological assessment along the road axis,
- 1:25000 scale surficial geological surface mapping
- 69 geotechnical boreholes along the axis of the Motorway on the European side and 34 geotechnical boreholes along the axis of the Motorway on the Asian side
- 52 test pits conducted along the axis of the Motorway on the European side and 11 test pits conducted along the axis of the Motorway on the Asian side
- Geotechnical property testing from soil samples collected from the geotechnical boreholes including bearing capacity, sieve analysis,

Atterberg limits, consolidation tests, CBR among some the parameters that were tested

Offshore investigations were undertaken in 2016 and 2017 along the bridge alignment which consisted of:

- Bathymetric survey: to determine the seabed bathymetry and morphology in the investigated areas
- Side Scan Sonar (SSS) survey: to identify seabed features and obstructions in the investigated areas
- Sub Bottom Profiler (SBP) survey: to obtain a qualitative information relevant to soil stratigraphy and to identify superficial geohazards;
- Magnetometric survey: to detect existing subsea cables, pipelines, and other metallic obstructions
- Ultra-High Resolution (UHR) survey: to identify and map deeper geological and stratigraphic features and phenomena.
- Borehole investigations at the European and Anatolian Tower;

Site Geology and Risk of Land Instability

COKThe general geology as well as the geological characteristics along the Project alignment were reviewed as part of both the geology baseline and the soil baseline that included critical areas for land instability. The preliminary geotechnical-geological assessment identified 12 engineering structures and five cut and fill areas had critical land instability which indicated that risks were present for the geological and geotechnical aspects of the Motorway Design. COK has currently undertaken a more detailed site investigation to further assess the critical aspects of the Project Design.

The six main geologic formations that represent the Project site are: Danişmen, Keşan, Korudağ, Çamrakdere, Kirazlı and Alluvion.

Soil Characteristics and Erosion Risk

The information on soil groups and erosion degrees was obtained from the digital soil maps of The Ministry of Agriculture and Rural Affairs. The soils with respect to their properties relevant for erosion risk are discussed in this section with the potential impacts to the Project during construction or operation phase and the soil conditions relative to their land use (eg, for agriculture).

Of the many soil types in Turkey, 18 are considered as "Main Soils" and five (5) of these are common in the Project area: Alluvial Soil, Brown Forest Soil, Non-Calcareous Brown Soil, Vertisol, and Non-Calcareous Brown Forest Soil.

According to the soil distribution map, mainly Non-Calcareous Brown Forest Soil is present between KM 105+000 – KM 145+500 and Brown Forest Soil and

Vertisol are the other soil types are partially observed. The section starting from KM 146+000 to KM 167+000 is dominated by the presence of Brown Forest Soil. Vertisol and Non-Calcareous Brown Soil are located between KM 168+000 – KM 180+500. The coastal sections of the Project are covered by Alluvial soil type. Brown Forest Soil dominates from KM 185+000 to KM 194+500.

Large parts of Gelibolu Peninsula (75.8%) and Tekirdağ province (61.9%) have very low erosion risks. Erosion risks are low in forested lands and lowland bases. However, there are also certain locations in the region having high erosion risks with partially high slope, weak flora, high valley density and/or erodible soil type (thin characteristics).

The total permanently occupies area by the highway is estimated to be 1,400 hectares based on Chapter 2.4 Biodiversity and Conservation, Ecosystems Services section. It can be observed that the most affected habitat (permanently occupied by the highway – habitat lost) is agricultural lands (74.76%), described with a negligible sensitivity (see Table 1-6). The affection to the rest of the habitats will be much lower, with a percentage of habitat loss below 8% in all the cases. Regarding temporary occupancies of habitats, they are mostly limited to agricultural lands (47.71%) and east Mediterranean frigana community (39.42%). The rest of the habitats represent a percentage below 5% each. According to the Turkish Statistical Institute database, 0.6 % of the agricultural products of Turkey in 2016 has been supplied by Malkara, Gelibolu and Lâpseki Districts that are on the Project route. Based on the literature review and agricultural production data. Given that the loss of agricultural land is a fraction of the agricultural land crossed in these districts, the overall loss of land, the percentage of the overall loss of agricultural land will be negligible on a national context

Seismic risk

Researchers suggest that one or two earthquakes of a magnitude of 7.2-7.4 are likely to occur in the next 30 years in the Marmara Sea, and there is also a chance that an earthquake of magnitude 8 or more could occur within the next 100 years (Hubert et al. 2000; Altinok, 2001). Therefore, in view of the above-described seismic activity of the NAF and related faults, special consideration is needed (and has been given by the Project designers) to incorporate seismic risks in the entire Motorway design, and especially for the construction of the 1915 Çanakkale Bridge given the extension of North Anatolian Fault (NAF) in the Marmara Basin.

NAF crosses the Project section between KM 134+000 and KM 135+000 of the Project. The last large earthquake in this segment of the NAF occurred in August1912 of a magnitude of 7.3. Numerous other earthquakes have occurred at NAF and other smaller fault lines near Çanakkale.

Contaminated Land

There is no official registry or archive of contaminated land in Turkey. Therefore, there is no baseline information available that would indicate the presence of any known or suspected contaminated land along the Motorway route, eg due to spills or waste dumping from current or historical industrial activities, unofficial municipal dumps, etc. No such areas were discovered during the geological and other investigations conducted as part of the Motorway planning and design to date, and also none were observed during the scoping visit and baseline data collection in many parts of the Project area for the preparation of this ESIA; nevertheless, the presence of some isolated contamination cannot be ruled out.

Due to the predominance of agricultural and forestry land uses along the Motorway, the potential of encountering historical soil contamination is likely to be low except in the industrial facilities in the vicinity of urban areas on the route. A review of the publicly available satellite images of the Project area was conducted to determine if there is any identifiable (or prominent) industrial facility on the Motorway alignment. The existence of such facilities suggests that Motorway excavations in these regions and the potential for encountering affected soils or waste materials during construction are of higher potential at these locations.

In July 2017, ENCON conducted a brief survey to determine the soil contamination in the vicinity of the Project. During the survey 1 kg of soil was collected from 5 different areas with locations and sent to the laboratory for analyses. Concentrations of BTEX, cadmium, lead, thallium, and volatile organic compounds (VOCs) were determined using US EPA methodology. The concentration of Total Petroleum Hydrocarbons (TPHs) was measured using Turkish Standards Institution's TS EN 14039 methodology. The testing methods are based on the Regulation on Soil Pollution Control and Point-Source Contaminated Sites; Official Gazette Date/Number: 08.06.2010/27605 by which the Turkish accredited laboratory are obliged to perform the standards for their analysis.

Concentrations of BTEX, cadmium, and VOCs for all 5 samples were below the detection limit. Lead measurements ranged from 7.71 to 17.07 mg/kg which is in the lower natural level for lead in the environment. TPHs values ranged from 75 to 151 mg/kg which is also in the lower end of the natural levels.

Important Geological Features

There were no indications in the various geological studies along the Motorway route (as described above) of the discovery of any specific geologic formations that are of particular scientific or cultural importance or otherwise unique. The relevant local and regional authorities have not indicated any

concerns about such scientific or cultural aspects of the geological features during the approval of the Turkish EIA study. A separate review of available literature was conducted to ensure the Turkish EIA findings.

7.3.3 Summary of Significant Impacts

Significant impacts are summarised for the construction and operation in *Table 7-3*. Mitigation measures are identified in the table below also.

For the assessment of impacts of minor or negligible significance see *Appendix 2.2* of *Volume III.*

Table 7-3 Significant Construction and Operation Geology and Soil Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**Soil instability risk** A review of the assessment methods indicated that geotechnical laboratory analysis were based on appropriate ASTM methods, Slope Stability Analysis were conducted by the Limit Equilibrium Method, software used to assess slope stability slide6.0 is an accredited software and the safety factors under static (Safety Factor (SF)=1.5) and earthquake loads (SF=1.0) are acceptable safety risk levels. Several areas with high risk of settlement, liquefaction conditions were identified as part of the preliminary geotechnical assessment investigation. As mentioned earlier there are 12 engineering structures and 5 cut/fill areas that are identified as critical regarding liquefaction and settlement risk. Conduction of more extensive research studies were deemed to be required on the critical sections before the construction phase. For this reason, additional geotechnical assessments are being undertaken at present.	The impact significance would be **major** given the large magnitude the soil stability risks associated with locations: • Viaduct at chainage 115+318 - 116+439; • Overpasses at 133+765 and 152+094; • Underpass at 154+084; • Overpasses at 160+380 and 164+710; • Viaduct at 168+305 – 169+898; • Underpass at 177+500; • Overpasses at 177+799, 178+279, 178+958; • Underpass at 179+454.	*Design Phase:* The soil stability identified at the critical locations need to be taken in to the design stage of the Motorway. Presently the designs are not finalized and need to incorporate appropriate embedded design states to lower the major impact significance. *Construction Phase:* Construction methodology will incorporate appropriate technical guidelines during slope excavations. Appropriate construction techniques will be implemented that will incorporate risk assessments for excavation and slope stability requirements for the construction area as well as outside of the alignment areas such as construction camps, roads, quarry locations where Project area activities will be undertaken. Soil stability will considered to be adequately addressed by the available soil conditions and construction techniques.	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
2	**Soil Erosion Risk** Several areas soil erosion were identified as part of the preliminary geotechnical assessment investigation. There are areas along the Project which have a natural erosion risk due to their subsurface characteristics, areas which are prone to subsidence (alluvial soils), areas at risk from excavation works and soil movement such as steep slopes at cut and fill sections, and risks related to medium stable soils which are present in fault zones.	The significance of the impact will vary between negligible to **major** depending on the source and receptor setting. According to soil erosion risk maps mentioned in Appendix 2.3, the Project area has little potential of erosion in between KM 105+000 and KM 155+000, and KM 172+000 and KM 181+000 KM 182+000 and KM 195+000; moderate potential in between KM 155+000 and KM 165+000; high potential in between KM 165+000 and KM 172+000. The section of moderate erosion area (medium magnitude) is identified as mostly agricultural area which is high in Capability Class (high sensitivity) and very close to Güneyli and Bolayır residential districts. Together, the Project can have a major impact in this area. The most critical section of the Project in terms of erosion risk is located around Ocaklı and Kavaklı districts that are the areas having the highest soil erosion risk in the Gelibolu peninsula. The erosion risk of these regions is high (large magnitude) because the region is mainly bare and has low plant coverage falling under lower Capability Class (low vulnerability) thus Projects impact would be major based.	Soil erosion prevention is a key element of Project design are provided to ensure long-term integrity of structural bases for all structures and cut and fill areas. The following key mitigation measures are recommended. Design Phase: A Soil Erosion, reinstatement and Landscape Management Plan will need to be developed to include measures to ensure that the road design is 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. These plans will be integrated into the process for deciding the layout of all construction sites, work and camp areas. COK A.S. will review the implementation of these plans. Construction Phase: Th Soil Erosion, Reinstatement and Landscape Management Plan will cover the preventative and mitigation measures to minimize and manage the effects on soil and water quality during construction. The procedure will include erosion, sediment and pollution control, management of upper soil, as well as storm water run-off. The SMP will address the measures below: • Spoil and soil storage areas and open stores of construction materials will be designed and managed to control loss of sediments into run-off by minimizing the length and angle of slopes • Schemes to prevent new eruption of ground surface from rainfall erosion or to avoid	**Neglijible**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			construction activities during periods of heavy rainfall. • Contouring and minimise the length and the steepness of the slopes. • Local control measures such as sediment fences, control dams, mulch barracks and sludge traps, as well as line inspections such as sediment basins from construction sites. • Diversion of external 'clean' runoff around the construction area to prevent mixing of 'clean' and 'dirty' runoff and reduce the size of the required sediment basins. • Conveyance of all 'dirty' runoff to the proposed sediment basins. • Establishment of barrier fences and / or markings to determine the extent of the structure / work area that may be damaged. • Installation of controls to trap sediments, including but not limited to, sediment fences, rock groynes, geofabric barriers and hay bales. • Limitation of the exposure to the soil and the minimum amount of deterioration required for the construction. • Covering and protection of the degraded fertile ground by soil, vegetation, mulch or erosion-resistant material. • Construction of all drainage structures (e.g. culverts, sediment basins and catch drains) should be established as early as possible. • Existing drainage and irrigation channels, sediment barriers, green areas, protection strips, such as drains and drainage and erosion control	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			pits should be protected by taking appropriate measures The surface erosion on the cut and fills of the Project will be addressed by Landscape Application Projects in line with KGM standards which require the use of native plant species or if not possible the use of selected plant species with a high survival rate and compatible with the climate and soil structure of the Project area. Plant species will also be distributed and co-located equally with existing natural vegetation structure and formation. • The vegetative windrows should be considered on the downward slope of the stocks/soil where adequate space is available and it is appropriate to do so. Otherwise, alternative erosion and sediment controls should be established. • Construction of all drainage structures (eg culverts, sediment basins and catch drains) should be established as early as possible. • Existing drainage and irrigation channels, sediment barriers, green areas, protection strips, such as drains and drainage and erosion control pits should be protected by taking appropriate measures. • A supplemental assessment of stormwater drainage risks to the Environment will be undertaken to verify that stormwater drainage designs are effective in mitigating impacts on surrounding land use, surface and groundwater or sensitive ecological receptors therein. The assessment will inform the selection, design and	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			siting of sustainable storm water drainage solutions. Measures such as the need for sand layers to 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 will be assessed. • If relevant, the supplemental assessment will also include a monitoring programme for evaluating the effectiveness of the sustainable drainage solutions in avoiding contamination of soils during operation. A plan showing the locations and types of drainage selected at each chainage will be included in the supplemental Assessment. • The sustainable road drainage and storm water management practices will be assessed during the design stage with international guidelines (such as the AASHTO Highway Drainage Guidelines or similar guidelines) to minimize impacts of road drainage on surrounding surface water, marine water, ground water, land use and soil resources and sensitive ecological receptors. Such practices may include measures to slow peak runoff flow (retention basins, rock/riprap), reduce sediment load, detention ponds or basins. In addition to pollution risks, the assessment will include consideration of drainage outfall siting and potential for erosion and flooding of farmlands and other sensitive land uses and ecological receptors. The assessment shall identify mitigations so that significant impacts are avoided.	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			• A spillage risk assessment will be undertaken in accordance with the UK Design Manual for Roads and Bridges (DMRB) (1) as part of the development of the Environmental Management Plan (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. The spill risk assessment will be completed during the design of the Motorway taking into account that no oil water separators are typically adopted by KGM.	
3	**Seismic risk** Earthquake may occur either during the construction or the operation of the Project. The Project site is located on the 1st degree seismic zone.	**Major** during the construction and operation phases, for all receptors in the Project area	The Project design will comply with the relevant Turkish regulatory requirements related to seismic design and risk assessment and also the findings of the site specific geological/geotechnical investigation study. The Regulation on Buildings to be Built in Seismic Zones (Official Gazette date/no: 06.03.2007/26454) will be complied during all construction works within the Project site for the Motorway Section. The seismic design for the Project and all related structures such as viaducts, culverts, bridges, cut and fill sections, and the tunnels is based on the seismic hazard level of a 475 years return	**Negligible** to **minor**

(1)Design Manual for Roads and Bridges (DMRB): Volume 11 (2009). This Standard provides guidance on the assessment of highways and/or roads projects in accordance with the provisions of the Conservation Regulations. It consolidates current best practice advice in this area. (http://www.dft.gov.uk/ha/standards/dmrb/vol0/section1/gd0108.pdf)

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			period (1). This design has to be approved by KGM in accordance with the Disaster Regulation for the Structural Engineering Along Motorways (2). Each country has developed their specific earthquake codes. Based on the demand of people and the official institutions for earthquake safe environment after the earthquakes experienced in 1999, many structures were investigated in terms of seismic safety and some of these were retrofitted. The current codes of practice in Turkey and the United States are similar in terms of strength and detailing requirements according to Sezen et. Al (2001). The most important advances introduced through the 2007 version of the code are: • Inclusion of a new extensive chapter on seismic safety assessment and retrofitting of existing buildings • Inclusion of a linear elastic method for seismic safety assessment considering the inelastic behavior in terms of approximate allowable demand/capacity ratios given depending on the damage level • Inclusion of the performance-based assessment principles for existing structures in seismic safety evaluation and retrofitting • Inclusion of different levels of design earthquakes (such as service, design and maximum	

(1) The 475 year return period is the most common standard used in the industry for assessing seismic risk. Statistically this means, the loss which has a 10 percent probability of exceedance in 50 has an effective return period of 475 years. Also used in EN 1998: Eurocode 8 Design of structures for earthquake resistance which applies applies to the design and construction of buildings and other civil engineering works in seismic regions

(2) KARAYOLU YOLBOYU MÜHENDİSLİK YAPILARI İÇİN AFET YÖNETMELİĞİ (Official Gazette 07.12.2006/26369)

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			earthquakes) and performance levels (such as immediate occupancy, life safety and collapse prevention) to be considered for various types of buildings. The seismic design of the 1915 Çanakkale Bridge will be in compliance with the British Standards (BS), Eurocode, Technical Specifications of the AASHTO, European and/or other international standards in coordination with KGM and its consultant. These are widely accepted international standards and will ensure that appropriate design is made to minimise the risks of any detrimental results from seismic events. In addition, the EPC contractor for the Bridge will hire specialist firms to conduct technical review of the designs, including seismic factors.	
4	**Contaminated Land** Based on the predominance of agricultural and forestry land uses along the Project, the potential of encountering historical soil contamination in the unpopulated and remote areas is considered to be low. There are a number of areas of potential contamination identified via evaluation of satellite images and it is possible that additional suspect sites exist along the route that have not yet been noted. The types of facilities identified via satellite images include gas stations, transformer station, batch plant, organized industrial site and some industrial facilities. The potential type and extent of contamination cannot be	**Negligible to major** depending on the source and receptor setting	The following mitigation measures will be implemented to address both the expected and unexpected encounter of contaminated soils: • A dedicated soil section as part of the Environmental Management Plan will be developed and address the points below. This will be integrated with other related procedures like the, and consistent with the Turkish Regulation on Soil Pollution Control and Point-Source Contaminated Sites and Lender Requirements. • A Pro-active risk assessment will be based on the possibility of soil pollution on the alignment. These risk assessments will comply with the Soil Pollution Control and Regulated Polluted Areas Directive and best international practices in order to assess the probability of pollution.	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	ascertained based on the available information. If contaminated soils/groundwater are encountered and excavated by the construction crews, the potential exposure to certain contaminants may present health risks to the construction workers and to a lesser extent neighboring population. Improper handling and disposal of the contaminated materials can also cause further pollutant impacts to the local environment.		• Discussions will take place before the construction for the "potentially contaminant" areas adjacent or on the Motorway. Local authorities will be contacted to clarify who would be responsible for taking mitigating measures in case of contamination detected. • Construction crews will be trained to determine contaminated areas of soil during earthworks. Any contaminated soil/waste encountered during construction will be reported to the local authorities in all cases and other measures will be taken as agreed with the competent authorities and local authorities.A protective cover for the lightly soiled material will be in place. More severely affected soils and sludges will be removed from the site for proper treatment and / or destruction in licensed waste areas, as appropriate. • A methodology will be developed to identify and address contaminated materials that are unexpectedly encountered during construction, until further steps are taken with the competent authorities, including appropriate temporary storage operations in contaminated soils. Temporary storage will be such that contaminating materials will not flow into any running water and be placed in suitable containers with sealed bottoms and covers to prevent runoff and wind dispersion.	
4	**Contaminated spills and runoff** The magnitude of the impacts on the soil media of spills and runoff arising during the	From **minor** to **major,** depending on the sensitivity of the receptors and magnitude of the spills/runoffs	All appropriate measures will be taken to avoid spills, runoff and operational seepage from the Motorway into waterways by complying with Turkish law, the	**Negligible** to **minor**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	construction and operation activities ranges from small to large depending on the contamination levels stated in the Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites (Soil Pollution Control Regulations). For example, if concentrations of pollutants in the soil defined in the Soil Pollution Control Regulations are exceeded to cause long term cancer and hazard risk, the magnitude of impact is considered as large.		Technical Specifications for Highways issued by KGM in 2006, and the IFC General EHS Guidelines and Sector Guidelines for Toll Roads and Retail Petroleum Networks. No significant impacts of contaminated spills and runoff are anticipated assuming all the requirements of regulations will be implemented during construction and operation of the motorway. Many of the items below, particularly with respect to spill response procedures, will need to be addressed in the Emergency Response Plan (ERP) and Environmental Management Plan, which will need to be updated accordingly. *Design Phase:* The following mitigation procedures will be included within the Environmental Management Plan, Emergency Response Plan, Control of substances Hazardous to Health Procedure etc related to the design phase of the Project. • Appropriate treatment-spill control systems must be placed in water crossings, fresh water sources and protected areas where surface runoff may adversely affect soil, surface water and ground water media. • Underground storage tanks (USTs) or aboveground storage tanks (ASTs) will be designed and built according to the recognized industrial standards. Containment measures for gas/petrol stations will be in compliant to the Turkish Standard TSE 12820 for gas/petrol stations and the IFC EHS guideline for retail	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			petroleum networks. Secondary containment systems will be used for USTs and ASTs to prevent the uncontrolled release of fuels. • Corrosion protection will be used in underground steel tanks and piping, which may consist of coating with a suitable dielectric material or by cathodic protection. • Leak detection systems will be provided to detect the presence of liquid or petroleum vapour within the interstitial space of double-walled tanks. • Spill and overfill alarm, automatic shut-off devices and/or catch basin around fill pipes will be equipped for the tanks. Fill pipes on ASTs will be located within the tank's secondary containment structures. • Petroleum contaminated storm water runoff from petrol stations will be minimized by: o Installation of roofs or covers to prevent rainwater influence and runoff at areas handling petroleum products; o Implementation of secondary containment system; and o Segregation of clean drainage and potentially contaminated drainage, treating the latter through oil/water separator. • The design of rest areas/restaurants/petrol stations along the Motorway must include appropriate treatment of liquid and solid wastes to avoid contamination of local soils/ecology near these facilities. *Construction Phase:*	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			The following mitigation procedures will be included within the SMP and other plans related to the construction phase of the Project: • The Control of Substances Hazardous to Health Procedure will specify that fuels, oils and chemicals will be stored on an impervious base protected by a bund, and drip trays will be used for fuelling mobile equipment. No USTs will be used during construction stage. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007). As example secondary containment structures will consist of berms, dikes, or walls capable of containing the larger of 110 percent of the largest tank or 25% percent of the combined tank volumes in areas where hazardous materials are handled (e.g. fuel stores and loading areas, concrete mixing, hazardous material stores) to prevent hazardous materials entering the site drainage. • An Emergency Response Plan (ERP) will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS guidelines (IFC, 2007) for handling spills of hazardous materials including fuels that will be handled during construction works. • Safe Fuelling and Gasoline Handling Guidelines will be developed in the construction areas. 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	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact

		equipment to hinder accidental spillage to drain into the soil and therefore in potential groundwater aquifers. • The soil contaminated due to spillages during handling fuel and other hazardous liquids will be removed from the site for suitable treatment and/or disposal according to the Environmental Management Plan. *Operation Phase:* The following mitigation procedures will be included within the Environmental Management Plan and related plans during the operation phase: • Personnel responsible for the application of herbicides in the maintenance of ROW will receive applicable certifications or equivalent training where such certifications are not required. • An Emergency Response Plan (ERP) will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS guidelines (IFC, 2007) for the operation risks. Measures for the case of lorry spills, fire, etc. involving hazardous/polluting substances along the Motorway will be included within the EPR Plan to prevent and clean up any significant impacts from drainage of contaminated liquids and fire-fighting water. Appropriate spill response equipment must be available along the route, with particular emphasis on quick-response in areas of higher ecological sensitivity. As previously stated spillage risk assessment will be undertaken in accordance with the UK Design Manual for Roads and Bridges	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			(DMRB) as part of the development of the Environmental Management Plan (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. The spill risk assessment will be completed during the final design of the Motorway taking into account that no oil/water separators are typically adopted by KGM. • The Soil Erosion, Reinstatement and Landscape Management Plan to be developed will address integrated vegetation management (IVM) for the maintenance of the ROW to ensure that biological, mechanical and thermal vegetation control measures are used where practical, and avoid the use of chemical herbicides. The Procedure will reflect the EHS guidelines for Environmental, Health, and Safety Guidelines for Toll Roads in full (as well as Turkish regulations). The Procedure will reflect the EHS guidelines for Environmental, Health, and Safety Guidelines for Toll Roads in full (as well as Turkish regulations). The Soil Erosion, Reinstatement and Landscape Management Plan will specify that when using pesticides and herbicides for the maintenance of ROW, potential impacts to soil and groundwater will be minimised by implementing landscaping plans which have to be submitted to KGM for approval. These plans will address pesticide management and the following measures:	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			○ Comply with Turkish regulations on pesticide use. If pest infections are detected the competent authority needs to approve respective pesticide/biocide for pest control. Pesticides of WHO Type 1a and 1b will not be used; ○ Only use registered or approved 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 water sources and surface water bodies; and ○ Store appropriately by following good hazardous materials storage and handling management practices. • 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); during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material); road litter, illegally dumped waste, or general solid waste from rest areas; animal carcasses; vegetation waste from right-of-way maintenance; and sediment and	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			sludge from stormwater 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). COK A.S.. have committed to preparing Environmental Management Plan , which also include handling solid waste generation during operation and maintenance activities as well as spills and leakages of hazardous materials during construction and operation. These procedures will be updated routinely as the level of detail of the Project Design increases. • A spillage risk assessment will be undertaken in accordance with the UK Design Manual for Roads and Bridges (DMRB) (1) as part of the development of the Environmental Management Plan (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. The spill risk assessment will be completed once the final design of the Motorway has been approved by KGM taking into account that no oil / water separators are typically adopted by KGM.	

(1)Design Manual for Roads and Bridges (DMRB): Volume 11 (2009). This Standard provides guidance on the assessment of highways and/or roads projects in accordance with the provisions of the Conservation Regulations. It consolidates current best practice advice in this area. (http://www.dft.gov.uk/ha/standards/dmrb/vol0/section1/gd0108.pdf)

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			Alternative mitigations for significant impacts will be developed in the spillage risk assessment. • The Environmental Management 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. • Service Areas will conform to the following requirements: • All Petrol Stations along the Motorway will be operated in accordance with TS 12820 which are in line with the IFC EHS Guidelines for Retail Petroleum Networks as best practice measures. These requirements will be included in the contract of the Petrol Station operator. Petrol Station locations are given in Chapter 2. • Oil separators will be operated, and maintained to achieve the desired water treatment results.	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact

7.4 WATER ENVIRONMENT – TERRESTRIAL

7.4.1 Introduction

The full assessment of the impacts on the terrestrial water environment is presented in *Appendix 2.3* of *Volume III* of this ESIA Report. The Appendix presents a detailed description of the baseline terrestrial water environment and the impact assessment chapter of this Appendix discusses significant impacts and mitigation measures. The sections below summarise the findings of this assessment.

7.4.2 Summary of Baseline Findings

The entire Project route is situated within the Marmara Watershed, which is the 9th largest watershed in Turkey with a precipitation area of 24,100 km^2 that comprises 3.1 % of the total precipitation area of all 25 watersheds. The Marmara Watershed holds 4.5 % of Turkey's total surface water potential with an average flow of 8.33 billion m^3/year.

There are no major natural lakes within 50 km of the Project alignment. The only natural lake to be considered is Uzun Göl at the edge of the Gulf of Saroz which is 5 km northwest of the Project. No information about Uzun Göl is present in the literature or in any governmental plans or projects. The lake is approximately 300 m in length and 40 m in width.

There are, however, eleven artificial lakes ie water storage reservoirs from irrigation dams near the Project area. These water storage reservoirs are identified in *Appendix 2.3*. The most important reservoirs are Demirci Lake, Çokal Dam Lake and Umurbey Dam Lake.

According to the latest Project design, three bridges over watercourses are planned as well as approximately 120 culverts and passage elements to cross smaller water courses. The major stream and river crossings that may result in environmental and social impacts are the planned crossings at Kocadere, Sülüklü, Paşova, Münipbey and Umurbey. The locations of these crossings are identified in *Appendix 2.3*.

The review of the preliminary design for the new culvert and crossing of existing streams indicate that redirection of the normal flow conditions have been avoided for all cases. The design calculation procedures indicate the flooding, erosion of soils near the crossings and control of water surface profiles during high rainfall intensity cases are taken into account during the design process. All of the designs are required to be approved by the State Water Institute (DSI) prior to construction process.

Flooding events are rare in the southern Tekirdağ province. Only two flooding events were observed in this area between 1955 and 2008. According to the Ministry of Forestry and Water Affairs, there is only one flood monitoring facility near the project, which is located at Koca Dere Stream, Tekirdağ. The Project as currently planned will pass through this monitoring station at KM 115+500.

There are no flood monitoring facilities in Gelibolu and Lapseki, Çanakkale. Ten flood events were recorded in Çanakkale between 1955 and 2008, all occurred on the Asian side with the nearest event observed 25 km south of the Project alignment. The lack of flood monitoring facilities do not represent a risk for adequate prediction or forecasting of flood events based on accepted practices that the preliminary design has been based on.

There are number of irrigation systems in the vicinity of the Motorway-Bridge Project, all operated by DSI and some interseted by the alignment.

The Project intersects a number of irrigation areas and their pipelines particularly in *Gelibolu*. The *Gelibolu Gökbüet Project Evreşe Kavak Plain Irrigation* and *Çokal Dam Irrigation* are currently under construction phase and *Umurbey Plain Irrigation* is under operation. The *Çimendere I Pond Irrigation* is under construction and *Çimendere II Pond Irrigation* is under planning phase. More information on the irrigation crossings is provided in *Appendix 2.3*.

The Project crosses the Çokal Drinking Water Pipeline at eleven points throughout the route. There is also a deviation point on the water pipeline at KM 159+063 due to the proposed project.

The Ergene Watershed towards Northwest of *Tekirdağ* and Southern and South-eastern regions of Çanakkale has abundant groundwater resources. Unlike these areas, *Gelibolu* and the area which forms the route of the Project alignment are not rich in groundwater resources and detailed studies regarding the depth and regime of the groundwater resources have not been conducted.

There are seventeen licensed groundwater wells near the Motorway-Bridge Project (see *Figure 1-8* in *Appendix 2.3* of *Volume III*). The closest distance between these wells and the Project alignment is between 250 m to 1 km. Other wells are located in Gelibolu and *Lapseki*, between 1 km to 7 km from the alignment. It should be noted that besides these licensed groundwater wells, it is expected that there are other unlicensed, unofficial community and communal sources and groundwater wells used for irrigation and drinking water.

Groundwater is protected in Turkey according to designated groundwater protection zones. According to the hydrological information received from the Ministry of Forestry and Water Affairs and the 1/100,000 scaled Balıkesir-

Çanakkale and Lower Thrace Region Environmental Plan the Motorway-Bridge Project does not cross the two most stringent categories of 1st or 2nd degree groundwater protection zones [(1)].The use of groundwater resources will be subject to DSI approval. DSI will allow the drilling and use of extraction wells in case the ground water supply is adequate. Such approvals are based on the availability of water supply.

Groundwater levels were recorded during the site investigation studies conducted for the Project design. Groundwater levels below grade level (bgl) measured in the boreholes were recorded during the investigation study and were noted to vary between 0.3m-6m depth bgl indicating the presence of shallow groundwater in all of the boreholes drilled during the soil investigation. For more information see *Appendix 2.3* of *Volume III*.

Vulnerable biodiversity areas in the vicinity of the Motorway were examined and discussed in *Appendix 2.3 Volume III 2.4 Biodiversity and Conservation and Ecosystems*.

Vulnerable biodiversity areas in the vicinity of the Motorway were examined and discussed in *Appendix 2.3 Volume III 2.4 Biodiversity and Conservation and Ecosystems*.

7.4.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-4* and for operation in *Table 7-5*. Mitigation measures are identified in the tables below also.

For the assessment of impacts of minor or negligible significance see *Appendix 2.3* of *Volume III*

(1) 1st degree protection zone: It is forbidden to pass, construct any kind of structure, dispose of any kind of solid or liquid waste. (50 m around of the wells and resources should be surrounded with barbed wire). 2nd degree protection zone: It is forbidden to construct any kind of structure. It can be used only for the purposes of passing and recreation.

Table 7-4 Significant Construction Terrestrial Water Environment Impacts and Mitigation

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
1	**Impacts on Surface Water** Impacts on surface water quality and quantity are considered to be temporary and include the following: • Silty/soiled water 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. • If a construction site or a refuelling and storage depot is located near a surface water body, the surface water is at risk from 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	Impacts of **major** significance are predicted before mitigation.	*Surface and Groundwater Quality* • It should be noted that the impacts of associated facilities have not been identified and assessed in this section. At the time the ESIA was being prepared the potential existing quarries-borrow pits were being identified and their impacts on the water environment were not undertaken. However, COK has committed to following the Environmental, Health and Safety (EHS) Guidelines for construction materials extraction (IFC, 2007) which has specific guidelines for the water environment. The potential impacts will be reviewed and mitigation measures will be undertaken once the Project Design is completed and the associated facilities are selected. • A supplemental assessment of stormwater drainage risks to the Environment will be undertaken to verify that stormwater drainage designs are effective in mitigating impacts on surrounding land use, surface and groundwater or sensitive ecological receptors therein. The assessment will inform the selection, design and siting of sustainable storm water drainage solutions. Measures such as the need for sand layers to 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 will be assessed. • If relevant, the supplemental assessment will also include a monitoring programme for evaluating the effectiveness of the	With the application of the mitigation measures neglijible residual impacts are predicted.

(1) In addition to mitigation measures described above; there are mitigation measures and commitments identified in Turkish EIA Report, which are (some of the mitigation measures and commitments presented here may be same as above ones. These are listed in *Appendix 2.3.*

watercourses, aquatic ecology and downstream users. • 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. • 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 prior to discharge (either by on-site treatment or removal for disposal via the local sewage network, if available). • Use of surface water supply sources to obtain water supply needs for the construction process • Motorway repair activities (including removal of worn down asphalt and replacement, painting, infrastructure maintenance) has the potential to impact the ground quality since these will involve construction activities including the usage of chemicals. The risk of water pollution is also high within all road sections close to ground water resources		sustainable drainage solutions in avoiding contamination of surface and ground waters and soils during operation. A plan showing the locations and types of drainage selected at each chainage will be included in the supplemental Assessment. • Safe Fuelling and Gasoline Handling Guidelines will be developed in the construction areas. No fuelling of vehicles or equipment will take place within excavated areas. If heavy equipment cannot be moved to appropriate fuelling points, an impervious surface (such as a drip-tray) will be used for refuelling this equipment to prevent accidental releases to groundwater aquifers. • Hazardous materials will not be stored in excavated areas and all handling of all hazardous materials will be in accordance with the Control of Substances Hazardous to Health Procedure. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007). As example secondary containment structures will consist of berms, dikes, or walls capable of containing the larger of 110 percent of the largest tank or 25% percent of the combined tank volumes in areas where hazardous materials are handled (e.g. fuel stores and loading areas, concrete mixing, hazardous material stores) to prevent hazardous materials entering the site drainage. • An Emergency Response Plan (ERP) will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS guidelines (IFC, 2007) for handling spills of hazardous materials including fuels that will be handled during construction works. • An Environmental Management Plan will be developed to respond to surface and ground water resources potential mitigation during the construction phase. The Plan will include the following items: • Water resources assessment based on requirements for batch plant and other requirements or construction	

process. As previously discussed water sources will be identified with their surplus capability for use during construction process. Monitoring of water quantity will be performed.

- 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.
- Wastewater from all construction compounds and associated building will be either discharged into the local/municipal sewage network or treated prior to discharge to the suitable receiving environment or collected onsite 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 prior to disposal.
- Waste water treatment plant will be designed, licensed and operated to treat, domestic wastewater to discharge into the natural environment or permits will be obtained to connect to existing sewerage collection and treatment work.
- Wastewater generated during concrete batch plant operations and washing of cement trucks will be monitored for the pH and temperature of the wastewater effluent. Water usage is significant in concrete plants, not only in concrete production but also for washing waste in concrete mixer trucks, washing patios, and sprinkling on aggregates to reduce dust. Concrete wastewater may show high pH values, between 11 and 12, and high alkalinity due to the presence of hydroxides and carbonates in addition to the elevated concentration of solids. These characteristics may necessary to treat wastewater prior to final disposal, whether in water or soil. Effluent guidelines

for the. Turkish legal requirements (Water Pollution Control Regulation 2004, No. 25687) and other Lender Standards prior to disposal.

- Mud generated from the concrete batch plant operation operations and washing of cement trucks will be tested for hazardous characteristics and will be disposed of in line with Turkish regulations on waste management which are in line with EU Regulations.
- The Environmental Management Plan and the Watercourse Crossing Plan will include monitoring of surface water quality, drainage infrastructure assessment as well as ground water quality procedures. The monitoring of the groundwater resources will be based on guideline to be developed following the hydrogeological investigations. The guideline will be based on the Guidance on Groundwater Monitoring, Common Implementation Strategy for the Water Framework Directive (2000/60/EC) and will include the following items:
    - Identification of existing extraction wells (irrigation, domestic and public use) within the zone of influence
    - Periodic monitoring of ground water use quantity during construction period
    - Periodic monitoring of ground water quality during construction period and operation period
    - Periodic monitoring of groundwater discharge locations (stream or lake monitoring) and operation period
- The monitoring program to be used forof the surface water quality will be based on site specific risk assessments as well as specific guidelines for surface water quality standards given in the regulatory framework (Category I = very good; II) as on the General EHS Guidelines, especially

with regard to emissions or effluents from road maintenance facilities. The framework for the monitoring program will be as follows:

- Wastewater treatment plant outfalls on construction (e.g. construction camps) and operation phases (e.g. retail petroleum sites) based on Turkish permitting and relevant IFC guidelines requirements;
- Upgradient and downgradient locations of stream/river crossings testing for low flow and high flow conditions (seasonal) will be tested routinely tested during construction and operation phases These tested locations and frequency will be selected based on the risk assessment of the downgradient receptor sensitivity (e.g. ecological and/or water resources); the upgradient testing locations will represent baseline conditions for surface water quality;
- Road drainage outfalls will be tested routinely at locations as well as during repair activities at ecologically sensitive locations as well as upgradient of surface water resources. The testing frequency will be selected based on the flow discharge characteristics and risk assessment of the downgradient receptor sensitivity (e.g. ecological and/or water resources).
- Surface water quality testing will include potential contaminants during including oil and grease, metals (e.g. lead, zinc, copper, cadmium, chromium, and nickel), particulate matter and other pollutants released by vehicles on the roadway, in addition to de-icing salts (e.g. sodium chloride and magnesium chloride) and their substitutes, from roads as well nutrients and herbicides used for management of vegetation in the rights-of-way;These will include contaminants of concern to the ecologists (pesticides, sediment load and contaminants) as identified as

concerns in the ESIA ecology chapter will also be taken into account.

- Assessment of surface water runoff and of flooding conditions after heavy rainfall events for efficiency of water conveyance systems will be implemented

Environmental Management Plan, Soil erosion, Reinstatement and Landscape Management Plan, Watercourse Crossing Plan , Control of Substances Hazardous to Health Procedure etc will cover the preventative and mitigation measures to minimize and manage the effects on soil and water quality during construction. The procedure will include erosion, sediment and pollution control, management of upper soil, as well as storm water run-off. The specific items in the SMP will address the measures below related to surface water and ground water quality protection:

- Spoil and soil storage areas and open stores of construction materials will be designed and managed to control loss of sediments into run-off by minimizing the length and angle of slopes.
- Schemes to prevent new eruption of ground surface from rainfall erosion or to avoid construction activities during periods of heavy rainfall.
- Contouring and minimise the length and the steepness of the slopes.
- Local control measures such as sediment fences, control dams, mulch barracks and sludge traps, as well as line inspections such as sediment basins from construction sites.
- Diversion of external 'clean' runoff around the construction area to prevent mixing of 'clean' and 'dirty' runoff and reduce the size of the required sediment basins.

- Conveyance of all 'dirty' runoff to the proposed sediment basins.
- Establishment of barrier fences and / or markings to determine the extent of the structure / work area that may be damaged.
- Installation of controls to trap sediments, including but not limited to, sediment fences, rock groynes, geofabric barriers and hay bales.
- Limitation of the exposure to the soil and the minimum amount of deterioration required for the construction.
- Covering and protection of the degraded fertile ground by soil, vegetation, mulch or erosion-resistant material.
- Construction of all drainage structures (e.g.culverts, sediment basins and catch drains) should be established as early as possible.
- Existing drainage and irrigation channels, sediment barriers, green areas, protection strips, such as drains and drainage and erosion control pits should be protected by taking appropriate measures.

- Drainage from excavations will be collected and settled to remove suspended materials prior to discharge in accordance with required permits. Where practicable, local perimeter drains will be constructed around working areas to collect suspended run-off and direct it to a system of settlement basins before discharge in accordance with required permits.
- Treated wastewater will be reused where possible (eg for local watering of vegetation, dust control or as fire-fighting reserve) or discharged in accordance with international guidance (1).

(1) IFC (2007) General EHS Guidelines Wastewater and Ambient Water Quality

- 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 at either by spreading on site (if uncontaminated) or at a suitably licensed facility.
- Following 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)
- Spoil and soil storage areas and open stores of construction materials will be designed and managed to control loss of sediments into run-off by minimizing the length and angle of slopes.
- The size and duration of exposure of areas of open ground will be kept to the minimum.

Surface Water Bodies and Water Infrastructure (Channels)

- Foundation works for the bridges, viaducts, retaining walls and other structures at or close to particularly sensitive surface water bodies will not take place during the high-water season
- Presently the design of these structures is being undertaken and have not been finalized. A technical assessment will be undertaken to assess a number of issues including: the review of the selection of the flood return periods across the range 100 – 500 for the bridges, justify for the return periods used for the culverts and bridges in comparison to the KGM Technical Specifications (2006), ensure that the river function of sediment transport is not adversely affected, bedload sediment transport been considered in the design of water crossings
- Although the preliminary design has not been taken into account factors such as climate change and ecology factors, a

preliminary E&S review of the design based on potential climate change as well as other factors will be conducted and findings reported. The E&S review will include a review of culvert discharge locations and assessment of risks to flooding and erosion of farmland and other sensitive receptors. Alternative mitigation may need to be developed for improving the design/mitigating significant impacts as far as possible

- Work on stream crossings will be carried out, where technically feasible, 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 rivers, streams or on their banks will be forbidden except if unavoidable to construct a particular structure. Then appropriate measures will be implemented to protect sensitive areas, for example by placing with metal plates to drive on.
- Where practicable 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 earth work 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.

For each stream deviation, a specific approval from DSI is required.

- The site specific design mitigations will be considered for deviations as per requirements of DSI and are listed in *Appendix 2.3*.

2	**Impacts on Groundwater** Large construction sites, if not properly managed and operated, can lead to significant impacts on groundwater quality as given in Table 4 and discussed in the groundwater resources section. 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 on groundwater quality and quantity which can arise in the absence of appropriate mitigation and controls: • There is the possibility of contamination of aquifers in the event of intentional or accidental discharges of hazardous materials to the ground during construction, particularly in shallow overburden areas. • The bedrock aquifers may be impacted by various activities involving site clearance / earthworks, and spillages / leakages from construction plant and at refuelling and storage depots located on site. • 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 prior to discharge (either by on-site treatment or removal for disposal via the local sewage network, if available). • The use of groundwater extraction wells for water supply related to operating facilities	Impacts of **major** significance are predicted before mitigation.	• See above • The contact of the dewatered groundwater with potential chemicals will not be allowed by appropriate sealing mechanisms (enclosed conveyance of the extracted groundwater to the settlement structures). Discharges will be periodic tested to meet Turkish and international standards (eg. IFC General EHS Guidelines, EU standards). • The use of groundwater resources will be subject to DSI approval. DSI will allow the drilling and use of extraction wells in case the ground water supply is adequate. Such approvals are based on the availability of water supply.	With the application of the mitigation measures neglijible residual impacts are predicted.

may impact the groundwater availability in the vicinity of the extraction well.

- Groundwater from any temporary dewatering measures during construction will be drained to a nearby surface water course. The turbidity has to be monitored and if needed a settling tank (or similar structure) utilised to reduce turbidity prior to discharge. In addition, there is the possibility of risks of excavation groundwaters being contaminated by chemicals (e.g. from grouting) or cementitious materials.

The sensitivity of the ground water resources can be considered to be medium to high as they are being used for drinking and/or domestic purposes. Depending on the type of impact the magnitude can be large (decommissioning of extraction wells due to construction). Hence the impact significance on the ground water resources can vary between moderate to major.

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. In addition to that, according to the hydrological information received from the Ministry of Forestry and Water Affairs and the 1/100,000 scaled Balıkesir-Çanakkale and Lower Thrace Region Environmental Plan the Motorway-Bridge Project does not cross the two most stringent categories of 1st or 2nd degree groundwater protection zones

Table 7-5 ***Significant Operation Terrestrial Water Environment Impacts and Mitigation***

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
1	**Impacts on Surface Water Quality (temporary)** • Spills during road accidents and spillages / leakages from filling stations and service area also present further risks of pollution during operation. Impacts of **Major** significance could occur from accidental releases to surface waters when high amounts of water contaminated 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. • Motorway repair activities (including removal of worn down asphalt and replacement, painting, infrastructure maintenance) had the potential to impact the surface water quality since these will involve construction activities including the usage of chemicals. The risk of water pollution is also high within all road	Impacts of **major** significance are predicted before mitigation.	COK A.S.. have committed to preparing an Environmental Management Plan, which will include handling solid waste generation during operation and maintenance activities as well as spills and leakages of hazardous materials during construction and operation. These procedures will be updated routinely as the level of detail of the Project Design increases. **Accidental Spills** A spillage risk assessment will be undertaken in accordance with the UK Design Manual for Roads and Bridges (DMRB) (2) as part of the development of the Environmental Management Plan (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. The spill risk assessment will be completed during the design of the Motorway taking into account that no oil water separators are typically adopted by KGM. DMRB Volume 11 Environmental Assessment section 3 Environmental Assessment Techniques Part 5 Procedure for Assessing Impacts Annex I Method D Pollution Impacts from Accidental Spillages provides the methodology for assessing the risk assessment. It should be noted that Article 2.35 Volume 11 indicates that "The management of pollution incidents usually involves the isolation of part of the road drainage system, so that the pollutant can be recovered or treated. For minor incidents, the use of booms, drain mats or absorbent	Following the application of mitigation measures, neglijible residual impacts are predicted.

(1) In addition to mitigation measures described above; there are mitigation measures and commitments identified in Turkish EIA Report, which are (some of the mitigation measures and commitments presented here may be same as above ones. These are listed in Appendix 2.3.

(2)Design Manual for Roads and Bridges (DMRB): Volume 11 (2009). This Standard provides guidance on the assessment of highways and/or roads projects in accordance with the provisions of the Conservation Regulations. It consolidates current best practice advice in this area. (http://www.dft.gov.uk/ha/standards/dmrb/vol0/section1/gd0108.pdf)

	sections close to surface water bodies such as stream crossings		materials may suffice. Larger incidents are likely to require closure of valves or penstocks, and/or blocking of outfalls/drainage ditches to avoid damage to surface waters and groundwaters. A rapid and appropriate response can often prevent a spillage from causing a severe pollution incident. • The Environmental Management 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.	
2	**Impacts on Surface Water Quality (permanent)** • Surface water can be affected during operation by routine deposits from vehicles (e.g. tyre 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 the wastewater discharge from the Service Areas (including petrol filling stations, restaurants, sanitary facilities, etc) is not adequately treated in	Impacts of **major** significance are predicted before mitigation.	• Surface and Groundwater Quality (routine operation and maintenance) • The Environmental Management Plan Aand the Watercourse Crossing Plan will be implemented so that surface water and ground water impacts are prevented from wastes generated during routine maintenance of the Motorway. The measures are discussed in Chapter 2.1 Resources and Waste. • 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 Highways, published in 2008. These natural fertilizers are in line with the IFC Environmental, Health, and Safety Guidelines for Toll Roads (IFC, 2007) which require compliance with international restrictions on pesticide use; Restriction of herbicide use to those that are manufacture under license, and registered / approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides. If pest infections are detected the competent authority needs to approve respective pesticide/biocide for pest control.	Following the application of mitigation measures neglijible residual impacts are predicted.

line with Turkish and international standards/guidelines.

In addition, the conditions listed in the IFC Performance Standard: Resource Efficiency and Pollution Prevention (2012) Pesticide Use and Management Section Articles 14-17 will be implemented including the formulation and implementation of an integrated pest management and/or integrated vector management approach

- The Soil erosion, Reinstatement and Landscape Management Plan (See Volume III 2.2 Geology, Soils and Contaminated Land) to be developed will address integrated vegetation management (IVM) for the maintenance of the ROW to ensure that biological, mechanical and thermal vegetation control measures are used where practical and avoid the use of chemical herbicides. The Plan will reflect the EHS guidelines for Environmental, Health, and Safety Guidelines for Toll Roads in full (as well as Turkish regulations). The Soil erosion, Reinstatement and Landscape Management Plan will specify that when using pesticides and herbicides for the maintenance of ROW, potential impacts to soil and groundwater will be minimised by implementing landscaping plans which have to be submitted to KGM for approval. These plans will address pesticide management and the following measures:
    - Comply with Turkish regulations on pesticide use. If pest infections are detected the competent authority needs to approve respective pesticide/biocide for pest control. Pesticides of WHO Type 1a and 1b will not be used;
    - Only use registered or approve 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 water sources and surface water bodies; and
    - Store appropriately by following good hazardous materials storage and handling management practices.
- Permanent erosion and runoff control features will be regularly inspected and maintained during operation.

			• Service Areas will conform to the following requirements: • All Petrol Stations along the Motorway will be operated in accordance with TS 12820 which are in line the IFC Environmental, Health, and Safety Guidelines for Retail Petroleum Networks (IFC, 2007). These requirements will be included in the contract of the Petrol Station operator. Petrol Station locations are given in Chapter 2. • Oil separators will be operated, and maintained to achieve the desired water treatment results. • All wastewater from the Service Areas will be designed to either discharged into the local/municipal sewage network (if available nearby) or otherwise treated decent rally prior to 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 prior to disposal. These regulations are in line with EU environmental regulatory framework.	
3	**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 storm water flow rates can lead to erosion, habitat deterioration, and flooding. • 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.	Impacts of **major** significance are predicted before mitigation.	**Structure of Surface Water Bodies, Drainage and Flooding (permanent)** An Environmental Management Plan and Watercourse Crossing Plan will be developed to include measures to ensure that the road design is 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. These plans will be integrated into the process for deciding the layout of all construction sites, work and camp areas. COK A.S.will review the implementation of these plans. The Turkish EIA requires that hydrogeological investigations be conducted prior to construction to assess the hydrogeological framework within the project area. Detailed hydrogeological investigation report shall be prepared and shall be submitted to State Hydraulic Works, Directorate of 25th Region before preparation of implementation projects. These investigations will be used to identify the impact of the motorway construction and operation on the groundwater resources. These impacts will include potential decrease in the use of groundwater extraction wells, lowering of groundwater recharge into the underlying water bearing units and closure of potential future areas of groundwater extraction. Project elements will be located to minimize risks	Following the application of mitigation measures neglijible residual impacts are predicted.

to important sources of groundwater (including unofficial community and communal sources and groundwater wells) and to ensure surface waters and water supplies are not impacted. Where impacts cannot be avoided, appropriate technically and financially feasible mitigation measures will be developed, such as new ground water wells and diversions of irrigation channels to maintain the functionality of the systems during construction period.

Sustainable road drainage and storm water management practices are part of the stormwater design process for culverts and drainage-stream designs will be implemented and maintained in accordance with international guidelines (such as the AASHTO Highway Drainage Guidelines or similar 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, detention ponds or basins).

4	**Potential impacts on Groundwater** • 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. • 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.	Impacts on ground water resources can vary between **moderate to major.**	See above.	Following the application of mitigation measures neglijible residual impacts are predicted.

7.5 WATER ENVIRONMENT – MARINE

7.5.1 Introduction

The full assessment of the impacts on the marine water environment is presented in *Appendix 2.3* of *Volume III* of this ESIA Report. The Appendix presents a detailed description of the baseline marine water environment and the impact assessment chapter of this Appendix discusses significant impacts and mitigation measures. The sections below summarise the findings of this assessment and presents impacts of moderate or major significance. For assessment of impacts of minor or negligible significance see *Appendix 2.3* of *Volume III*.

For the purposes of this assessment the Study Area has been defined as the marine physical environment of the Straits, including the sea surface, water column, seabed and littoral zone, which occur within these confines. The principal focus will be on an area of the DS approximately 10 km on both sides of the proposed bridge crossing. In the event of accidents such as fuel spills from ship collisions, the StudyArea is broader covering the Sea of Marmara and the Aegean Sea.

The following sensitive receptors have been identified that may be affected during construction and over the long term operations of the bridge.

- Physical environment: hydrodynamic and morphodynamic regimes and sediment and water quality.
- Biological environment: benthic fauna, macroalgae and seagrasses, fish, marine mammals and birds (these receptors are addressed within the Aquatic Ecosystem baseline report *Volume III Chapter 2.4 Annex III.1a*); and
- Socio-economic environment: socio-economic activities including local fisheries, commercial shipping, recreational activities (including coastal recreation and boating), and public transport (ferries and related services) (these receptors are addressed within the Socio-economic baseline report Volume III Chapter 3.1 Annex III.3).

The following data collection exercises and technical assessment were undertaken in support of this report.

- A desk-based evaluation of baseline data, including a review of existing scientific literature;
- Evaluation of the technical data related to the design of the bridge as well as geotechnical assessment of the DS section where the bridge will be constructed;
- Assessment of the investigations related to navigational risk assessment (NRA) in the ship traffic studies;

- Assessment of the sediment sample analysis where the tower constructions will be taking place
- Reconnaissance visit of the shoreline to assess the conditions of the shore environment at the location of the anchorages and along and the dry dock area near the shoreline;
- Sediment sampling and analysis and limited water quality sampling along the axis of the proposed bridge; and
- Sediment plume modelling for the trailing suction hopper dredger (TSHD) proposed activities.

7.5.2 Summary of Baseline Findings

Geographical setting

The Dardanelles Strait (DS) is located between the Aegean Sea in the southwest and the Marmara Sea in the northeast. The Marmara Sea is further connected to the Black Sea via the İstanbul Strait. The waterways of the DS and the İstanbul Strait constitute narrow channels and, together with the Marmara Sea, have controlled water exchanges and, thus, palaeoceanographic conditions between the Eastern Mediterranean and the Black seas ever since the invasion of Mediterranean waters some 12,000 B.P. (Stanley and Blanpied 1980; Cagatay et al. 2000; Kaminski et al. 2002). The available data suggest that the effects of both regional tectonic DS and global sea-level changes have played important roles in the evolution and shaping of the present valley-like morphology of the DS.

The 1915 Çanakkale Bridge will be built at the northern part of the DS and will connect the European and Asian parts between Sütlüce and Suluca. The Bridge section lengths are planned to be as follows:

- 4023 m between the anchors,
- 2023 m for the mid-span is, and
- 1000 m for the approach.

The DS catchment area is a part of the wider Marmara Watershed. The main freshwater inputs to the Bay are the Cumalı, Sarıçay, Tayfur Dere and Umurbey Streams.

The landscape around the crossing point is that of a wide open marine and coastal setting with extensive and uninterrupted views of the DS. The immediate coastline in the vicinity of the crossing is not well developed and urbanised in character. Much of the coastline, have not have suffered from human activities except in the vicinity of urban settlements.

Physical environment

The climate in Turkey is influenced by its varied topography which includes mountainous and coastal regions. Canakkale has a Mediterranean climate with hot and dry summers and cool and rainy winters. Although the rising average temperature in the last 2 years may be due to global warming, a transition climate of Mediterranean and Black Sea can still be seen as a dominant feature. Weather conditions are important in the design of the Project for a number of reasons including surface water drainage from road and bridge structures, bridge stability under wind conditions, DS flow direction and magnitude impact which will have influence on navigational risks for shipping activities.

Rain generally falls during winter months and air and sea temperature reach maximum values during July and August. The average annual temperature and rainfall are 15.0 °C 637 m, respectively.

Seabed and sediments

The geology of the region surrounding the DS consists of pre-Miocene to Miocene basement and upper Miocene and younger (Pliocene, Quaternary) deposits. Upper Miocene sediments consisting of siliciclastic and limestone particles deposited in fluvio-lacustrine, beach and shallow marine environments, as well as some volcanics crop out on both sides of the DS (Erol 1968, 1972, 1981, 1985, 1992; Elmas and Meriç 1998; Çağatay et al. 1998; Tüysüz et al. 1998; Yaltırak et al. 1998, 2000, 2002). The upper Miocene sediments are overlain by Pliocene deposits, whereas the younger deposits around the DS comprise both marine and terrestrial (fluvial and alluvial) sediments of Quaternary age supplied by modern rivers discharging into the strait.

The surface morphology of the narrow, NE–SW-oriented Gelibolu Peninsula also shows a basin-ridge type of morphology with steep slopes along both coasts. The shorelines of the Gelibolu Peninsula along the DS and the Saros Gulf are generally straight, except for the 8 km left-lateral step along the south-western edge of the peninsula. In contrast to the Gelibolu Peninsula, the coast of the Biga Peninsula is irregular and the land surface slopes relatively gradually towards the DS. The Nara Promontory, which is the most prominent morphological feature along the Biga Peninsula side of the DS, is located opposite to the left-lateral step in the Gelibolu Peninsula.

Due to the coastal morphology of the Gelibolu and Biga peninsulas, the DS can be subdivided into three morphological segments: a relatively straight, ca. 30 km-long, NE–SW-oriented northern segment (I) extending southwards from the Marmara Sea exit to a narrow, about 20 km-long, zigzag-shaped central segment around the Nara Promontory (II), also known as the 'Nara Passage', and an up to 7.5 km-wide and ca. 20 km-long, NE–SW-oriented southern segment ending at the Aegean Sea exit (III).

An E–W-oriented, approx. 1.7-km-wide and 15-km- long, narrow submarine channel bordered by the 50m depth contour forms the inner part of the DS on the SW Marmara Sea shelf (Figure 1.5a, inset). It extends along and parallel to the coasts of the Gelibolu and Biga peninsulas. The seafloor morphology of the DS is thus characterized mainly by a deep inner channel bordered by shallower and flat submarine flanks on both sides of the channel.

Three units (units 1, 2 and 3) with several subunits have been distinguished on the seismic profiles. These are associated with changes in reflection configurations, reflection terminations, and unconformity surfaces. Unit 1 comprises the uppermost deposits in the DS. Its unconformity overlies unit 2 but may also lie directly on the upper erosion surface of unit 3 where unit 2 does not occur. Unit 1 represents the youngest channel deposits. This indicates that unit 2 is probably composed of riverine sediments deposited during the last sea-level lowstand. The upper surface of unit 3 is erosional with younger units onlapping or downlapping onto it. The seismic profiles clearly indicate that the DS has been cut into unit 3 deposits, which should therefore consist of upper Miocene deposits widely out- cropping along the coast of the DS.

Oceanography and Hydrography

Oceanographic and hydrographic conditions were reviewed for the Project area and surroundings. The DS is a part of the Turkish Strait System (TSS) that connects the Aegean/Mediterranean Sea waters to the Black Sea and has a unique setting as it is a stratified flow system where the upper part of the water column flow into the Aegean Sea and the lower part of the water column flows into the Marmara Sea. The sum of riverine discharge and precipitation is not balanced by evaporation in the Black Sea.

Information was reviewed regarding the amount of flow occurrence and currents, salinity gradient, water column exchange which may be impacted by the presence of the bridge. The magnitude of the physical setting needed to be identified to assess whether the construction and presence of the bridge may have an impact.

The hydrography of the DS is governed by a two-layered flow system, i.e. a surface layer flowing from the Black Sea (salinity 17.8 PSU (practical salinity unit)) through the Marmara Sea (salinity 20.17 PSU) towards the Aegean Sea (salinity 29.2 PSU), and a bottom layer comprising Mediterranean waters (salinity 38.86 PSU) flowing towards the Black Sea (Beşiktepe et al. 1994). The interface between the upper and lower water layers is situated at a water depth of 30 m at the Marmara Sea exit, and at 10 m at the Aegean Sea exit (Defant 1961; Sur 1988; Oğuz and Sur 1989).Jarosz et. al (2013) conducted current velocity observations over 13 months at both ends of the DS and provided estimations of volume flux time series. The fluxes show distinct temporal variability in both upper and lower layers along both northern and southern sections. The flux variability in the upper layer was in line with the

local atmospheric forcing and the bottom-pressure anomaly gradient. In the lower layer, flux variations were related to variations of the bottom-pressure anomaly gradient.

Water quality

The DS catchment area is a part of the wider Marmara Watershed. The main freshwater inputs to the Bay are the Cumalı Deresi, Sarıçay, Tayfur Dere and Umurbey Çayı. The streams water quality is adversely by settlements and agriculture. The major discharges occur from both sides of the Straits. Human activities that directly impact the DS include urban and industrial wastewater discharges and discharges from heavy shipping traffic. Water quality information was collected from the literature as well as se water quality assessments conducted during the ESIA.

Türkoğlu et. al. (2005) evaluated the DS water quality at 52 points in the period December 2002 and March 2003. Temperature (T), pH, salinity (S), specific conductivity (SC), dissolved oxygen (DO) and total dissolved solids (TDS) were measured at 1, 5, 10, 20 and 30 m depths.

Salinity profiles of the DS showed that there was stratification and formation of two different water masses during the sampling period. The temperature and salinity measurements showed that there was generally an increase with depth in the sampling period. A thin upper layer (20 m) had salinity values of about 22‰ while a much thicker lower layer (20 m) had salinity values of about 38‰.

The mean pH of the DS is slightly basic at around 8.4. The average pH of the DS is around 9.0 from 5 m to 20 m depth in the northeast of the Dardanelles (ie near Marmara Sea). pH levels of the surface layer flowing from the Marmara Sea to the Aegean Sea are higher than those of the lower layer flowing in the other direction from Aegean to the Marmara Sea.

The concentration of DO was around 10 mg L-1 from 1 m to 5 m depth between Canakkale and Dardanos. The concentration of DO was about 10 mg L-1 at 20 m depth around the River Kalabakli. The DO measurements in the northeast of Kilitbahir were lower than to the southwest. Measurements showed that DO concentrations were generally saturated both in the surface and lower layer due to counter-flow in the Dardanelles and their mixture in the southeast areas of Kilitbahir Narrows.

The values ranged from 20 to 50 g L-1 in the Dardanelles TDS increased with depth and distance in the Sea of Marmara.

During the ERM baseline survey in July 2017, water samples were taken at three stations at the location of the bridge crossing. These results showed that pH, DO and salinity levels measured are in line with previous measurements obtained in the DS sea water quality.

Sediment Quality

Contaminants can be released into the marine environment through natural processes or anthropogenic activities. Organic pollutants such as hydrocarbons are characterised by a high persistency in the environment, low water solubility and a tendency to adsorb to organic and inorganic particles. In the water column these substances are therefore predominantly found adsorbed to particles that become incorporated into the sediment. Metals also have a tendency to stick to sediments, although zinc and nickel are relatively soluble. Metals mostly bind as sulphides or are sorbed onto iron sulphides that form under anoxic conditions. The level of such contaminants in the sediment reflects the overall pollution level in the area, but also has a strong correlation with the local sedimentation rates. As contaminants are deposited into the bed sediments, they may accumulate over time and therefore sediments may act as long-term reservoirs of chemicals to the aquatic environment and to organisms living in or having direct contact with sediments.

The concentrations of 27 elements in the geochemical analyses were determined. The average values of samples were calculated by using the average values obtained for each sample.

According to the results of determinations, Al, Cu, K and P at samples taken from the DS are higher than the average value of Marmara Sea.

Analyses of 13 different sediment samples were conducted within the scope of 1915 Canakkale Bridge Project. The results of the following parameters were obtained by performing physical and chemical analyzes: odor, PH, moisture, organic and inorganic substance content, TOC. In addition, detailed inorganic content analyses, metal analyses, ecological toxicity and acute toxicity analyses have been conducted. The results of the analyses have been evaluated by considering limiting values identified in ANNEX-3 B of the Waste Management Regulation. These are in line with the EU Waste Framework Directive. According to results of analyses and limiting values, sediment samples have been classified as non-hazardous in the analyses reports.

Natural Hazards

Turkey is a seismically active area within the complex zone of collision between the Eurasian Plate and both the African and Arabian Plates, it is seismically one of the most active countries in Europe. Much of the country lies on the Anatolian Plate, a small plate bounded by two major strike-slip fault zones, the North Anatolian Fault (NAF) and East Anatolian Fault (EAF). The project area is entirely located within the 1st Degree seismic zone of Turkey (1st Degree is the most critical on a scale ranging from 1 to 5).

The frequency and strength of storms that occur in in the Straits could have implications for drainage capabilities on the bridge; any run-off as a result of heavy rainfall could affect water quality. Strong winds could affect the wind driven surface currents in the Bay and wave heights. Maximum wind speed recorded over a ten-year period is 32.5 m s^{-1} and maximum wave heights lie in the range of 1.25-2.5 m (General Directorate of State Meteorological Works, 2010). These values indicate that extreme weather conditions may have potential impacts on the bridge design, safety of ships during construction and operation phases, safety considerations for construction camps used in the construction phase, emergency response planning assessment including oil spill scenarios mitigation planning. COK A.S. has taken these conditions into the planning, design, construction and implementation phases of the Project.

The stability of the sediment at the location of the bridge crossing will be important throughout the construction period and life of the bridge because of the potential structural damage it could cause to the bridge. The design of the Bridge foundations will take into account the risk of scour developing around the piers based on sediment data. Management of the risks may take measures such as ongoing monitoring or physical protection such as mattresses. Furthermore, potential morphological changes will be modelled elsewhere in the DS to assess the impacts of the physical changes in the Straits.

Shipping Traffic and Traffic Schemes

The Montreux Convention regulates the legal regime of the Turkish Straits and this is recognized by European Country. Merchant shipping of any flag and with any cargo has freedom of transit in the straits during peacetime and during wartime whenever Turkey is not a belligerent. Turkey may, however, require merchant ships to stop at a station upon entering the straits for the purposes of sanitary and health control. The Montreux Convention implicitly gives Turkey the power to adopt such a regulatory scheme.

The International Convention for the Prevention of Marine Pollution from Ships, (MARPOL), International Regulations for Preventing Collisions at Sea, 1972 was accepted by Turkish government are related strait rules. The International Maritime Organization (IMO), as a consequence of this UN document, started to refer to the Straits as the Strait of Istanbul, Strait of Dardanelles and the Marmara Sea. Turkey, due to these facts and as the sovereign state of the Straits, started to officially use the term 'Turkish Straits' in its domestic legislation, Turkish Government has implemented the The Traffic Separation Scheme (TSS) which maritime traffic regulations have been implemented; for this reason for the yearly casualty rate has sharply been reduced especially after 1998 rules.

A total of 44,035 vessels passed from the DS in 2016 which means 121 ships per day on average. A total 5,665 ships were longer than 200 m. Of the 44,035 ships, 989 were LPG-LNG tankers. While there are no strict length or draft

limits on vessels using the DS, vessels between 150 and 200 meters long and/or with a draft between 10 and 15 meters must report to the Traffic Control Centre no less than 24 hours before entering the DS. Larger vessels must report no less than 48 hours before entering the Turkish straits. Turkish vessels over 150 meters long must use a pilot, but other vessels are recommended to use a pilot, even though it is not required for transit vessels. Vessels not using a pilot in the DS may expect longer waits than those with pilots. Masters, owners or agents of the vessels carrying dangerous cargo and which are 500 gross tons and more, 24 hours before entering the entrance of the Strait of Istanbul and the Strait of Dardanelles are required to provide a Sailing Plan (SPI) as determined by the administration.

Ship accidents in the TSS are examined mainly under four categories; collision, grounding, fire and stranding. Each has a distinct effect on the marine ecosystem. Collision is the dominant type of accident in the area. It is caused by poor visibility and strong currents.

Current and future changes in traffic arrangements resulting from developments in ports and terminals in the region are affecting the traffic pattern of the ships already. Between 2004 and 2014, there were 45 accidents in the DS except for the accidents involving small boats. This number corresponds to an average of 4-5 ship accidents each year when spreading over the years. In these 45 accidents, 26 run ashore and 17 machine or rudder failures happened. Again, in the last 10 years, it has been recorded that, there was one ship fire and one ship sank after collision.

The traffic Scheme for the Straits is divided 3 local areas and are as follows:

- Ships ask permission from the Gelibolu Control Station by put in order by VHF Channel 11, prior 30 nm to Gelibolu Light House to enter DS. Upon approval, the vessels can enter the Straits.
- The vessels should, in accordance with rules of Regulations for Prevention Collisions at Sea, keep to that side of mid-channel which lies on their starboard side, taking care to make sound signals in accordance with the rule when approaching the narrows of Dardanelles and the bend of Nara. Vessels should also take every precaution to avoid meeting other vessels in the areas between Kilitbahir and Çanakkale, between Nara and Kilia, between Gelibolu and Cardak; and, when the current or weather is in their favour should give way to oncoming vessels by stopping or reducing speed.
- The DS have a 90^0 turning making ship manoeuvring difficult at Nara Turning point. Nara is the shortest sector and has a sharp turning point both of side. There is environmental potential risk on to Çanakkale city on an account of Nara corner.
- The vessels require permission from Mehmetcik Control Station by VHF Channel 11, Prior 30 nm to Mehmetcik Light House to enter the DS.

Present Navigtational Risks

The sea accidents occurring in the Dardanelles are collision, fire, drift, grounding, machinery accidents, side-lying, capsizing and medical emergencies. Among these collision, drifting and grounding are the outstanding ones accounting for more than half of the accidents. When the distribution of the vessels in the DS according to their type is examined, 50% of the accidents involve the dry load cargo vessels.

In recent years, the number of ships passing through the Dardanelles has tended to decline rapidly. When we look at the distribution of foreign flagged vessels passing by the straits according to the countries, Malta flagged vessels are in the first place with more than 5,000 passes per year. Panama flagged ships are in second place with more than 4,000 passes. The Russian flagged ships are in third place with an approximate passage of 3,500 per year. Given the distribution of the ships passing through the Dardanelles according to their type; dry cargo vessels are in the first place with approximately 50%, 10% of the vessels passing through the throat form dangerous substance loaded tankers, 10% are cargo vessels, 10% are container vessels and, 20% are ro-ro ships, cargo ships and other vessels. When the accidents are examined in the Dardanelles, dry cargo vessels are mostly involved in the accident. Later on, cargo ships and bulk carriers are among the most involved in the accident. When the formations of the sea accidents in the strait are examined, most machine failure events occur. Afterwards, accidents occur in the form of landings and conflicts.

According to the risk map created on the accident data in the DS, between Kilitbahir-Çanakkale and Nara Burnu and Poyraztepe are the greater risk areas for the crash. Since Lapseki and Gelibolu coasts are shallow, this poses a risk for the ships to land. Fields marked with light yellow have taken place on the map as the least accidental areas that have not been accidents so far, whicİh do not cause dangerous passage of ships. The Canakalle Bridge falls within the highest risk areas based on the Ilgar Study (2015).

7.5.3 Summary of Significant Impacts

Significant impacts to the marine water environment are summarised for the construction in *Table 7-6* and for operation in *Table 7-7*. Mitigation measures are identified in the tables below also.

For the assessment of impacts or minor or negligible significance see *Appendix 2.3* of *Volume III*.

Table 7-6 Significant Construction Marine Water Environment Impacts and Mitigation

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
1	**Impacts from Dredging Activities** The sediment release from dredging through TSHD method has been assessed through a plume modelling conducted by 9 Eylül University Marine Sciences institute which is recognized by the MOEUP as an accredited institution for the preparation of dredging management impact and planning. Impacts from increased turbidity from dredging will be assessed from the results of the modeling effort hence the magnitude of effect on the water quality from increased turbidity was identified based on the modeling efforts. The following adverse impacts that may occur depending used: • Water quality may be affected by the sediment plume due to increased turbidity and the release of nutrients and contaminants into the water column (e.g. metals and organic pollutants). • An increase in turbidity, nutrient and contamination	Significance of the impacts cannot be determined without sediment characteristics assessment and plume modelling results but adverse impacts are predicted.	Mitigation measures within the context of the present Project are included in the *Environmental and Social Management Plan* - ESMS and its subsequent plans and procedures and some of them are listed below for both the dredging and dredge disposal activities. With respect to dredging: • Reduction of the dredged area to as small as reasonably practicable by opting for the design option with the smallest dredging footprint and least environmental consequences; and • The dredging disposal methodology will be agreed with the MOEUP. As guidelines • With respect to dredge disposal, the following measures will be taken as appropriate: • Beneficial reuse of uncontaminated dredged material will be considered (eg as fill material for near-shore construction projects).	The plume modelling results indicate that the impacts will likely to be negligible to minor.

(1) In addition to mitigation measures described above; there are mitigation measures and commitments identified in Turkish EIA Report, which are (some of the mitigation measures and commitments presented here may be same as above ones. These are listed in *Appendix 2.3*.

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	levels due to sediment suspension may have indirect impacts on marine organisms. Indirect impacts to flora and fauna may occur due to changes in water quality e.g. the plume may alter fish distribution and the settlement of the plume (which may extend outside of the dredging area) out of the water column onto the seabed may smother sedentary benthic organisms and/or clog filter feeding apparatus. Toxic effects may also be experienced from increases in contamination concentrations. • Increased turbidity may reduce light penetration, which affects macroalgae and seagrasses. • Increased turbidity, nutrients and contaminants can impact filter feeding benthic fauna by clogging and damaging feeding equipment and reducing water quality parameters.		• Use of submerged discharges will be considered for hydraulic disposal of dredged material. • Inspection and monitoring of dredging activities to evaluate the effectiveness of impact prevention strategies, and re-adjusted where necessary as required by the MOEUP sediment disposal guidelines.	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
2	**Non-routine events during construction** There is potential for the accidental or unplanned release of untreated construction site wastewaters. Standard operating procedures and good construction site management (e.g. regular equipment inspections, careful storage of construction liquids and materials away from the marine environment, careful disposal of all construction wastes, careful movement of material around the construction site etc.) will prevent most incidents but it may not be possible to prevent all accidents in this way. Extreme weather events, poor maintenance, and operational errors are the most likely causes of accidental discharges from the construction site to the marine environment. Stormwater flows could cause the construction site run-off and drainage management systems to overflow untreated into Dardanelles. This could affect water quality and marine ecosystem by introducing a surge of particulate matter, nutrients, and contaminants into the water column. The decomposition of this material can deplete concentrations of dissolved oxygen, with the potential to cause fish kills.	**Moderate**	• COK A.Ş will prepare, during the current design stage, an international Emergency Prevention and Response Plan (EPR Plan) applicable to spill containment and clean-up incidents on land and in the marine environment. The EPR Plan will apply to marine incidents stemming from construction vessels, eg spillage of oils or fuels into the DS waters due to leaks or collision damage. Any major spills into the DS waters (e.g. due to collisions of large commercial vessels or severe accident on the bridge) will primarily be handled by the General Directorate of Coastal Safety and Salvage Administration, which has emergency equipment and responds to emergency incidents with the order of the Board of the Port Authority Harbour Master. In addition, there is a private organization (MARE-Marine Clean-Up Services) in Dardanelles Straitsthe DS, which was established by the 20 coastal facilities. Therefore, COK A.Ş will not be obliged to maintain its own fleet of clean-up/rescue vessels to respond to potential maritime incidents. • The EPR Plan will include, among others, the following topics: • A spillage risk assessment in accordance with the UK Design Manual for Roads and Bridges (DMRB);	The mitigation measures presented are designed to prevent accidental and uncontrolled releases, or to facilitate the rapid clean-up of any discharges that cannot be contained. These mitigation measures are considered to be sufficient in preventing impacts to the marine environment in the majority of cases. Thus, with good site practice and operating procedures in line with internationally accepted levels, as provided above, the probability of accidental and uncontrolled discharges is low and the residual non-routine impact with the exception of collision based events of minor significance. The significance of collision based risks will be assessed following the results of the NRA.

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	Construction site wastewaters may contain silt-loaded site run-off, fuels, oils, lubricants, cement, grout, water proofing chemicals, abraded materials from construction machinery and activities (including rubber, metals, and dust), and sewage effluent. Wastewater sources may include equipment washing processes, equipment and vehicle maintenance, spills of vehicle fuels and oils, and the release of wastewater from fire-fighting. Water used for extinguishing fires may contain ash and sediments, hydrocarbons, and fire suppressant chemicals.		• Based on the results of the risk assessment (and in conformance with statutory requirements), design of spill prevention/containment structures around sensitive equipment, installation of appropriate spill cleanup equipment and development of response procedures; • Training of contractor staff on spill prevention and response; • Emergency communication procedures with local authorities; The Environmental Management Plan and the Marine Safety for Tower Foundation Procedure which will include procedures on marine environmental design management will include, among others, the following considerations: • Design of sediment traps and oil-water separators to prevent contaminated runoff from land-side approach roads at the DS into the marine environment; • Design specifications to allow the use of biodegradable hydrocarbons (ie less harmful oils and lubricants) for plant and equipment employed on or close to marine environments. As a minimum, the Environmental Management Plan to be required from the contractors prior to construction will need provisions that ensure that:	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
			• no wastes will be disposed of from the vessels into the DS; • the allocation and correct use of safe waste disposal sites from vessels and within the Project site will be in accordance with Lender Requirements and will be monitored, including for the collection and temporary storage of hazardous waste; • waste containers that do not allow leakage or dispersal of contents will be installed and their correct use will be monitored; • waste containers will be appropriately labelled to separate waste types; • waste streams will be regularly assessed in terms of waste types and quantities in order to evaluate whether additional reuse and recycling methods may be applied; and • the handling, transport and disposal of hazardous waste within the Project site and to third party facilities will be regularly assessed	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
3	**Navigational risks** During construction, there will be an increase in maritime traffic in DS, with construction, surveillance and support vessels and barges moving between the materials offloading facilities and the construction site, and at the location of the bridge crossing itself. The heavy industrial shipping and fishing activity that exists in the DS will continue throughout the construction phase of the Project. The presence of construction vessels (tugs, floating cranes), dredgers and barges, vessel anchorage and all the associated support boats during the construction phase will limit navigation and consequently pose an increased risk to marine traffic. Furthermore, approach limits and no-go areas that restrict all shipping traffic will be in place in the marine environment to allow the installation of the foundations, towers, and superstructure. This includes a restricted access zone around the work areas and safe approach limits from the centerline of the bridge for ships crossing the Straits. Although the restricted access zones will reduce the likelihood of commercial or fishing vessels from interacting with the construction vessels, they will reduce the width of the navigable passage through	COK will undertake a NRA study following which the effectiveness of the existing and proposed TSS system can be incorporated into the impact significance. Engineering studies and security corridor technical assessment addressing the safe approach of levels will be performed to assess what tower access limits there will be for construction and operation. The magnitude of the impact will be assessed following the results of theNRA.	The scope of the risk assessment will include: • The baseline data, hazard identification, hazard ranking, ALARP assessment, hazard log, ALARP statement • A clear identification of all potential sources of risk (e.g. construction/ operation risks, risks of third party vessel - vessel collision, project vessel - third party vessel collision, third party or project vessel collision with temporary and permanent infrastructure, whether there are different risks to different types of third party vessel. • Identification of different types of risk (e.g. anchorages, risk of drifting craft in adverse weather, dangers to smaller craft in larger shipping lane etc. Management actions required by different parties will be clearly identified clearly (e.g. what risks will be mitigated by actions of the authorities in charge of shipping safety in the channel, what actions will need to be taken by third party vessels, what actions need to be taken by Project vessels The bridge designers will coordinate installation of relevant equipment to mark the main channel centreline (as will be supplied by the relevant authorities and installed under their direction), as well as warning lights to mark the tower piers and pier protection structures. All the process will be managed by Port Authority, KGM and other	The implementation of the recommended safe approach limits and inherent design measures outlined above will reduce the magnitude of the bridge as an obstruction to vessels approaching the adjacent ports to small. Although vessel maneuverability will become more cumbersome, vessels not using a pilot in the DS may expect longer waits than those with pilots. Masters, owners or agents of the vessels carrying dangerous cargos and which are 500 gross tons and more, 24 hours before entering the entrance of the Strait of Istanbul and the Strait of Dardanelles are required to provide a Sailing Plan (SPI) as determined by the administration. The magnitude of the residual impact will be assessed following the results of the navigational risk assessment.

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	the narrow strait between the Straits. The presence of the construction fleet and the restricted access zones has the potential to obstruct and interfere with existing maritime traffic. This in turn will increase the risk of collision for ships in transit through the strait. Local fishermen of the small-scale fishery sector might temporarily be impacted during the construction phase of the Bridge with regard to limited access to certain travel routes and fishing grounds. The bridge will present permanent in-stream obstructions and a collision risk for shipping, including the local and regional fishing fleet in Dardanelles Strait. As this area is one of the busiest for shipping in the region, this potentially represents a significant impact on shipping and the movement of goods and people and on related port activities with economic impacts on associated industries. Engineering studies and security corridor technical assessment addressing the safe approach of levels not been conducted yet. Therefore, it is not clear what tower access limits there will be for construction and operation. All mariners using the area will be receptors to the impacts associated with the reduced area of navigable waters		relevant authorities. COK A.S. will need to inform the port authority of the overall planned construction schedule. Prior to start of construction, COK A.S. will need to identify together with the port authority the restricted access zones around the construction vessels, tower structures and southern anchorage, and clarify enforcement of these zones by the port authorities. The management of navigation risk in the Straits (including the Project Area) falls primarily under the responsibility of the Undersecretaries of Maritime Affairs and port authorities via the full implementation of the TSS, application of pilotage procedures for ships passing through the strait, and placement of marine markers, buoys, and lights to indicate hazards and obstructions to navigation. As previously discussed a VTS and an STS is in place. The construction vessel presence and the timing, duration and areas of restricted access will be advertised at local ports and communicated to the maritime traffic using onboard VHF radio. All construction vessels and maritime traffic are further expected to comply with the IMO COLREGS (1972) to prevent collisions at sea by ensuring they are visible and have suitable navigation equipment. The early works will be using the existing VTS and STS to minimize risks related to increase in vessel presence. The construction methodology provided by the	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	around the bridge site, but especially those vessels operating from the ports, marinas and anchorages near to the construction sites. The potential interactions between industrial and fishing vessels, ferries and naval craft and the construction fleet are navigational obstruction with consequential detours and increased journey times, groundings in shallow water, ship to ship collisions, and ship to bridge tower collisions. There is also potential for further hazards to occur, including capsize, mechanical failures, hull damage, and fires or explosions COK A.S. has undertaken navigation study and marine traffic analysis for assessing the presence of the bridge. KGM requested that Dokuz Eylül University (DEU) Maritime Faculty with prepare a "navigation study and marine traffic analysis" in order to investigate the effects of the tower legs of the 1915 Canakkale Bridge on the marine traffic and to make the navigation channel analysis to be used during the Bridge construction works and during the operation period. In the research for the navigation studies PIANC (2014) Harbour Approach Channels Design Guidelines, Report No: 121 was used as reference document.		EPC contractor indicates the following mitigation procedures will be in place to mitigate ship collision risks with other vessels within project area or vicinity with 3rd party vessels: • Use correct navigation aids (update chart, GPS, radar, etc.) • Continuous radio-watch. • Each operation has to be reported to Port Authority, proper communication and each vessel passing or crossing keep distance and should slow down. • Respect the applicable shipping trade regulations; navigation control, correct signing, lighting and signalisation. • Be aware of the strong and treacherous currents; assisting tug is available for critical manoeuvres. • All vessels utilized on site shall be in good and sound condition. • Vessels shall make sure that the access to the channel / sailing route / traffic lane is clear before entering • Proper communication with other vessel and with the port authorities. The bridge will be designed in accordance with the relevant Turkish legislation so as not to significantly impede or delay passage of any vessel, regardless of its size, shape or design. The design will need to incorporate navigational safety measures (e.g. warning	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	Detailed ship collision risk assessment has been conducted for the Project operation stages (1915 Canakkale Bridge Detailed Design Ship Collision Risk Assessment, COWI, December 2017). The following categories were assessed: The considered scenarios are: • CAT I Vessels that become aberrant due to technical or human errors (black out, loss of propulsion, weather condition). • CAT II Vessels that forget to turn and instead continue towards the bridge structure on the original course. • CAT III Vessels making evasive manoeuvre to avoid ship-ship collision, potentially causing collision with bridge element. • CAT IV Vessels manoeuvring blindly or drifting. This may be due to incapability if the crew (sleep, intoxication, absence on the bridge) or loss of steering. A prognosis for the vessel traffic in year 2073 has been made and the results discussed previously. Year 2073 is 50 years after expected bridge completion and thus, half way through its design life, which COWI considered reasonable for the risk assessment. The analysis of		lights, shipping lane markers and signage, approach markers, guidance buoys etc.), anti-collision and bridge protection structures in compliance with national and international shipping laws and regulations.	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	the ship collision risk for the 1915 Çanakkale Bridge resulted in the specification of the design impact forces. This combination of design impact forces results in a probability of severe collisions of 9.5x10-5 per year, i.e. within the acceptance criterion of 1x10-4 per year. This mean that the risk for the side span piers arising from ship collision with the revetment shall not exceed 0.5x10-5 per year to remain below 1x10-4. This shall be verified when the design of both the Asian and European revetments are designed. Detailed navigational risk assessment has not been conducted for the Project construction and operation stages. The premise of the risk assessment approach is that there is a statistical probability, referred to as probability of aberrancy, that a vessel will stray off course and end up on shore, or collides with other vessels or hits the bridge under construction. Causes for such events include pilot error, mechanical failure or adverse environmental conditions such as bad weather. The risk assessments use a stochastic approach to assess the probability of different types of shipping accidents based on a statistical distribution of maritime accidents calculated for the whole of Turkey.			

Table 7-7 Significant Operation Marine Water Environment Impacts and Mitigation

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
1	**Reduced need for ferries from increased road-based accessibility** The bridge will reduce the need for ferry services that currently operate across the DS and thus indirectly decrease any associated physical, chemical and noise pollution to the marine environment, specifically water quality.	**Positive**	None proposed.	**Positive**
2	**Impacts to water quality from surface run-off drainage and littering** Operational surface water run-off from the bridge deck has the potential to be contaminated with hydrocarbons, heavy metals, de-icing compounds, and material abraded from the vehicles (e.g. tyres, brake linings, etc.) using the crossing. If appropriate surface water drainage, containment and treatment measures are not installed on the bridge deck, contaminated surface run-off will be released into the marine environment either during periods of rainfall or with melt water. The bridge will bear three traffic lanes each way. Technical specifications of KGM foresee two pedestrian gangways adjacent to the outer windscreens, one on each side of the suspension structure. Activities associated with the	mpact on water quality and marine ecosystem is considered to be of minor to **moderate** significance.	Mitigation and management measures that should be implemented to address the potential impact of the release of contaminated road surface run-off and littering on the marine environment respectively include: a) in terms of surface run-off drainage, the Environmental and Social Management Plan – ESMP and its subsequent plans and procedures will include, among others, the following aspects: • All surface run-off of the approach viaducts to the bridge (i.e. the parts of bridge over land) will pass through an appropriately designed drainage system, incorporating sediment traps and oil interceptors to treat run-off, prior to being released into the marine environment wherever possible; • Proper design and regular maintenance will ensure effective treatment and sufficient capacity to prevent any accidental release from overflow; • Tracking of waste recovered from the oil water separator will be undertaken; and	**Negligible**

(1) In addition to mitigation measures described above; there are mitigation measures and commitments identified in Turkish EIA Report, which are (some of the mitigation measures and commitments presented here may be same as above ones. These are listed in Appendix 2.3.

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact
	operation of the bridge will also develop at each landfall end. Use of the bridge by vehicles would result in an increase in littering of these landfall areas. It is likely that items discarded from vehicles would eventually end up in the marine environment of Dardanelles Straitsthe DS when the litter is blown from the bridge deck or any vista points located near the coast. If no measures are implemented to prevent, then collect and properly dispose of litter over the operational life-time of the bridge, the cumulative volumes being discarded could be large. It is assumed that the majority of discarded materials will be food items or paper, plastic and aluminium food containers.		b) in terms of littering, the Environmental Management Plan during Motorway operations will include the following aspects: • Motorists will be advised via signposts on the approaches and on the Bridge to not litter; • Litter and debris on the Bridge road surface and walkways will be cleaned regularly as part of routine maintenance procedures and appropriately disposed of; • Road-side litter and debris that has blown into the environment surrounding the bridge will be regularly collected. Litter receptacles will be provided at vista-points/parking areas and regularly emptied. All litter will be disposed of at appropriate facilities.	

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact

43	**Bridge Designa and Non- Routine events or external events:**
	
	Damage to bridge structure from external event
	
	The bridge needs to be designed to withstand a service life of 100 years serviceability against static as well as extreme events.
	
	Canakkale Bridge is located in the vicinity of the North Anatolian Fault - NAF which forms part of the border between the Eurasian and African-Arabian plates. The area is susceptible to earthquakes as it is located in the 1st degree earthquake zone.
	
	It is considered that there is a medium probability of a large seismic event (in terms of scale and intensity) occurring in the region during the operational life-time of the bridge of 100 years. Such an event is likely to affect numerous receptors in the marine and shoreline environment (depending on the degree of destruction to the bridge structures and traffic caused and extent of any consequential pollution events) and therefore of major consequence.
	
	The non-routine impact significance is major.
		Major	Measures to protect the bridge from structural damage and control traffic during seismic events has been considered through the detailed design phase. The geotechnical, geological and earthquake engineering study conducted by COK A.S. has formed the basis for initiation of design and this data will be enhanced by the remaining interpretive work, laboratory testing and earthquake engineering analyses.
			
			These further studies of the risk of seismic events and implications thereof for bridge design and operation will aid in drawing up emergency response plans aimed at preventing, reducing and/or containing the potential impacts of such disasters if they occur.
			
			The bridge is being design with the following conditions
			• Earthquake Return Period
			  ○ Functional Evaluation Earthquake 145 years
			  ○ Safety Evaluation Earthquake 975 years
			  ○ No Collapse Earthquake 2475 years
			• Wind loads to be obtained in accordance with EN 1991-1-4, except where described otherwise in this document. The recommended values for Nationally Determined Parameters stated in EN 1991-1-4 shall be used unless noted otherwise
			• Mean water level to be considered a as a permanent load for all load combinations. The following unit weights of water shall be applied:
			  ○ Minimum = 9.8 kN/m³
			  ○ Maximum = 10.1 kN/m³ (sea water)
			  ○ In load combinations the most unfavourable value of minimum or maximum unit weight of water shall be applied.
			• Ship impact loads (Risk acceptance criteria for failure due to ship collision shall be taken as 1.0 x 10-4 per year for the total bridge)
				Negligible

No.	Impact Description	Impact Assessment for the Area of Influence	Mitigation /Enhancement Measures (1)	Residual Impact

			• Maximum total storm surge in water level due to wind and to changes in barometric pressure is preliminary assessed as +1.50 m (100 year Return Period event).
			• Accidental design situations
			  ○ Ship impact (global and local effects)
			  ○ Fire
			  ○ Tsunami
			  ○ Rupture of hanger cable
			• Cable structures
			• Geotechnical and foundation design to be designed in accordance with the pure EN 1997-1 using the Determined Parameters stated in EN 1997-1.
			
			Scour protection shall be designed in accordance with recognised design methods for a damage level corresponding to no/minor movements of rocks for maximum wave and current loads corresponding to a 100-year return period event. However, COK foresees that similar protection applied to the Osmangazi Bridge, filler layer of some 1.0m think followed by armour layer of some 1.0m to be applied on the seabed around the tower foundation caisson. The material requirements will be specified in the Technical Specification. The computer fluid dynamic (CFD) analysis is planned to be performed to seawater flow condition around the caisson at the bottom and around the stepped parts, which would provide a basis for the scour protection
			
			COK is committed to undertaking pre-construction scour surveys along the bridge piers and depending on the level of risk of program of mitigation measures will be implemented. Potential mitigation measures may include mattresses, rip-rap around the foundation of the footings. Potential bathymetric changes in other parts of the DS will not be assessed.	

7.6 BIODIVERSITY AND CONSERVATION

7.6.1 Introduction

The full assessment of the impacts on biodiversity is presented in *Appendix 2.4* of *Volume III* of this ESIA Report. The Appendix presents the ecological baseline description and ecological impact assessment of the Project and defines mitigation measures. The sections below summarise the findings of this assessment.

Terrestrial Ecology

The area of influence is defined as the area 1,000 m buffer along the length of the Project, consisting in a 500 m buffer either side of the Project. This area of influence will be considered as the study area for terrestrial ecology.

Freshwater Ecology

The area of influence results from the intersection between the Project and the identified significant freshwater features. A desktop review of satellite images (Google Earth) was conducted, and a total number of 8 rivers / streams / creeks were identified as crossed by the Project. This area of influence will be considered as the study area for freshwater ecology.

Marine Ecology

The area of influence is defined as the intersection between the bridge and its associated auxiliary construction areas (dry and wet dock) and the marine environment; specific distances are not relevant along the Canakkale strait. This area of influence will be considered as the study area for marine ecology.

7.6.2 Summary of Baseline Findings

1. Terrestrial Ecology

Flora and Habitats

The study area is located in the Marmara region, characterized by a Mediterranean climate, where natural habitats including *Pinus brutia* forests, maquis and psedumaquis, riparian areas and meadows are mixed with conifer plantations and agricultural areas (fruit trees and wheat, as main crops).

A total of 22 different EUNIS habitats were identified in the study area during the desktop analysis and were verified during the field survey. Only 14 of these habitats were evaluated during the field survey, taking into account that the remaining 8 were excluded for the following two reasons:

- Being too affected by the human activity, resulting in the absence of ecological receptors that could result affected by the Project.

- Being aquatic features. It should be noted that aquatic features are described in the Freshwater Ecology section.

Each habitat has different species of flora. It should be noted that in most of the cases, they have lost their naturality, due to the human presence and activity in the area. When present, natural habitats are not continuous but intermittent. This is also linked by the human presence mentioned above.

Habitat B1.4 - Fixed coastal dunes with herbaceous vegetation. Fixed shore dunes at the seashore of the both leg sides of the Canakkale Bridge pass. This habitat contains spread annual dune plants such as *Cakile maritima, Silene gallica, Sinapis arvensis, Matthiola tricuspidata,* at the back of the dune there is spread of perennial plants such as *Centaurea spinosa, Elymus farctus, Cynanchum acutum subsp. acutum, Phragmites australis.* In this habitat no rare spread plant species are detected. This habitat is also described as a priority habitat[1] according to the EU Habitats Directive (92/43/EEC). Sensitivity of this habitat is defined as Medium, following the criteria included in *Appendix 2.4 of ESIA Volume III*.

Habitat C3.2 - Water-fringing reedbeds and tall helophytes. Reed bed habitats that grow at the edge of the creek and are highly desirable for water are mostly represented on the edges of the creek with high flat alluvial areas. Dominant species of the habitat are *Phragmites australis, Cynodon dactylon, Juncus effusus, Poa trivialis, Typha angustifolia, Conium maculatum, Hordeum marinum var. pubescens* and *Silybum marianum*. Sensitivity of this habitat is defined as Low.

Habitat D5.3 - Juncus marshes. This habitat is only observed in the study area in the river overflow areas. This habitat is characterized by the following species: *Juncus effusus, Cynodon dactylon, Potentilla recta* and *Poa trivialis*. Sensitivity of this habitat is defined as Low.

Habitat E1.6 - Ruderal Areas. This habitat is located in field and road sides and consist mostly in annual cheeky flora. Dominant species of this habitat are *Sinapis arvensis*, *Ecballium elaterium*, *Daucus carota*, *Polygonum bellardii*, *Centaurea solstitialis subsp. Solstitialis* and *Anthemis chia*. Sensitivity of this habitat is defined as Low.

Habitat F5.2 – Maquis. This habitat is observed near the shore. Dominant species of this habitat are *Quercus coccifera* and *Phillyrea latifolia*. Other species spread in this habitat include *Pyrus elaeagnifolia subsp. elaeagnifolia; Crataegus orientalis* and a rich variety of herbaceous species. Sensitivity of this habitat is defined as Low.

Habitat F5.3 – Pseudomaquis. This habitat is very common in the Marmara region. It consists in a combination of evergreen maquis elements, deciduous

[1] Priority habitats in the Annex I of the EU Habitats Directive are those natural habitat types in danger of disappearance.

bush and woody species. Dominant species of this habitat are *Quercus petraea subsp.iberica, Quercus infectoria, Quercus pubescens, Acer tataricum, Quercus coccifera, Cistus creticus, Phillyrea latifolia, Fraxinus ornus subsp. ornus, Paliurus spina-christii* and *Ulmus minor subsp. minor.* Height of vegetation can reach 2-6 m. Similar to the maquis habitat, the pseudomaquis is also rich in herbaous species, together with bush species. Some additional species of interest found in this habitat are *Rorippa thracica, Ferulago confusa* and *Thymus atticus,* due to their limited spread distribution. Sensitivity of this habitat is defined as Medium.

Habitat F5.4 - Spartium junceum community. This habitat is scarce in the study area. Dominant species of the habitat are *Spartium junceum, Pyrus elaeagnifolia subsp. elaeagnifolia, Quercus coccifera, Asparagus acutifolius, Phillyrea latifolia, Jasminum fruticans, Osyris alba, Pistacia terebinthus subsp. terebinthus, Styrax officinalis.* All these species are bush species. The habitat is also rich in herbaceus species. Plantations of *Pinus pinea* and *Pinus brutia* can also be observed within this habitat. Sensitivity of this habitat is defined as Low.

Habitat F7.3 - East Mediterranean Frigana Community. This habitat is characterized by bush species such as *Sarcopoterium spinosum* together with other seldom species such as *Crataegus monogyna subsp. monogyna, Pyrus amygdaliformis var. amygdaliformis, Paliurus spina-christi, Astragalus thracicus, Onobrychis caput-gallii, Dactylis glomerata* and *Asparagus acutifolius*. The habitat is also rich in herbaceus species. Sensitivity of this habitat is defined as Low.

Habitat G1.1 - Riparian gallery forests. This habitat can be found along the river sides. Dominant tree species include *Salix alba, Populus alba, Pyrus bulgarica* and *Ulmus minor subsp. minor*. Bush species within this habitat include *Prunus spinosa subsp. dasyphylla, Crataegus monogyna subsp. monogyna, Rosa canina, Cornus sanguinea subsp. sanguinea, Rubus sanctus, Vitis sylvestris* and *Ligustrum vulgare*. Herbaceous species within this habitat include *Phragmites australis, Arctium minus* and *Viola sieheana*. Sensitivity of this habitat is defined as Medium and taking into account the good populations of *Pyrus bulgarica* observed during the field survey in the Çayırlar Creek (freshwater sampling point E-AQ-06).

Habitat G1.3 - Mediterranean riparian forests. This habitat can be observed along the river sides of the south of the Marmara region. Dominant tree species of the habitat are *Platanus orientalis, Salix alba* and *Ulmus minor subsp. minor.* Bush species within this habitat include *Prunus spinosa subsp. dasyphylla, Rubus sanctus* and *Vitis sylvestris*. Herbaceous species within this habitat include *Carex pendula, Brachypodium sylvaticum, Ranunculus arvensis, Geranium molle subsp. molle, Lamium garganicum subsp. laevigatum, Conium maculatum* and *Phragmites australis*. Sensitivity of this habitat is defined as Low.

Habitat G1.D - Fruit Gardens. This habitat is widely common in the study area, especially in the Anatolian side. Species typically cultivated in fruit gardens include peach, cherry, walnut, quince, plum, apricot, pear, olive, and

persimmon. Fruit gardens have a commercial interest. Sensitivity of this habitat is defined as Negliglible.

Habitat G3.7 - Mediterranean Pinus Forests (except *Pinus nigra*). Some natural forests of *Pinus brutia* are located in the study area. In most of the cases, these forests are damaged because of the human activity. Coverage of *Pinus brutia* within these forests is about 90-100%, reaching a height of 5-10 m. Coverage of bush species within the forest is about 90%, with bushes reaching a height of 1-3 m. Coverage of the herbaceous species is about %20, with a height between 5 and 80 cm. Dominant bush species are *Fraxinus ornus subsp. ornus, Cercis siliquastrum subsp. siliquastrum, Sorbus torminalis var. torminalis, Styrax officinalis, Quercus coccifera, Pistacia terebinthus, Quercus infectoria, Philyrea latifola* and *Arbutus unedo.* Dominant herbaceous species are *Dactylis glomerata, Laser trilobum* and *Lapsana communis.* Sensitivity of this habitat is defined as Low.

Habitat G3.F - Artificial Conifer plantation. There are large areas covered by conifer plantation in the Marmara region, including plantations of *Pinus pinea, Pinus brutia, Pinus nigra* and *Cupressus sempervirens*. Dominant tree species are *Pinus sp*. Bush species within this habitat include *Quercus coccifera, Juniperus oxycedrus subsp. oxycedrus, Pistacia terebinthus subsp. terebinthus, Cistus creticus, Ruscus aculeatus subsp. angustifolius, Quercus infectoria subsp. infectoria, Osyris alba, Thymbra spicata var. spicata,* and *Asparagus acutifolius*. This habitat is also rich in herbaceous species. Sensitivity of this habitat is defined as Negliglible.

Habitat I1.2 - Agricultural Fields. Agricultural fields are very common in the study area, including crops such as wheat and sunflower. Sensitivity of this habitat is defined as Negliglible.

Surfaces of each habitat that will result affected by the project have been calculated and are shown in the *Table 7-8.*

Table 7-8 Calculation of Surfaces of each Habitat affected by the Project

Habitat Code	Habitat Type	Surface (ha) within the AoI (500 m buffer)	Surface (ha) permanently occupied by the highway	Surface (ha) temporarily occupied (i.e. temporal construction sites)
C 3.2	Water-fringing reedbeds and tall helophytes	20.21 (0.2%)	0.809 (0.06%)	-
B1.4	Fixed coastal dunes with herbaceous vegetation	6.32 (0.06%)	0.025 (0.00%)	1.281 (2.96%)
D5.3	*Juncus* marshes	33.35 (0.33%)	1.164 (0.08%)	-
E 1.6	Ruderal Areas	72.87 (0.72%)	22.02 (1.54%)	1.826 (4.22%)

Habitat Code	Habitat Type	Surface (ha) within the AoI (500 m buffer)	Surface (ha) permanently occupied by the highway	Surface (ha) temporarily occupied (i.e. temporal construction sites)
F 5.2	Maquis	128.24 (1.27%)	12.99 (0.91%)	1.143 (2.64%)
F5.3	Pseudomaquis	714.62 (7.06%)	95.19 (6.67%)	-
F5.4	*Spartium junceum* community	43.24 (0.43%)	2.811 (0.2%)	1.319 (3.05%)
F7.3	East Mediterranean Frigana Community	261.78 (2.59%)	12.93 (0.91%)	17.07 (39.42%)
G1.1	Riparian gallery forests	66.35 (0.66%)	5.372 (0.38%)	-
G 1.3	Mediterranean riparian woodland	156.73 (1.55%)	17.67 (1.24%)	0.0012 (0.00%)
G 3.F	Artificial Conifer plantation	941.54 (9.3%)	109.32 (7.66%)	-
G 3.7	Mediterranean Pinus Forests	366.98 (3.63%)	40.42 (2.83%)	-
G1.D	Fruit Gardens	251.46 (2.48%)	39.65 (2.78%)	-
I 1.2	Agricultural lands	7057.83 (69.73%)	1067.59 (74.76%)	20.66 (47.71%)

It can be observed that the most affected habitat (permanently occupied by the highway – habitat lost) is agricultural lands (74.76%), described with a negligible sensitivity. The affection to the rest of the habitats will be much lower, with a percetange of habitat loss below 8% in all the cases.

Regarding temporaty occupancies of habitats, they are mostly limited to agricultural lands (47.71%) and east Mediterranean frigana community (39.42%). The rest of the habitats represent a percentage below 5% each.

Resulting from the desktop analysis and the evaluation of habitats during the field survey and identification of flora within the study area was conducted. A total number of 363 species of flora, from 77 different families, have been detected in the study area.

Three of these species of flora are endemics: *Campanula lyrata subsp. lyrata, Acanthus hirsutus* and *Ballota nigra subsp. Anatolica*. The three species are well spread over Turkey. Sensitivity of these 3 endemic species is defined as Medium.

Three other species of flora have a limited distribution range in Turkey, only present in the Marmara region: *Rorippa thracica, Ferulago confusa* and *Thymus atticus*. They are not endemic in Turkey since they are also found in the Balkans, in special in the East Balkans. Sensitivity of *Rorippa thracica* is defined as High, whereas *Ferulago confusa* and *Thymus atticus* are defined with a Medium sensitivity.

The rest of the flora present in the study area would be defined with a Sensitivity of Negligible.

Terrestrial Alien plant species

According to the European and Mediterranean Plant Protection Organization (EPPO), some 15 alien plant species (aquiatic and terrestrial) may be potentially present along the Canakkale motorway.

Taking into account that the ecological sensitivity of most of the flora species in the study area was assessed as Negligible, it is estimated that the same would apply in regards to settlement of Alien species along areas with low sensitivity.

Amphibians

The key findings about amphibians in the study area are summarized below:

- There are not any endemic species among the amphibians recorded in the survey area.
- All the amphibian species identified in the study area have a threat status of Least Concern, as per the IUCN, except the common toad (*Bufo bufo*) who is described as Data Deficient.
- Potential spawning areas are located at the river beds, bottom of rocks and puddles in the study area.
- The following 3 species of amphibians were described in the available bibliography reviewed during the desktop analysis as potentially present in the study area: Smooth newt (*Lissotriton vulgaris*), Fire-belied toad (*Bombina bombina*) and Agile frog (*Rana dalmatina*). However, they were not observed during the field survey. A medium sensitivity is defined for these species, except *Lissotriton vulgaris,* who is defined with a low sensitivity.

Reptiles

The key findings about reptiles in the study area are summarized below:

- There are not any endemic species among the reptiles recorded in the study area.

- Only 1 reptile species is described as Vulnerable by the IUCN: Spur-thighed Tortoise (*Testudo graeca*).
- According to other international references: (1) all the reptile species are under protection in compliance with the provisions of Bern Convention; (2) 3 reptile species are included in the Appendixes II and IV of the Habitats Directive; and, (3) 15 reptiles species are included in the Appendix IV of the Habitats Directive.
- According to the National Red List, all the reptiles species are categorized as Near Threatened.
- All the 9 reptile species identified in the study area that were not found during the field survey are defined with a Medium sensitivity, except *Cirtopodion scabrum* and *Malpolon insignitus*, defined with a Low sensitivity.

Birds

Up to 140 different species of birds were found during the field survey. The key findings about birds in the study area are summarized below:

- There are not any endemic species among the birds recorded in the study area.
- Up to 17 bird species are considered suitable for breeding in the study area.
- All observed birds during the field survey were mature individuals.
- Birds were generally observed along the whole study area. An individual counting was not conducted, as part of the field survey.
- Small forest passer birds are found in two important forest habitats within the project area. Other areas outside these forest habitats are usually. Ground nesting birds breed agricultural areas and steppe. In addition, there were no nest of raptors (and rather suitable habitats) that were observed during the studies
- According to the IUCN:
  - 4 bird species are described as Vulnerable: *Puffinus yelkouan, Aythya farina, Aquila heliaca* and *Streptopelia turtur*.
  - 2 bird species are described as Near Threatened: *Falco vespertinus* and *Anthus pratensis*.
- According to the CITES Convention:
  - 2 bird species are included in the Appendix I (Threat of extinction): Imperial eagle (*Aquila heliaca*), Peregrine (*Falco peregrinus*),
  - 1 bird species is included in the Appendix II (Restricted trade): Black Stork (*Ciconia nigra*).
- According to the Bern Convention:
  - 98 bird species are included in the Appendix II (strictly protected fauna species).
  - 34 bird species are included in the Appendix III (protected fauna species).

- According to the CHC (Central Hunting Commission):
  - 25 bird species are included in the Appendix I (protected against hunting).
  - 14 bird species are included in the Appendix II (allowed to be hunted).
- According to the EU Bird Directive:
  - 48 bird species are included in the Appendix I (threatened birds and all migratory birds).
  - 23 bird species are included in the Appendix II and III.
- Since suitable wintering birds habitats were not identified during the field survey, presence of wintering birds in the study area is not expected. Field survey cannot confirm this, since it was conducted in May, out of the wintering bird season.
- Low activity of migrating birds during the field survey, together with the review of the available bibliography conducted during the desktop analysis, suggest that the study area is not in the main migratory routes of the migratory birds.
- Passerine birds and crown species were observed in a few number of individuals.
- The presence of predatory birds (i.e. Long-legged buzzard – *Buteo rufinus*, Buzzard – *Buteo buteo*, etc.) can be explained by the presence of small mammal species (i.e. rodents) that are predated by these birds.
- All the bird species are categorized as Medium or Low sensitivity.

It should be noted that in some cases lack of identification of specific bird species result from the period where the survey was conducted (May 2017). This is particularly relevant in the case of the following species: lesser white-fronted goose (*Anser erythropus*) and red-breasted goose (*Branta ruficollis*), which are wintering species triggering for the Saros Bay IBA. Being wintering species they cannot be found in the month of May, when the survey was done, but their presence cannot be excluded.

Habitats suitable for non breeding activities (wintering) of red-breasted goose (*Branta ruficolis*)[1] include: arable land, pasture land, grassland (temperate), coastal brakish (saline lagoons / marine lakes) and wetlands. In the case of the lesser white-fronted goose (*Anser erythropus*)[2] they include arable land, pasture land, grassland (temperate) and wetlands. Some of these suitable habitats are present (i.e. agricultural lands – arable lands, and pasture and grassland – east Mediterranean Frigana community).

Therefore, although the overlap area corresponds to an already disturbed area (presence of an existing road and residential buildings), further surveys on these species would enhance the baseline information and subsequently

1 http://datazone.birdlife.org/species/factsheet/red-breasted-goose-branta-ruficollis/details
2 http://datazone.birdlife.org/species/factsheet/lesser-white-fronted-goose-anser-erythropus/details

would enable to better assess the impact on these species, shall they be present in the study area.

Mammals

The key findings about mammals in the study area are summarized below:

- There are not any endemic species among the mammals recorded in the study area.
- According to the IUCN, only 2 mammal species are described as Near Threatened: otter (*Lutra lutra*) and Mehelyi's horseshoe bat (*Rhinolophus mehelyi)*. The rest of the species are described as Least Concern.
- According to the CITES Convention:
  - 1 mammal species is included in the Appendix I (Threat of extinction): otter (*Lutra lutra*).
  - 2 mammal species are included in the Appendix II (Restricted trade): gray wolf (*Canis lupus*) and wild cat (*Felis silvestris*)
  - 4 mammal species are included in the Appendix III: golden jackal (*Canis aureus*), red fox (*Vulpes vulpes*), stone marten (*Martes foina*) and red deer (*Capreolus capreolus*).
- According to the Bern Convention:
  - 21 mammal species are included in the Appendix II (strictly protected fauna species).
  - 11 mammal species are included in the Appendix III (protected fauna species).
- According to the CHC (Central Hunting Commission):
  - 2 mammal species are included in the Appendix I (protected against hunting).
  - 5 mammal species are included in the Appendix II (allowed to be hunted).
- Presence of several species of carnivorous (gray wolf – *canis lupus*, wild cat – *felis silvestris*, etc.) can be indicative of a good ecological conservation of the study area, since carnivorous species are a good indicator of the ecological conditions.
- Presence of a large number of small mammals (i.e. several species of rodents were identified) enables the presence of predators (not only mammals, but also predatory birds and snakes.
- 7 bat species were described as present in the study area, according to the desktop analysis. 4 of the 7 bat species were observed during the field survey. No bat roosting features were identified during the field survey. Bats observed were while flying (never when emerging nor re-entering to the roost).
- All the 17 mammal species identified in the study area that were not found during the field survey are defined with a Low sensitivity, except the following species, defined with a Medium sensitivity: *Rhinolophus mehelyi, Nyctalus leisleri, Plecotus austriacus, Lutra lutra* and *Felis silvestris.*

Terrestrial invertebrates

The key findings about terrestrial invertebrates in the study area are summarized below:

- There are not any endemic species among the terrestrial invertebrates (lepidoptera and odonata) recorded in the study area. One species of lepidoptera (*Hipparchia mersina*) has more than half of its population (60%) in Turkey, however it cannot be considered endemic from the country, since a remaining 40% of the population is out of the country.
- According to the IUCN:
  - 1 species of lepidoptera is described as Vulnerable: Ottoman´s copper (*Lycaena ottomanus*).
  - 2 species of lepidoptera are described as Near Threatened: *Phengaris arion* and *Archon apollinus*.
  - 1 species of odonatan is described as Near Threatened: *Libellula pontica.*
- According to the Red Book of Butterflies in Turkey:
  - 1 species of lepidoptera is described as Vulnerable: Ottoman´s copper (*Lycaena ottomanus*).
  - 1 species of lepidoptera are described as Near Threatened: *Argynnis pandora.*
- All the 92 lepidoptera species identified in the study area that were not found during the field survey are defined with a Low sensitivity, except *Phengaris arion, Lycaena ottomanus* and *Archon apollinus,* defined with a Medium sensitivity.
- All the 14 odonata species identified in the study area that were not found during the field survey are defined with a Low sensitivity, except *Aeshna ephippiger,* defined with a Negligible sensitivity.

2. Freshwater Ecology

Two sections are differentiated in the study area, regarding the freshwater ecology: the Anatolian section (south Canakkale Bridge) and the European section (north Canakkale Bridge).

Anatolian Section

Two sampling points are located in this section, within the Biga Peninsula Basin, in two different creeks (Umurbey creek and Bayram creek).

According to a survey conducted in this basin by Sari et al. in 2006, along 35 sampling sites; up to 13 fish species where found to be present in the Biga basin (two sites corresponding to the Umurbey and Bayram creeks). Individual results from the sampling of these two creeks in 2006 showed that the only species found in these where *Squalius cii* (previously known as *Leuciscus cephalus*) from the family Cyprinidae (carps). The 2017 sampling also found that the only fish species present in these creeks where *Squalius cii*.

The rest of the fish species identified by bibliographic sources in the study area that were not found during the field survey are defined with a Low sensitivity, except *Anguilla anguilla,* defined with a High and whose presence is likely according to fishermen interviews.

Up to 9 different benthic taxa were found in the sample A-AQ-01 (Umurbey creek) and up to 5 different taxa were found in the sample A-AQ-02 (Bayram creek). No Ecological sensitivity is defined for them, taking into account that the identification was only conducted up to the family level.

European Section

The European section includes streams and rivers located within the boundaries of the Çanakkale province and the Gelibolu district that flow towards the Marmara Sea and the Eagean Sea.

Up to six sampling points are located in this section, within the Saroz Gulf Basin: E-AQ-01, E-AQ-02, E-AQ-03, E-AQ-04, E-AQ-05 and E-AQ-06.

A summary of the fish species observed in the European section during the field survey is included in the table below, including the resulting Ecological Sensitivity.

Table 7-9 Fish species found in the European section

Sampling point	Scientific name	Common name	Family	Endemic	IUCN Threatened Status	Ecological Sensitivity
E-AQ-01 E-AQ-05 E-AQ-06	*Squalius cii*	Marmara chub	Cyprinidae	Endemic	LC	Medium
E-AQ-01 E-AQ-05 E-AQ-06	*Gobio bulgaricus*	Gudgeon	Cyprinidae	-	LC	Low
E-AQ-03	*Mugil cephalus*	Flattened Grey Mullet	Mugilidae	-	LC	Low
E-AQ-03	*Liza aurata*	Golden Grey Mullet	Mugilidae	-	LC	Low
E-AQ-03	*Dicentrarch us labrax*	European Bass	Moronidae	-	LC	Low

E-AQ-04 E-AQ-05	*Carassius gibelio*	Prusian Carp	Cyprinidae	-	LC	Low
E-AQ-04	*Cyprinus carpio*	Wild Carp	Cyprinidae	-	VU (Danube Population)	Low
E-AQ-04	*Gambusia holbrooki*	Eastern Mosquitofish	Poecilidae	-	LC	Low
E-AQ-05	*Alburnus alburnus*	Bleak	Cyprinidae	-	LC	Low
E-AQ-05	*Barbus cyclolepis*	Barbel	Cyprinidae	-	LC	Low
E-AQ-05	*Rhodeus amarus*	Bitterling	Cyprinidae	-	LC	Low
E-AQ-05	*Vimba vimba*	Zarte	Cyprinidae	-	LC	Low
E-AQ-05	*Cobitis strumicae*	Struma Spine-Loach	Cobitidae	-	LC	Low

As described in the Anatolian section, the rest of the fish species identified in the study area that were not found during the field survey are defined with a Low sensitivity, except *Anguilla anguilla,* defined with a High sensitivity and *Solea solea,* defined with a Medium sensitivity.

Up to 13 different taxa were found in the samples collected in the European section. No Ecological sensitivity is defined for them, taking into account that the identification was only conducted up to the family level.

3. Natural Protected Areas

A total number of 14 national protected areas have been identified in the proximity of the study area, 2 of which are partially within the study area (overlapping): Saros Bay Wetland and Saros Bay SPA.

Sensitivity of the National Protected areas within the study area (Saros Bay Wetland and Saros Bay SPA) is defined as High.

A total number of 8 international designated areas have been identified in the proximity of the study area, 2 of which are partially within the study area (overlapping): Canakkale Strait and Saros Bay (Key Biodiversity Areas and Important Bird Areas). The sensitivity of these two areas is defined as High.

4. Marine Ecology

The Marmara Sea is connected to the Black Sea via the Bosphorus Strait and to the Mediterranean through the Çanakkale Strait. While the surface waters of the Marmara are affected by the Black Sea, its deeper waters are influenced by the Mediterranean Sea. The two water layers do not mix, and a stable density gradient prevents vertical mixing and hinders the transport of oxygen to deeper layers (Kocataş et al., 1993).

The Çanakkale Strait represents a transitional zone for organisms not only between The Aegean and The Marmara Sea, but also between the Mediterranean and Black Sea basins (together with Bosphorus at the north, including Marmara Sea) also. As such it constitutes either a barrier, a corridor or an acclimatization zone for living organisms.

Marine Flora

In total, some 600 marine benthic macroalgae have been reported from Turkey, including 150 Phaeophyceae (brown algae) (25%), 330 Rhodophyta (red algae) (55%) and 120 Chlorophyta (green algae) (20%), and 34 of which are alien taxa (5,66%) (Taşkın et al. 2008, 2011; Taşkın 2015; Taşkın and Öztürk 2013; Crocetta et al. 2015). Turkey has 53,71% of the Mediterranean macrobenthic algal flora (Taşkın 2015). Specific studies have been conducted in the Çanakkale Strait where estimated number of taxa is of 386 species, brown and red algae being the most common.

Alien invasive species commonly found in the strait are the Brown algae *Colpomenia peregrina,* which is abundant in Spring. recently, an alien red algae *Antithamnion hubbsii* was reported from the Çanakkale (Özsoy et al. 2016).

A list of potential species of macrophytes present in the Çanakkale strait is available in the Baseline Report Annexed to *Appendix 2.4 (Annex 1.b)* of *Volume III*.

Marine Fauna

Plankton

The Sea of Marmara with its saline, oxygen deficient lower layer and highly productive brackish upper layer provides habitat for a wide range of zooplankton species and also acts as a corridor for the "Mediterranization of the Black Sea" (Kovalev et al. 1999). A total of 129 Copepoda and 6 Cladocera species have been registered in the Sea of Marmara.

A list of potential species of phyto-zooplankton present in the Çanakkale strait is available in Baseline Report, Volume III, Annex III. 1. The list is based on the studies covering and/or indicating records from The Çanakkale only, depending on the clear ecological distinction between Marmara Sea, The

Aegean Sea, and the barrier effect of different topographical, morphological and hydrological conditions along the colonization route.

Benthic Fauna

A wide varierty of benthic invertebrates inhabit the Sea of Marmara such as ostracods, foraminifers, sponges, anthozoans, bryozoans, crustaceans, mollusc, echinioderms. Key diversity features are:

- Up to date totally 210 ostracoda species were recorded from the Sea of Marmara [184 species (88%), with the Çanakkale (63 species (30%)) and Bosphorus (54 species (26%). The higest number of species was found in Genus Loxoconcha with 23 species in the Sea of Marmara (Özsoy et al. 2016).
- Özsoy et al. 2016 review of the relevant literature revealed that 418 species in nine orders of malacostracan crustaceans have been reported from the Sea of Marmara. Amphipoda with 195 species and Decapoda with 140 species were by far the most diverse orders, which together account for about 80% of the total number of species, followed by Isopoda (42 spp.), Cumacea (18 spp.), Mysida (12 spp.), Tanaidacea (7 spp.), Stomatopoda (2 spp.), Leptostraca (1 sp.), and Euphausiacea (1 sp.)
- Mollusc species of the Sea of Marmara have been estimated up to 598 species of which 362 (60.54 %) belonging to Gastropoda, 200 (33.44 %) to Bivalvia, 18 (3.01 %) to Cephalopoda, 11 (1.84 %) to Polyplacophora, 5 (0.84 %) to Scaphopoda and 2 (0.33 %) to Caudofoveata (Özsoy et al. 2016).
- There are 36 echinoderm species (two Crinoidea, 9 Asteroidea, 14 Ophiuroidea, 5 Echinoidea and 6 Holothuroidea) reported from the Çanakkale Strait, compared to the 58 species found in the Sea of Marmara,
- According to Topaloğlu et al. (2016) five sponge species have been identified in the Çanakkale Strait, from a total of 75 species from the Sea of Marmara.
- In the Sea of Marmara, where the Mediterranean meets the Black Sea, 59 anthozoan species were recorded so far, with 35 hexacorals and 24 octocorals . The IUCN Endangered Mediterranean Pillow coral Cladocora caespitosa may occur at 2-23 m depth and the total spreading area that colonies covered in Dardanos region is 27 m^2. In Soğandere region the total area is 3 m^2. The total coverage for the other areas is less than 2 m2. In the Dardanelles (Marmara Sea) there are many individual colonies, not forming a large coral bank.
- Özsoy et al. 2016 estimate some 83 spceis of bryozoans for the Sea of Marmara.

A list of potential benthic species present in the Çanakkale strait is available in Baseline Report- Annex III.1a. The list is based on the studies covering and/or indicating records from the Çanakkale only, depending on the clear ecological distinction between Marmara Sea, the Aegean Sea, and the barrier effect of different topographical, morphological and hydrological conditions along the colonization route.

Fish

The most recent research from Bilecenoğlu et al. 2014 estimates total fish diversity (including pelagic, demersal and benthic forms) in 257 species for the Sea of Marmara which represents half of the recorded ichthyofauna in Turkish seas. Of the 257 species, 36 of them are cartilaginous species including 21 sharks, 14 rays and 1 chimera. The great majority of total fish species being constituted by ray-finned fishes (bony fishes) with over 80% percent and chondrosteans namely sturgeons with 5 species.

The Sea of Marmara is an important migration route (both to and from the Back and Aeagean Seas) of many species of commercially valuable fish like *Xiphias gladius* (Sword fish), *Scomber japonicus* (Mackerel), *Sarda sarda* (Bonito), *Pomatamus saltatrix* (Bluefish), *Sardina pilchardus* (sardine) and *Engraulis encrasicholus* (Anchovy). Migration seasons are included in below.These species are pelagic, and particularly distribute and spend most of their life (except sardine, which is more coastal) in high sea. The Swordfish and Mackerel above mentioned unfortunately, have an affected distribution pattern in the Sea of Marmara due to over fishing A list of potential fish species present in the Çanakkale strait is available in Annex III.1a. The list is based on the studies covering and/or indicating records from The Çanakkale only, depending on the clear ecological distinction between Marmara Sea, The Aegean Sea, and the barrier effect of different topographical, morphological and hydrological conditions along the colonization route.

Marine mammals

Dede et al. (2016) listed and discussed the status of the populations of mammals in The Sea of Marmara, indicating there are three species of order Cetacea: common bottlenose dolphin *Tursiops truncatus* (Montagu, 1821), short-beaked common dolphin *Delphinus delphis* (Linnaeus, 1758) and harbour porpoise *Phocoena phocoena* (Linnaeus, 1758). One species of order Pinnipedia, the Mediterranean monk seal *Monachus monachus* (Hermann 1779) has been well known known in the past (Mursaloğlu 1984; Öztürk 1992; 1996).In addition, coupled with new records of two cetacean species: striped dolphin *Stenella coeruleoalba* (Meyen, 1833) and Risso's dolphin *Grampus griseus* (Cuvier, 1812),. According to Notarbartolo di Sciara and Birkun (2010) also *S. coeruleoalba* (visitor) and *G. griseus* (vagrant) as occasional

Dede et al. (2016), stated that The Sea of Marmara constitutes an important migration pathway between the Aegean Sea and the Black Sea, calling it the Turkish Straits System (TSS) together with the Çanakkale and Istanbul Straits. Turkish Straits System (TSS) together with the Çanakkale and Istanbul Straits. Dolphins use the area as a natural trap for feeding on migratory pelagic fishes. *T. truncatus* and *D. delphis* schools migrate through the Aegean Sea to the Sea of Marmara in April-May for feeding (Öztürk and Öztürk 1996). *D. delphis* migrate to the Black Sea in spring and back to the Aegean Sea in autumn (Berkes 1977). The above three species of cetaceans can be observed year round in the TSS

mostly in spring and autumn. In the TSS the most common species is indicated as *D. delphis* followed by *T. truncatus* and rare or sporadic *P. phocoena* (Öztürk and Öztürk 1997). Furthermore, Mediterranean monk seals have no longer been observed since the mid 90's, with the exception of an unusual sporadic observation in 2014 (Inanmaz et al. 2014).

The identified marine mammal species are listed in the IUCN Red List of Threatened Species (IUCN, 2016) as:

- Black Sea subspecies of short-beaked common dolphin: Vulnerable (VU);
- Black Sea subspecies of common bottlenose dolphin: Endangered (EN);
- Black Sea subspecies of harbour porpoise is Endangered (EN);
- Mediterranean subpopulation of striped dolphin is Vulnerable (VU);
- Mediterranean subpopulation of Risso's dolphin is Data Deficient (DD);
- The Mediterranean monk seal: Critically Endangered (EN; Mediterranean population assessment).

Marine Turtles

Three species of sea turtle, loggerhead turtle, *Caretta caretta* (Linnaeus, 1758), green turtle, *Chelonia mydas* (Linnaeus, 1758), and leatherback turtle, *Dermochelys coriacea* (Vandelli, 1761) are distributed in the Mediterranean and Aegean Sea coasts of Turkey (Güçlüsoy et al. 2014). According to Geldiay et al. (1982) and Geldiay (1984), sea turtles migrate to the Black Sea via the Turkish Straits System (TSS) and go back to the Aegean and Mediterranean Seas. However, no published data of sea turtle sightings or strandings in the TSS were found except Mediterranean Sea et al. (2012). Akdeniz et al., 2012 indicate that there is no turtle nesting activity in neither the Çanakkale nor the Sea of Marmara and/or Black Sea.

Migrating Species

The straits system plays an important role as well as a corridor for the penetration of Atlantic-Mediterranean fishes. In general, this migration originates from the Aegean Sea in the spring and returns to the Marmara and Aegean Sea in the autumn. Two species of cetaceans (*Tursiops truncatus*, *Delphinus delphis*) may occur in all seasons in the straits and Marmara Sea, but due to the heavy marine traffic and other ecological stresses, their migration does not occur regularly anymore (Beaubrun, 1995).

Table 7-10 Marine Migratory Species the Using Çanakkale Strait and IUCN Red List Status

Species	Migration Period		Spawning		IUCN Red List
	from Aegean to Marmara	from Marmara to Aegean	Period	Ground	
Marine fishes					

Species	Migration Period		Spawning		IUCN Red List
	from Aegean to Marmara	from Marmara to Aegean	Period	Ground	
Pomatomus saltator	March-May	October	June-September	Black Sea	Vulnerable(VU)
Sarda sarda	May-July	August-November	Mid May-Mid July	Black Sea and Marmara	Least Concern(LC)
Sardina pilchardus	Spring	Autumn	November-June	Aegean and Black Sea	Least Concern(LC)
Scomber japonicus	June	October-November	June - Mid August	Marmara Sea	Least Concern(LC)
Xiphias gladius	June - July	Summer	Mid-April-early July	Marmara Sea	Least Concern(LC)
Marine mammals					
Tursiops truncatus spp ponticus	May-April	Summer - Autumn	-	-	Endangered (EN)
Delphinus delphis	May-April	Summer-Autumn	-	-	Endangered (EN)

Source; Öztürk and Öztürk, 1996 and Dede et al. 2016

Marine Alien invasive species (AIS)

Alien species is another problem in the whole Mediterranean and The Black Sea. Apart from the alien and exotic species of Levantine and Aegean Seas, invasive species, such as *Rapana thomasiana, Mnemiopsis leidyi* and *Cunearca cornea*, have also become resident in the Sea of Marmara and especially in The Black Sea. The southernmost distribution boundary of these species is the Çanakkale Strait (Bilecik, 1990).

Field Study Findings

Habitats

From the survey findings, four marine habitat types have been identified in the project Area and control sites:

Sandy Bottom: This habitat consists of sand and/or pebbles or gravels of various size on the sand layer. This habitat was found at the Anatolian landfall between 0 – 6 meters up to the boundary of the seagrass habitat especially inside the inlets. In the European land fall it reaches up to 1 – 2 meters where the seagrass habitat starts. This substratum is also dominant

where sea grass ends around 16- 17 meters up to 24- 26 meters before the muddy bottom starts.

Rocky Habitat: This habitat was observed only at Control station CA5 at the Anatolian Landfall close to the shore where the formation of sea cliffs occurs. The purpose to select this habitat was to compare the biodiversity with other habitats and literature cited within the project corridor. This coastal habitat starts from the shore and visible up to 6-7 meters with an average of 3 meters depth. This habitat consists of rocky substratum covered with macrophytes.

Sea grass: This habitat is visible at both sides with species *Cymodocea nodosa* and *Zostera* sp. complex. Its coverage depends on visibility and the substratum. Soft substratum from 1- 2 meters up to 16 meters is covered with sea grass habitat

Muddy bottom: This habitat consists of fine material deposited on the bottom of deeper waters in the Strait. This habitat starts where it is 24 -25 meters at both landfall sides.

Biodiversity

Biodiversity of planktonic organisms and benthic microfauna identified through plankton net and grab samplings are given in *Annex 1* to *Appendix 2.4*. The species listed are found to be in line with general microfauna known from the Çanakkale Strait.

A small school of *Delphinus delphis* was recorded close to the shore.

Rocky habitat, which was found only in the control station, was the most diverse habitat. With variation, habitats with seagrass are generally also relatively high. Sandy and muddy habitat types have similar diversity values, slightly lower than the previous.

Evaluation of Critical Habitats

Terrestrial

There are a number of habitats along the route which do qualify as Natural Habitats, though amongst them as the most relevant in terms of presence and/or sensitivity/importance are: maquis, pseudomaquis, mediterranean and thracian riparian gallery forests, fixed coastal dunes with herbaceous vegetation, East mediterranean frigana community, over which the project still has residual impacts, and thus would require No Net Loss, meaning that the habitat areas which are to be permanently lost, would need to be offset through habitat restoration measures. Such mitigation is included for natural habitats affected by the following construction impacts: i) Damage, fragmentation and loss of habitats and ii) Loss of flora.

In terms of species, only the Yelkouan shearwater is likely to trigger CH, considering that over 1% of its global population may use the Canakkale Strait as a migration route. Additional surveys focusing on birds have been suggested in order to verify its CH status for the present analysis; as well as the engagement with local NGO's (e.g. Turkish Birdlife partners and/or specialists involved in the "Yelkouan Shearwater Project" in Turkey, whom have provided robust evidence of Yelkouan shearwater migration observations in the Dardanelles..

Marine Environment

With current information it is not possible to determine whether the considerd DMU is a Critical Habitat. Given the absence of data, either or both on occurrence within the DMU (which is bigger than the Project Area of Influence) or of global demographics or areas of occurrence for some species, a probabilistic approach is the only possible to take. The Criteria and species/habitats which could determine whether the DMU is a CH or not are as follows:

Criterion 1. Some species of Cartilaginous fishes and marine mammals. The fact that four of the species of cartilaginous fishes potentially present in the DMU are Critically Endangered make the threshold very stringent, "regular presence of at least one individual in the DMU". Given the mobility of individuals of these species, and the lack of data, the nature of "regular" of the presence af one individual of one of the four species is merely probabilistic. On the other hand these species are in fact very rare and their global Extent of Occurrence enormous with respect to the area of the DMU.In any case, these are the species and criteria which could be more likely to trigger the CH determination. In terms of marine mammals the monk seal, which is also CR there is consensus in accepting that its presence in the Marmara Sea is sporadic and vagrant, given the sightings in literature (one in the last 10 years) and anecdotal/indirect sources from inteviews with fishermen in Marmara. For the DMU, which is the Çannakale strait, a passage between the Mediterranean, where the species is still present, and the Marmara, where it is sporadic, the nature of "regular" presence seems to be far from probable. With regards to the cetaceans the probability of exceeding the threshold to determine CH is low.

Criterion 2. The species concerned, in tis case sub-species, are two of the mentioned cetaceans, and the threshold is the saem as for Criterion 1, thus as mentioned, the probability of exceeding it low.

Criterion 3. Five fish species and three cetacean species are of application for this Criterion. For the cetaceans the same threshod as for Criteria 1 and 2 apply, thus the conclusion is the same, low probability of exceeding the

threshold. For the fish species, given the life cycle of most of the concerned species, it is highly improbable that the threshold is exceeded.

Criterion 4. Only the presence seagrass meadows, if considered more similar to the Black Sea meadows than the corresponding Mediterranean ones, could determine the applicability of the Criterion. Current information is inadequate to make the assessment, butwith the available one, would seem that the seagrass meadows present in the DMU are more similar to the Mediterranean ones, thus not triggering the Criterion.

Criterion 5. Only the nature of biological corridor of the DMU could determine the applicability of this Criterion, and with respect to similar species as for Criteria 2 and 3, in particular the species/sub species of migratory cetaceans.

Thus the determination of CH of the DMU is a probabilistic exercise, which given the conclusions above, has a low probability. In any case, as it is described in following sections and paragraphs, there are either not significat impacts expected from the projects for some species or habitats which could trigger the CH determination (i.e the cartilaginous CR fishes, seagrass meadows), or the mitigation measures implemented sufficient for other sensitive species which could potentially determine CH (such as marine mammals).

7.6.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in

Table ***7-11*** and for operation in *Table 7-12.* For the assessment of impacts of minor or negligible significance see *Appendix 2.4* of *Volume III.*

Table 7-11 Significant Construction Biodiversity Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
1	**Damage, fragmentation and loss of habitats** there are a number of activities during the construction activities that can result in the damage, fragmentation and loss of habitats: Vegetation clearance, Soil and rock excavations and Borrow pits and quarries and pesticide use. **Loss of flora** Flora species will be directly affected from the road construction through vegetation removal. **Introduction of Alien invasive species** The clearing of new areas may provide opportunities for AIS introduction. **Accidental loss of fauna** The vegetation clearance activities can result in accidental loss of fauna. **Disturbance to fauna** Construction activities can directly and indirectly cause disturbance to species of fauna, due in most of the cases to the presence and activity of the machinery.	**Major** on species *Rorippa thracica,* which is classified as Endangered and has a limited distribution range in Turkey	The following general mitigation measures are to be implemented, as typical environmental standards in construction activities: • Employment of an "Ecological Clerk of Works" (ECoW) which will prepare the environmental documentation on delivery of ecological requirements on site before construction activities commence in order for contractors to meet key development milestones. The ECoW will monitor that site based construction activities are deliveredin accordance to relevant laws and Project commitments • Delimitation of areas to be cleared before the beginning of the construction activities in order to limit as much as possible the surface of vegetation to be cleared. • Access roads will be defined before the beginning of the construction activities. Some of the public roads may need to be used for access. Driving out of the access roads by the construction vehicles taking part of the construction activities will not be allowed. • Speed of vehicles will be limited, in order to limit emission of dust in non paved accessed roads and in order to limit the risk of accidents with fauna. • Noise emission will be limited as much as possible: speed limit for vehicles, maintenance programs of machinery, avoidance of emission of noise during the night, etc. • Use of signs and/or fences in access roads and construction sites, to avoid any affection to areas out of the Project footprint. Protective measures will be implemented especially on the locations of active construction works. Use of fences in the construction sites will also avoid the entrance of fauna in them, avoiding accidents.	**Minor**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
			• Vegetation clearance will avoid, whenever feasible, the breeding period. The places where Ministry of Forestry is responsible for vegetation clearance, best efforts will be made to implement the measure. Two areas were identified during the field survey with suitable forest habitats for passer birds: KP 117 to KP 121 and KP 135 to KP 138. Construction activities in these areas should avoid the breeding bird period (mid-April to mid-June). • If possible, gradual vegetation clearance will be conducted, to enable fauna to move to other areas. • No planting of alien species will occur in the camps or any areas within the AoI, including landscaping of re-vegetated areas. • A monitoring plan will be carried out to record alien species populations in the project area of influence and aimed at removing new populations and preventing them from spreading throughout the AoI. In addition, prompt revegetation (i.e. sowing of native herbaceous species and/or planting native shrubs/trees) on bare soil with natural or semi-natural vegetation will reduce the spread of alien species. • Revegetation (i.e. the sowing of native herbaceous species on top soils and/or the planting of native shrubs/trees) will be undertaken as soon as possible after clearance and construction. • Development of an Integrated Pesticide Management Procedure, as part of the Environmental Management Plan. • Develop habitat restoration/revegetation measures on temporary construction areas through the Soil Erosion, Reinstatement & Landscape Management Plan. • Wastes created during the construction activities will be managed under a Environmental Management Plan, to limit the disturbance to fauna as a result of presence of wastes and spills. • An additional level of mitigation will be adopted during the construction activities in those areas of the Project	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
			overlapping National Protected Areas and International Designated Areas. The following mitigation measures are to be implemented in relation with the loss of limited range distribution flora (*Rorippa thracica*): • Seeds of limited range distribution flora (*Rorippa thracica*) should be collected from the roadside to be used in the post-construction landscaping phase; • Some of the collected seeds of the limited range distributed flora should be delivered to the Ankara Seed GenBank, for conversation purposes. These two mitigation measures are to be implemented in the following locations, where the limited range distribution flora was identified: • *Rorippa thracica*: KP 116+500, KP 118+500 and KP125+000.	
		Moderate on species *Campanula lyrata subsp. lyrata, Acanthus hirsutus* and *Ballota nigra subsp. Anatolica,* which are endemic and on species *Ferulago confusa* and *Thymus atticus,* which are classified as Vulnerable and have a limited distribution range in Turkey	The following mitigation measures are to be implemented in relation with the loss of limited range distribution flora (*Ferulago confusa* and *Thymus atticus*): • Seeds of limited range distribution flora (*Ferulago confusa* and *Thymus atticus*) should be collected from the roadside to be used in the post-construction landscaping phase; • Some of the collected seeds of the limited range distributed flora should be delivered to the Ankara Seed GenBank, for conversation purposes. These two mitigation measures are to be implemented in the following locations, where the limited range distribution flora was identified: • *Ferulago confuse*: KP 18+500, KP 121+000, KP 125+000, KP 126+500, KP 130+000, KP 136+000 and KP 137+500. • *Thymus atticus*: KP 126+500.	**Minor**
			The following mitigation measure is to be implemented in order to enhance the baseline information and to better assess the impacts on some specific species of fauna: • Ecological field survey in order to identify presence / absence of lesser white-fronted goose (*Anser erythropus*) and red-breasted goose (*Branta ruficollis*) in those areas of the Saros Bay IBA located within the study area that are therefore susceptible to be impacted by the project activities. This field survey should also determine the presence of	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
		suitable areas for breeding of collared pratincole (*Glareola pratincola*), who is also a triggering species of the Saros Bay IBA. A detailed ToR about these surveys is included in the *Annex III.2.4a.* Based on the birds surveys full results, a Supplemental Assessment following additional bird surveys and for undertaking a CHA (if required) will be prepared and disclosed.		
			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. In addition to the above mitigation measures and taken into account the uncertain about the specific migration fly height of the yelkouan shearwater (*Puffinus yelkouan*) in the future location of the bridge, an additional ecological field survey during its migration period crossing the future bridge location is proposed, since it would enable to gather more accurate information based on which the impact assessment could be reviewed. A detailed ToR about this survey is included in the *Annex* III.2.4.a	
2	**Damage to freshwater ecosystems** There are a number of activities during the construction activities that can result in damage to the freshwater ecosystems: • Soil and rock excavations, with an associated change of the water quality. • Borrow pits and quarries, with an associated change of the water quality. • Construction of culverts, bridges and viaducts, with an associated change of the water quality. • Use of pesticides. Affection to freshwater ecosystems can therefore be the result of a change of the water quality. This can be produced in two different ways: • By an accidental spill of fuel or hazardous wastes affecting a water feature: river, lake, creek, etc. Dilution of the spill in the water feature will affect to	**Major** on ecosystems with high ecological sensitivity (potential presence of *Anguilla Anguilla*) **Moderate** on ecosystems with medium ecological sensitivity (presence of Riparian gallery forest, *Squalis cii* and potential presence of *Solea solea*)	The following mitigation measures are to be implemented in relation with the damage to freshwater ecosystems: • Wastes and any other product containing hazardous chemical substances (i.e. fuel) will not be stored in the proximity of freshwater features. Their management will be done according to a Environmental Management Plan that will consider among their objectives the avoidance of any spill affecting to the freshwater ecosystems. • Excavated materials will not be dumped into freshwater features, nor will they be stored in their proximity, to avoid any increase of the turbidity levels. • Culverts proposed as mitigation measure in the Water Environment Terrestrial section will be designed in a way that allows fish crossing (i.e. bottomless culverts). These are to be implemented through a Watercourse Crossing Plan.	**Minor**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
	the whole freshwater ecosystem, through direct exposure to the chemical compounds present in the spilled product, or by ingest of exposed organisms. • By an increase of the turbidity as a result of conducting construction activities within the water feature. However, although high levels of turbidity can affect fish populations, in most of the cases they are temporal events.		• Vegetation clearance works will avoid affecting the riparian vegetation, whenever possible, since it provides areas for spawning and sheltering of many aquatic organisms. • In case the riparian vegetation is riparian gallery forest (medium sensitivity habitat), the vegetation clearance works will only be conducted if habitat compensation measures (with a specific consideration of the *Pyrus bulgarica* populations identified in this habitat) are applied, in collaboration with local stakeholders. These mitigation measures are to be implemented in all the locations where the Project crosses a surface water feature: KP 110+500, KP 131+000, KP 135+500, KP 141+000, KP 148+000, KP 178+500, KP 196+500 and KP 188+500. The following mitigation measure is to be implemented in order to enhance the baseline information and to better assess the impacts on some specific species of fauna: • Ecological field survey in order to identify presence / absence of lesser white-fronted goose (Anser erythropus) and red-breasted goose (Branta ruficollis) in those areas of the Saros Bay IBA located within the study area that are susceptible to be impacted by the project activities. This field survey will also determine the presence of suitable areas for breeding of collared pratincole (Glareola pratincola), who is also a triggering species of the Saros Bay IBA in order to inform the need of conducting winter surveys to verify if it breeds within/adjacent to the construction area near Saros Bay IBA. A detailed ToR about these surveys is included in the Annex III.2.4a.. • Ecological field survey in order to identify collision risks of migrating flocks of Yelkouan shearwater movign to/from the Black Sea areas along the Canakkale strait (and enable to gather more accurate information based on which both the impact assessment and the CH status could be reviewed). A detailed ToR about these surveys	

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
			is included in the Annex III.2.4a. and should include engagement with local NGO's or ongoing Projects aimed at this species.	
Marine Environment (The impacts to the marine physical environment are summarized under *Section* 7.5 of the *Volume II* of the ESIA)				
3	**Underwater noise** The underwater noise generated by the installation of bridge piers, support structures and standing areas during Project construction will have effects on marine mammals, sea turtles and fish. The potential sources of underwater noise during construction will be as follows, in order of decreasing importance • piling associated with the tower and approach bridge construction • ship-related engine and thruster noise; • dredging (for preparation of Tower Foundation at tower locations, and dry dock and wet dock access for tower foundation construction);	**Moderate**, in the worst case, for species with a medium sensitivity	• Use of Hydrohammer technology . Specific noise abatement technologies applicable specifically to this technology will be included if thechnically feasible and necessary • No simultaneous piling will be conducted. Use of the JNCC Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise protocol, which include for this specific case any marine mammals or turtle observed: • Implementation of in–situ noise monitoring of initial piling activities, including pre-construction background noise baseline to aid interpretation of results. • If results are above standards (NOAA or German, to be decided), Project will implement the use of a noise reduction device or change in methodology.	**Minor**
4	**Change of habitat** Any change of habitat associated with construction activities for the proposed Çannakale Bridge may affect macroalgae, seagrasses, benthic fauna and/or fish depending on the source of impact. The potential sources of changes of habitat will be as follows: • loss of habitat through dredging required for the towers and access channel to dry/wet docks;	**Moderate** impact on *Pinna nobilis* and seagrass areas from substate removal	Mitigation will be achieved by the following measures: • In the event that a new disposal site is selected and MOEUP does not require an investigation of the seabed conditions/sensitivity, then in any case a screening will be conducted of the site to determine the presence of any sensitive habitats or receptors such as seagrass beds. • *Pinna nobilis* individuals will be identified and trans-located to suitable areas prior to works in the coastal	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
	• loss of habitat through reclamation/ground improvement at the approach bridge; • loss of habitat through dredge spoil disposal to the seabed; and • .		approach bridg: Appropriate monitoring of the success of this translocation will be monitored after its implementation . Details of this measure will be provide in the Biodiversity Action Plan (or BAP) • Monitor the natural re-instatement of seagrass in the dry dock access channel area after finalisation of works. If natural re-instatement of the damaged habitat does not take place, these habitats will be re-instated using appropriate techniques to restore or re-create original habitat present. • .	
5	**Colonisation of new hard substrata** Additional new hard substrate habitats will be created through the physical presence of the concrete towers in Çannakale and to a lesser extent to the approach bridge ground improvement. Each tower pier and the foundation will provide four faces for potential colonisation. Exact area available for colonisation depends on species preference, water depth and currents.	**Positive**	None proposed.	The impact will remain **positive.**
6	**Shipping-related accidents and accidental spillages** The sea accidents occurring in the Dardanelles are collision, fire, drift, grounding, machinery accidents, side-lying, capsizing and medical emergencies. Among these collision, drifting and grounding are the outstanding ones accounting for more than half of the accidents. Of particular concern are those accidents that may occur with an increased likelihood owing to the presence of the construction fleet and/or bridge with potential consequences that include uncontrolled discharges of fuel or cargo. An accident risk map has been established by Ilgar (2015), the Canakalle Bridge falls within the highest risk areas. Detailed navigational risk assessment has not been conducted for the Project construction and operation stages.	**Given that the risk assessment has not been completed, the magnitude of these risks cannot be provided in the impact assessment.**	COK needs to undertake a navigational risk assessment study following which the effectiveness of the existing TSS system can be incorporated into the impact significance. The management of navigation risk in the Straits (including the Project Area) falls primarily under the responsibility of the Undersecretaries of Maritime Affairs, and related harbour authorities, COK A.S. will need to inform the port authority of the overall planned construction schedule. Prior to start of construction, COK A.S. will need to identify together with the port authority the restricted access zones around the construction vessels, tower structures and southern anchorage, and clarify enforcement of these zones by the port authority. The bridge designers will coordinate installation ofrelevant equipment, as well as warning lights to mark the tower piers and pier protection structures. The entire process will be managed by the Port authority, KGM and other relevant authorities.	Residual impacts will be assessed following the navigational risk assessment results.

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
			COK A.S. will need to inform the port authorities of the overall planned construction schedule. Prior to start of construction, will need to identify the restricted access zones around the construction vessels, tower structures and southern anchorage, and clarify enforcement of these zones by the port authorities. A specific Transport Control and Site Access Procedure to control construction traffic/activities is also considered necessary to decrease the risk of collision including a proper communication protocol with authorities and other users	
7	**Change of Water Quality from Accidental and Uncontrolled Discharges** There is potential for the accidental or unplanned release of untreated construction site wastewaters. Standard operating procedures and good construction site management (e.g. regular equipment inspections, careful storage of construction liquids and materials away from the marine environment, careful disposal of all construction wastes, careful movement of material around the construction site etc.) will prevent most incidents but it may not be possible to prevent all accidents in this way. Extreme weather events, poor maintenance, and operational errors are the most likely causes of accidental discharges from the construction site to the marine environment. Stormwater flows could cause the construction site run-off and drainage management systems to overflow untreated into Dardanelles strait. This could affect water quality and marine ecosystem by introducing a surge of particulate matter, nutrients, and contaminants into the water column. The decomposition of this material can deplete concentrations of dissolved oxygen, with the potential to cause fish kills.	**Moderate** overall non-routine impact of accidental and uncontrolled discharges	COK A.S. will prepare, during the current design stage, an Emergency Response Plan (EPR Plan) applicable to spill containment and clean-up incidents on land and in the marine environment. The EPR Plan will apply to marine incidents stemming from construction vessels, eg spillage of oils or fuels into the Strait waters due to leaks or collision damage. Any major spills into the Strait waters (e.g. due to collisions of large commercial vessels or severe accident on the bridge) will primarily be handled by the General Directorate of Coastal Safety and Salvage Administration, which has emergency equipment and responds to emergency incidents with the order of the Board of the Port Authority Harbour Master. In addition, there is a private organization (MARE-Marine Clean-Up Services) in Dardanelles Strait, which was established by the 20 coastal facilties. Therefore, KGM will not be obliged to maintain its own fleet of clean-up/rescue vessels to respond to potential maritime incidents. The EPR Plan will include, among others, the following topics. • A spillage risk assessment in accordance with the UK Design Manual for Roads and Bridges (DMRB). • Based on the results of the risk assessment (and in conformance with statutory requirements), design of spill prevention/containment structures around sensitive equipment, installation of appropriate spill cleanup equipment and development of response procedures.	**Minor**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
			• Training of contractor staff on spill prevention and response. • Emergency communication procedures with local authorities. The *Marine Environmental Design Management Plan* (MEDMP) will include, among others, the following considerations. • Design of sediment traps and oil-water separators to prevent contaminated runoff from land-side approach roads at the Strait into the marine environment. • Design specifications to allow the use of biodegradable hydrocarbons (ie less harmful oils and lubricants) for plant and equipment employed on or close to marine environments.	

Table 7-12 Significant Operation Biodiversity Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
1	**Accidental loss of fauna** The presence of a motorway can result in the loss of some fauna, as a result of accidents when crossing the motorway, getting run over by the vehicles. This can affect to all the different groups of fauna. However, some groups of fauna result more affected than others.	**Moderate** impact on species that have a medium sensitivity	The following mitigation measure is to be implemented in relation with the accidental loss of fauna: • Warning signs along the motorway, to advice drivers about the risk of run over wild fauna. This measure shall be applied in: • The proximity of the surface water features (KP 110+500, KP 131+000, KP 135+500, KP 141+000, KP 148+000, KP 178+500, and KP 188+500), where the presence of amphibians may be higher. • Other identified areas with a more intense presence of fauna has been identified:, KP 108+500, KP 132+500, KP 137+500, KP 143+000, KP 155+000, , KP 195+500 and KP 187+500).	**Minor**
2	**Barrier effect in fauna** The linear infrastructures, such as motorways projects, contribute significantly towards the habitat fragmentation by creating barriers to fauna animal movement and the isolation of their populations.	**Moderate** impact on species that have a medium sensitivity	The following mitigation measure is to be implemented in relation with the barrier effect of the motorway: • Fauna crossing points (i.e. culverts) should be installed along the motorway. This will increase the	**Minor**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
Terrestrial Environment				
	The barrier effect created by such linear infrastructures can affect the dispersion and movement capacity of the fauna. This affects indirectly to their capacity for searching food, shelter or other individuals of their same species during the breeding season. These factors are linked with the species populations dynamic and can influence in the survival of threaten species.		permeability of the motorway and will reduce the barrier effect. This measure shall be applied in: • The proximity of the surface water features (KP 110+500, KP 131+000, KP 135+500, KP 141+000, KP 148+000, KP 178+500, and KP 188+500), where the presence of amphibians may be higher. • Other identified areas with a more intense presence of fauna has been identified:, KP 108+500, KP 132+500, KP 137+500, KP 143+000, KP 155+000, , KP 195+500 and KP 187+500).	
3	**Disturbance to fauna and damage to freshwater ecosystems** Regular maintenance of vegetation within the motorway will be necessary to avoid interference with vehicle travel and road maintenance. Regular maintenance of rights-of-way to control vegetation may involve the use of herbicides throughout the operational life of the road; which depending on their management have the potential of causing disturbance to fauna species as well as surface water bodies in the vicinity of the areas where herbicides are used (herbicides washed up by rain runoff)	**Minor**	For negligible impacts, the main mitigation measure in regards to pesticide use is the development of an Integrated Pest Management Procedure (as part of Environmental Management Plan).	**Negligible**
Marine Environment				
3	**Shipping related accidents and accidental spillages** There is heavy shipping in Dardanelles Strait. Ship types include oil and chemical tankers, container ships, bulk carriers, and general cargo ships. The presence of the bridge piers and supporting structures will provide permanent in-stream obstructions and consequently pose a risk to all vessels navigating the bridge crossing and approaching nearby ports. Any accidental ship grounding, collision with another vessel or ramming of the bridge structures has the potential to result on a large uncontrolled oil or chemical spill, which in turn may affect the marine ecosystem. At present, before bridge construction there is a high risk to navigation in the part of ÇanakkaleDardanelles Straits where the bridge will be constructed.	**As there are no available data on the frequency and extent of spills from collisions with bridge piers, no attempt was made to calculate the associated risk.**	Management of navigation risk in Çannakale strait (including the Project Area) falls primarily under the responsibility of the Undersecretaries of Maritime Affairs, e.g via the full implementation of the TSS, application of pilotage procedures for ships passing through the strait, and placement of marine markers, buoys, and lights to indicate hazards and obstructions to navigation. No further mitigation measures are proposed besides the obligatory actions described above to minimize navigation risks in the Project Area.	Residual impact assessment will be conducted following navigational risk assessment by COK A.S..

7.7 AIR AND CLIMATE

7.7.1 Introduction

The full assessment of the impacts on air and climate is presented in *Appendix 2.5* of *Volume III* of this ESIA Report. The Appendix presents a detailed description of the air quality environment, significant impacts and mitigation measures (where applicable). The sections below summarise the findings of this assessment.

Based on the results of the Scoping exercise, the following activities during the construction stage are subject to further impact assessment:

- earth moving activities and ground preparation;
- movement of vehicles over open ground, on unpaved roads and on the surrounding road network; and
- on-site concrete batching, handling of friable materials and stockpiling.

The potential degradation in local ambient air quality due to dust emissions from general construction activities has been considered on the basis of the potential for fugitive emissions to result in nuisance issues, and due to the potential for elevated PM_{10} and $PM_{2.5}$ concentrations.

7.7.2 Summary of Baseline Findings and Sensitive Receptors

The Project concession area from Malkara in the north extending to Canakkale in the south is located in the Mediterranean Region, which is known to have characteristically warm to hot, dry summers and mild, wet winters.

The wind direction data suggests that whilst being in a coastal environment with the sea on both sides of the land, the prevailing wind does vary throughout the year, however with a largely easterly bias. One year of meteorological data were used for the assessment. The wind rose shows that the prevailing wind is largely from the north-east, albeit with a degree of variation, which does reflect the historic wind data.

An ambient air quality monitoring programme was undertaken for the Project at six locations in July and August 2017, due to the absence of publically available baseline data.

Monitoring of oxides of nitrogen (NOx), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and benzene was undertaken for a period of one month using passive diffusion tubes at three locations. Dust deposition was also sampled for one month. Particulate (PM_{10}) monitoring was undertaken using a continuous analyser between 18th and 20th July 2017. Both dust deposition and PM_{10} were monitored at the six locations.

Locations of the sampling sites are detailed in *Table 7-13* and recorded sampling data for the six sites are also detailed in *Table 7-14* below, where data are available.

Table 7-13 ***Ambient Air Quality Sampling Locations***

Site	Location Notes	Coordinates		Pollutant Monitored
		X UTM (m)	Y UTM (m)	
Sındal Village, nearest building	Air-Anatolian-01	469173 E	4454481 N	PM_{10} & dust deposition
Lapseki close to sea shore	Air-Anatolian-02	470975 E	4464356 N	NOx, NO_2, SO_2, benzene, VOCs, PM_{10} & dust deposition
Sütlüce Village, settlement	Air-European-01	467797 E	4467521 N	NOx, NO_2, SO_2, benzene, VOCs, PM_{10} & dust deposition
Güneyli Village, nearest building	Air-European-02	473493 E	4482921 N	PM_{10} & dust deposition
Koruköy Village, nearest building	Air-European-03	483912 E	4489468 N	PM_{10} & dust deposition
Ahievren Village, nearest building WGS Grid – 35N	Air-European-04	506127 E	4525571 N	NOx, NO_2, SO_2, benzene, VOCs, PM_{10} & dust deposition

Table 7-14 ***Ambient Air Quality Sampling Results***

Site	NOx	NO_2	SO_2	Benzene	PM_{10}	Dust Deposition
Unit	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	
Averaging Period	Annual Average	Annual Average	24 hour	Annual Average	24 hour	mg/m²/day
AQS	**30**	**40**	**125**	**5**	**50**	**390**
Sındal,		-	-	-	<6.00	19.4
Lapseki	n/a	20.4	9.85	1.90	20.5	50.0
Sütlüce	23.2	21.6	10.3	2.20	24.4	157
Güneyli		-	-	-	18.9	170
Koruköy		-	-	-	18.0	125
Ahievren	17.3	11.8	3.63	1.50	21.3	90.0

Based on the ambient air quality monitoring data collected for the Project, however, it is considered that the Project route is in an undegraded airshed for all pollutants, as the ambient pollutant concentrations sampled as part of the baseline study for the Project are well below the relevant standards for each location.

Sensitive receptors

The following clusters are considered to contain sensitive receptors and have been included in the assessment.

- Yülüce – residential receptors west of the Project
- North of Korukoy - residential receptors on the new Project and E87/D-550 junction
- Koruköy - residential receptors west of the Project
- Bolayir - residential receptors east of the Project
- North of Güneyli - residential receptors west of the Project
- Güneyli - residential receptors west of the Project
- North of Sütlüce junction - residential receptors next to the E87 and new Bridge (west)
- South of Lapseki - residential receptors next to the E90 and new Bridge (east)

No hospitals, schools, or care homes have been identified within 200m of the Project alignment.

There are two Internationally Designated Areas of Biodiversity sites near to the Project, namely Saros Bay and Canakkale Strait (Dardanelles). Saros Bay is important for plant species *Dianthus ingoldbyi* which is an endemic and endangered species in Turkey and endangered globally. Canakkale Strait also provides important endemic plant species found in the field. Further details can be found in the Ecology ESIA chapter.

7.7.3 Overview of Greenhouse Gas Emissions

7.7.4 Approach

Carbon dioxide (CO_2) is the most relevant greenhouse gas (GHG) in the context of the Project activities. In accordance with international practice the emissions are evaluated separately for the construction and operational phases per the so-called Scope 1, 2 and 3 operational boundaries[1]:

- Scope 1 covers the direct emissions from sources owned or controlled by the project owner (in this case COK A.S.);
- Scope 2 emissions include indirect emissions from electric power taken from the grid; and
- Scope 3 emissions include emissions from sources that are neither owned nor directly controlled by the project owner, but related to the project activities.

[1] The Greenhouse Gas Protocol, WBCSD and WRI, 2001

Where available, data from previous studies, public sources and Project plans are used. Where no data are available, reasonable assumptions are made to estimate the order of magnitude of emissions for a given activity.

7.7.5 Construction Phase

The most relevant activities of each scope during construction are presented below, along with key assumptions and the calculated CO_2 emissions. The assumed construction period is 5.5 years. A conservative approach is taken on the individual assumptions, and numbers are rounded. In total, the emissions over the *entire* construction period are about **600,000 t CO_2**, with by far the greatest portion occurring under Scope 1 (450,000 t) and 3 (130,000 t), with Scope 2 (5000 t) being very minor in comparison. The average combined *annual* CO_2 emissions for the Scopes 1 and 2 are about **80,000 t**, and for Scope 3 about **25,000 t** per year.

Table 7-15 Key GHG emissions during entire construction period

Scope	Activities	Key Assumptions	Emissions (t CO_2)
Scope 1	Direct emissions from fuel combustion related to • construction machinery-equipment on site (including generators, project-related vehicles, etc. • onsite production of asphalt and concrete • transport-hauling of bulk construction materials	Machines • 50 machines in operation • 1000 t CO_2 per machine Production • Asphalt 13 mio t @ 18.5 kg/t • Concrete/cement q 520 kg/t ce Hauling • Total 100-130 mio km @ 0,78 kg/km	50,000 300,000 100,000
Scope 2	Indirect emissions from providing grid electricity to the site	• Main use at 3 worker camps, housing 2000 workers • Consumption avg 500 kWh/p • Grid emission factor in Turkey is 0.86 t CO_2 per MWh.	5,000
Scope 3	Indirect Emissions from the off-site production of material (including transportation of material to and from site) – here steel	• 120,000 t @ 1060 kg/t	130,000

7.7.6 Operation Phase

The key activities of each scope during Project operations are presented below, along with key assumptions and the calculated CO_2 emissions on an annual basis. A conservative approach is taken on the individual assumptions, and numbers are rounded. The average combined annual CO_2 emissions for the Scopes 1 and 2 are about **15,000 t**, and for Scope 3 about **13,000 t** per year.

It is emphasized that the Scope 3 emissions apply only to the *additional traffic induced* by the new Project, as based on the Leigh-Fisher traffic study[1]; the emissions from traffic that would anyhow take place along the route do not count within Scope 3. The Project will also result in a certain savings of emissions due to the modal shift, ie vehicles that now must take a longer route between the north or south destinations will in future via the Project have a shorter travel distance (and less traffic congestion). These emissions savings cannot be accurately estimated at this time, and are thus not considered quantitatively in these calculations. As such, the net Scope 3 emissions will be below the estimated 13,000 t per year.

[1] "Malkara-Çanakkale Motorway (Including Çanakkale Bridge) Traffic study" Leigh-Fisher, 2017

Table 7-16 Key annual GHG emissions during operations

Scope	Activities	Key Assumptions	Emissions ($t CO_2$ per year)
Scope 1	Road maintenance (emissions of vehicles on site by road maintenance) Direct emissions from service areas (if on-site boilers, combustion)	• 1% of construction GHGs, of which half is Scope 1 • 4 gas-fired boilers of 2 MW	3000 (maint) 6400 (boilers) **10,000 total**
Scope 2	Grid electricity for bridge and street lighting Grid electricity for operation of service and maintenance areas	• Ca 1800 H-P sodium lamps for roadway @ 200 W • Ca 1000 lights for bridge @ 200 W • Grid factor 0.86 construction GHGs, of which half is Scope 1 • Power use at service areas similar to that of the worker camps	3000 (lighting) 1000 (service) **< 5000 total**
Scope 3	Induced traffic Sourcing of maintenance materials for road and bridge	• Ca 750,000 additional car travels @ 0,125 kg CO_2/km • Ca 120,000 additional truck travels @ 0,2 kg CO_2/km • Sourcing of materials about 1% of construction GHGs, of which half is Scope 3	10,000 (induced) 3000 (materials) **13,000 total**

7.7.7 Alternative Analysis

According to Principle 2 of the Equator Principles[1], an alternative analysis (to determine less GHG-intensive options) is required for projects emitting more than 100,000 t of CO_2 equivalent **annually** within combined Scopes 1 and 2. Per the preceding calculations, the combined Scope 1 and 2 emissions for the *construction phase* of this Project is about 80,000 t per year and for the *operation phase* about 15,000 t per year. As such, current calculations show that both annual values are below this threshold andconsequently, such an alternatives analysis is not obligatory for this Project.

Nevertheless, consideration is given to the fact that the above-calculated annual emissions during construction are based on draft-stage design information and the overall averages over the 5.5 year construction period. The design information may change, and a year-by-year evaluation of emissions may show that the 100,000 t threshold may be exceeded in the "peak years". Therefore, a further update and breakdown of the GHG

[1] Equator Principles, June 2013, www.equator-principles.com

emission calculations will be warranted once further design details and project schedule are confirmed.

7.7.8 Monitoring & Reporting Requirements

According to Annex A of the Equator Principles, project developers/ borrowers must quantify Scope 1 and 2 GHG emissions in accordance with internationally recognised methods and goods practices. These Scope 1 and 2 emission levels must then be publicly reported annually if they exceed 100,000 t CO_2 equivalent annually during the *operational* phase of the project. Whilst not obligatory, borrowers are encouraged to voluntarily report their emissions if exceeding 25,000 t CO_2 equivalent annually.

In the case of this Project, per the above calculations and assumptions, the Scope 1 and 2 emissions during operations are estimated to be about 15,000 t CO_2 – and thus far below both the mandatory and voluntary thresholds. Therefore, no public reporting will be required for the Project.

7.7.9 Climate Change Adaptation

The Project region in the coastal area of western Anatolia is characterized by an Eastern Mediterranean climate with warm and dry summers and wet winters. Predictions of future climate change for this region, as based on modeling of the IPCC and other sources (as summarized in the Climate-Fact-Sheet for Turkey[1]), include the following trends:

- Heat increase of ca. 3.5°C by 2100 (max temp, median projection)
- Longer heat waves
- Less frequent precipitation and longer dry spells (summer)
- Heavy rains, though less frequent, might become stronger/more intense.

The predictions of the sea level rise for the Eastern Mediterranean are highly uncertain, but are in the range of 35 cm to 1 m.

Based on these potential scenarios, the following climate change adaptation measures are recommended for this Project:

- Design stage
    - Asphalt/road surfacing needs to be suitable for hot climate;

[1] Climate Service Center Germany: Turkey Climate Fact Sheet, 2013

- Design of the Motorway embankments and drainage system needs to be suitable for the potentially more intense (though less frequent) rainfalls;

- Operation stage
  - Measures should be reviewed periodically by the Project Operator as part of the environmental management system to promote water conservation at the Service Areas (eg recycling/re-use of any car-wash waters, rainfall recovery/re-use for onsite irrigation).

The relatively minor predicted increase in sea level is unlikely to have any consequences for the Project design; the Bridge is anyhow far above the water level of the Dardanelles Straight, and no parts of the Motorway are directly at/near the sea level.

7.7.10 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-17* and for operation in *Table 7-18*. For the assessment of impacts of minor or negligible significance see *Appendix 2.5* of *Volume III*.

Table 7-17 Significant Construction Air and Climate Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Construction dust** The unpaved road network used across the Project Site prior to works completion, is likely to be constructed from a mixture of rocks, stone, gravel, sand and silt, and can be particularly dusty when disturbed by vehicle movements. The elevated wind speeds occurring in the region together with the absence of natural barriers at the Project Site further increase the high potential for dust generation. Demolition requirements are unknown, however given the Project route, it is likely blasting 200,000m^3 of existing site material will occur. Total site area >10,000 m^2, potentially dusty soil type (e.g. material which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, total material moved >100,000 tonnes.	**High risk of significant impacts** by demolition, earthworks, construction and trackout on ecological receptors. **High risk of significant impacts** by demolition activities on human health and on dust soiling	The control and mitigation of dust is identified to be of primary consideration within the assessment and will be achieved by implementing following embedded mitigation measures: • where unpaved roads are utilised by vehicles, surface binding agents should be used, options include salt for road encrusting and oil-based agents; • a speed limit of 30kph on unpaved surfaces should be used; • vehicles should be kept clean to avoid tracking dirt around and off the site; • vehicles transporting friable materials should be covered; • where feasible, surface binding agents should be used on exposed open earthworks; • exposed ground and earthworks areas should be covered as much as possible, for example with sheeting or boarding, or the use of chemical binders should be investigated; • where ground and earthworks are covered or surface binders are used, the smallest possible area for working should be exposed; • use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust; • stockpiling of material, for example, rocks, sand and soils should be minimised; • stockpiles should be enclosed or sheeted as much as possible;	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	Total building volume >100,000m³, on-site concrete batching and use of dusty construction materials. Trackout >50 HDV (>3.5t) outward movements in one day.	**Medium risk of significant impacts** by earthworks, construction and trackout on dust soiling and human health	• stockpiles should be located as far away from receptors as possible; • the design of stockpiles should be optimised to retain a low profile with no sharp changes in shape; and • wind breaks should be erected around the key construction activities and, if possible, in the vicinity of potentially dusty works, to minimise impacts at nearby residential receptors. It is good practice to use vehicles that are compliant with recent emission standards (for example, EURO 3 or USEPA Tier 2) and maintained in reasonable working order. When not in use, vehicles should be switched off, unless impractical for health and safety reasons (for example maintenance of air conditioning).	

Table 7-18 Significant Operation Air and Climate Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation/Enhancement Measures	Residual Impact
1	**Off-site impacts** An increase in vehicle numbers is predicted along the Proposed route and major linking roads as traffic uses the major arterial routes and this will impact air quality within the wider traffic network. Around the new junction north of Koruköy village, the traffic flows are expected to reduce considerably (45%), when the Project is operational. Furthermore, around the new junction north of Gelibolu, traffic flows are also reduced considerably by 22%. The reduction in traffic also occurs on roads with significant residential exposure in Gelibolu; whereas the new motorway with traffic increases has far fewer receptors in close proximity (within 200m).	**Positive** impact on the local air quality	None proposed.	The impact will remain **positive**

No.	Impact Description	Impact Assessment	Mitigation/Enhancement Measures	Residual Impact
	The data also shows that around the new junction south of Gelibolu, traffic flows are predicted to increase by 14% with the introduction of the Project. This is considered likely to be due to the greater attractiveness of the new bridge route, compared to those using the existing ferry crossing. In addition, since the number of daily ferry services will decrease, this will also remove some of the existing vehicles from within the centre of Gelibolu.			

7.8 NOISE AND VIBRATION

7.8.1 Introduction

The full assessment of the impacts generated by noise and vibration is presented in *Appendix 2.6* of *Volume III* of this ESIA Report. The Appendix presents a detailed description of the existing acoustic environment, significant impacts and mitigation measures. The sections below summarise the findings of this assessment.

Noise impact from construction activities will arise principally from the following activities:

- construction of the Motorway and the bridge themselves;
- construction of other structures (e.g. services areas, overpasses, camps, storage areas etc.);
- excavation and preparation of construction materials in quarries or borrow pits; and
- transportation of excavated and construction materials.

Noise impacts can be caused by noise emissions from construction equipment (earthmovers, etc.), and construction vehicles carrying materials and spoil to and from the locations where work is taking place along the Motorway.

The sections below summarise the findings of the Noise and Vibration Impact Assessment.

7.8.2 Summary of Baseline Findings and Sensitive Receptors

The new Motorway will pass through mainly rural areas where existing ambient noise levels are low. Where it passes larger settlements, the most affected properties are likely to be those situated on the outskirts, close to the Motorway and shielded from the majority of urban ambient noise sources (such as local traffic and industrial facilities).

An initial baseline survey was carried out in July 2017 by ENCON Laboratuvari A. Ş. at six locations during the daytime, evening and night periods.

Locations of the sampling sites are detailed in *Table 7-19* and measured sampling data for the six sites are detailed in *Table 7-20*. The L_{den} was calculated based on the L_{eq} Day, L_{eq} Evening and L_{eq} Night measurements.

Table 7-19 Noise Sampling Locations

Site	Location Notes	Coordinates		Parameter Monitored
		X UTM (m)	Y UTM (m)	
Sütlüce Village, settlement	Noise-European-01	467797 E	4467521 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night
Güneyli Village, nearest building	Noise-European-02	473493 E	4482921 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night
Koruköy Village, nearest building	Noise-European-03	483912 E	4489468 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night
Ahievren Village, nearest building	Noise-European-04	506127 E	4525571 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night
Sındal Village	Noise-Anatolian-01	469173 E	4454481 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night
Lapseki	Noise-Anatolian-02	470975 E	4464356 N	L_{eq} Day, L_{eq} Evening, L_{eq} Night

Table 7-20 Noise Sampling Results

Site	Measurements Results dB(A)			
	L_{eq} Day	**L_{eq} evening**	**L_{eq} Night**	**L_{den} (calculated)**
	(7:00 - 19:00)	**(19:00 - 22:00)**	**(22:00 - 7:00)**	
Sütlüce Village, settlement	65.3	62.4	58.1	66.8
Güneyli Village, nearest building	57.1	55.1	50.4	59.0
Koruköy Village, nearest building	53.1	50.3	50.1	57.2
Ahievren Village, nearest building	55.8	55.4	55.4	62.1
Sındal Village	48.5	41.9	42.1	50.1
Lapseki	59.7	58.5	54.9	62.8

The noise impact assessment is not based on the baseline survey data obtained in July 2017; it is based on a worst-case scenario using the traffic flow forecasts for the year 2023 and 2033 for the Motorway provided by Leigh Fisher.

The client will develop a comprehensive noise baseline survey plan to be issued to approval by the end of February 2018.

The baseline will be quantified during the detailed design stage. A noise model will be constructed to predict the noise from the existing road, which is the main source at most receptor locations. The model will be validated using measurements where necessary and this will be used to establish baseline noise levels at key locations where the impacts are predicted. This will be used to inform the detailed design of mitigation.

7.8.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-21* and for operation in *Table 7-22*. For the assessment of impacts of minor or negligible significance see *Appendix 2.6* of *Volume III.*

Table 7-21 Significant Construction Noise Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Noise generated at Motorway Construction Sites (including main or satellite construction sites and structures)** Construction of the Motorway will progress along the route, and will result in a noise impact on a short-term basis as the construction approaches and moves past each settlement. Noise resulting from general construction work to build structures, such as bridges and viaducts, is covered by the road construction site assessments. It has been assumed that driven piling will not be used. Instead, hydraulic pile driving "silent piling" or bored piling will be used, which has lower noise levels than the percussive piling methods.	**Major** at the residential properties in north of Koruköi and South of Lapseki (Section V of the Bridge) during night time	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: • Project will ensure that all machinery and vehicles are regularly inspected and maintained; • Project will install install of silencers or acoustic enclosure on machinery, where applicable, such as installation of suitable mufflers on engine exhausts and compressor components as well as the use of portable sound barriers around stationary equipment e.g. generators; • Project will implement 30kph speed limits for trucks while travelling to and from construction sites (within settlements and on village roads of poor condition). This was reduce noise and vibrations but will also limit generation and emission of dust in non-paved accessed roads and limit the risk of accidents with fauna. Transgressions of this limit will be reported to site management and dealt with accordingly; • Project traffic routing through community areas will be avoided wherever possible. Where this cannot be avoided, Project will enforce slow driving rules in villages, particularly near sensitive use areas which will be identified (at least one month) prior to start of construction related activities. Any transgressions will be notified to site management and dealt with accordingly (such as additional driver training,	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			temporary speed-restrictions, enhanced driving monitoring); • Project will limit operating hours (typically to core daytime working hours, or times when areas are less sensitive to noise) for specific equipment or operations with larger noise and vibration impacts (e.g. trucks or machines operating in or passing through community areas); • Project will restrict the noise to be perceived at nearby settlements 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; and • 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. • Night-time operation and transportation will be minimized where villages are located close by and/or a transportation route passes through. • Excavated material will be stored between the construction site and sensitive receptors (e.g. hospitals, nursing homes, schools and other education facilities) to form a noise barrier (with cover to avoid dust erosion) Installation of other (temporary) noise barriers will be used if necessary. • Project will ensure that machines in intermittent use will be shut down in the intervening periods between work (or throttle them down to a minimum). • The Motorway alignment will be used for construction-related transportation and movement of	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			construction goods, materials and equipment whenever possible. • Where the Project is close to sensitive receptors and villages, the Project will consider construction of a new dedicated access road, rather than using the existing road network. • Internal haul routes will be kept well maintained and steep gradients will be avoided wherever possible. • Project will ensure that empty trucks have no loose chains or other noise-generating parts on the loading platform. • All ancillary plant (e.g. generators, compressors) will be positioned so as to cause minimum noise disturbance. • The Project will provide acoustic enclosures where works may cause potential noise impacts (as defined in the noise section of the ES) on nearby sensitive receptors, and where these will be beneficial in reducing noise. • Project will ensure that materials are dropped from a height low enough to avoid any significant acoustic disturbances (as defined in the ES) of surrounding receptors, or to generally minimise noise from the site. • Portable screens will be used where necessary to reduce the negative effects from construction noise for receptors. For sensitive receptors (e.g. hospitals, nursing homes, schools and other education facilities), the Project will undertake direct prior consultation with the receptor to consider specific and additional mitigation measures. • The Project will design the transport routes to avoid populated areas, as much as possible.	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• During Project-related rehabilitation and refurbishing works, specific acoustic insulation and related mitigation measures will be considered on a case-by-case basis. Where these mitigation measures are not adequate, a voluntary scheme for noise insulation will be considered for major noise impacts at the affected receptors. Resettlement may also be considered either temporarily during construction or permanently, but this would only be considered after all other options had been shown to be inadequate to avoid significant residual impacts. As Motorway construction moves along the alignment, potentially affected buildings will be identified prior to construction work approaching the village, including an evaluation whether the buildings may be sensitive to night-time disturbance (e.g. schools might be closed at night, and hospitals may not). For village areas which border the construction site up to 30 m, a reduction of at least 3 dB(A) is required to meet the daytime standard (predicted level is 78 dB(A) at 30 m distance). If noisy activities continue during night time, a reduction by 13 dB(A) is necessary at these locations. In order to achieve the higher levels of noise mitigation that would be required if work is carried out at night, localised screening of the site boundary is likely to be required through the use of noise barriers. This type of mitigation could provide reductions of the order of 10-15 dB(A) if required. According to the input data, during the construction phase the noise level will be monitored. In case the level will be higher than the threshold value then above mentioned measures. will be implemented.	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			The Project will develop a comprehensive noise baseline survey plan to be issued to approval by the end of August 2018 or when the detailed design are available. The baseline will be quantified during the detailed design stage. A noise model will be constructed to predict the noise from the existing road, which is the main source at most receptor locations. The model will be validated using measurements where necessary and this will be used to establish baseline noise levels at key locations where the impacts are predicted. This will be used to inform the detailed design of mitigation.	
2	See item #1	**Moderate** at the residential properties in north of Koruköi and South of Lapseki (Section V of the Bridge) during daytime **Moderate** at the residential properties in north of Koruköi, north of Sütlüce, South of Lapseki (Sections IV and V of the Bridge) during evening hours **Moderate** at the Commercial/Administrative building (receptor R34), residential property in Bolayir, residential property in North of Günelyli, residential properties in north of Sütlüce and South of Lapseki (Section V of the Bridge) during night time	See mitigation measures under item #1	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
3	Potential building damage from vibration generated during construction	**Moderate**	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. The following measures to control vibration from general construction sites will be implemented where practicable. • Buildings located within 50 m of significant sources of vibration (e.g. piling, operation of vibratory equipment (e.g. compaction) and blasting) will be identified ahead of construction works. Sensitivity of the identified buildings and building occupants to vibration will be evaluated, and if vibration predictions or measurements show the potential for building damage, alternative construction methods should be developed to avoid damage occurring. Where disturbance due to vibration is likely, the method will be reviewed as far as practicable. The vibration standards will be as defined in the ESHIA as implemented through the noise management plan. Documentation for each of the identified buildings will be prepared. This will include photographs of building structures sensitive to vibration and results of the sensitivity evaluation.; • Monitoring of vibration on commencement of relevant activities to ensure that the Turkish requirements are met. If the standards are exceeded additional measures will be taken to reduce vibration and if necessary altering the methods of working to use equipment that creates lower levels of vibration. Measures to control vibrations at quarry sites:	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• Mechanical ripping will be preferably used to avoid or minimize the use of explosives. Blasting will be limited to dedicated blasting times which will be negotiated with the affected communities in order to protect the people and minimize nuisance. Specific blasting plans and charging procedures will be developed; • Instead of using secondary blast, hydraulic hammers or other mechanical methods will be preferred to improve rock fragmentation and minimize fly-rock risks. Hammers will be shielded by noise screens in order to avoid significant increase in noise impacts on villages situated in the vicinity; • Delayed, micro-delayed, or electronic detonators will be used to reduce individual charge mass to safe limits where possible. At quarry sites, and if blasting is required during earthworks, close monitoring/supervision will be undertaken to ensure that legislative requirements and blasting permit conditions are complied with; if the standards are exceeded additional measures will be taken to reduce vibration impacts. • Where the Project procures material from quarries and suppliers not in the direct ownership of the Project or a Project-contractor; the Project will undertake to review the operations of this facility (or supplier) to confirm compliance with its permitted activites and related operational conditions (e.g. required control measures). • A Quarry and Associated FacilitiesCMP will be developed which will include plans to retain rock structures as noise barrier between the quarrying area and any potentially affected village.	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• For quarry and borrow pit 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 other land uses that have been approved under a zoning plan.	

Table 7-22 Significant Operation Noise Impacts and Mitigation

No.	Impact Description	Impact Assessment for the Social Area of Influence (SAoI)	Embedded controls/Mitigation Measures	Residual Impact
1	**Road Traffic Noise from Traffic on the Motorway** Noise levels perceived by the receptors during the Motorway operation. See item #1	**Major** at the residential property in north of Koruköy (receptors R26-R31, R33)	• providing low noise road surfacing the in the form of SMA (Stone Mastic Asphalt which is also referred to as Stone Matrix Asphalt); • maintenance of the road surface in good condition; • the provisions of the 'Regulation on Assessment and Management of Environmental Noise' will be followed;	At this stage it can be estimated that the noise level can be reduced between 0 to 21 dB(A) by implementation of various mitigation measures. However, the exact measures or a combination of measures to be applied especially for those areas where the impact is predicted as high cannot be currently established, due to the following factors: • insufficient information is available on the places where barriers could
		Moderate at Commercial/Administrative building (receptor R34), Commercial/Industrial Unit /Factory (receptor R35)		
		Moderate at residential property in north of Koruköy (receptor R32)		

No.	Impact Description	Impact Assessment for the Social Area of Influence (SAoI)	Embedded controls/Mitigation Measures	Residual Impact
		Moderate at residential property in north of Sütlüce (receptors R1-R7) - Section III: Gelibolu North to Gelibolu South **Moderate** at isolated residential property inside Güneyli junction (receptors R42, R43) - Section III: Gelibolu North to Gelibolu South **Moderate** at commercial area (receptor R13) – Section V: South of Bridge	• advantage will be taken of the natural topography for noise shielding • routing the Motorway away from sensitive areas; • speed reductions; • landscape screening, either by lowering the Motorway or adding landscape bunds; • noise barriers adjacent to the Motorway; • improving the housing isolation (e.g. sound proofing of windows and walls).	be installed and what their height could be; • the potential to re-align the junctions and motorway alignment will only be determined as design evolves; • the feasibility of imposing speed limits on sections of the main road and junctions (and what lowest speed could be tolerated) has not been investigated. These three unknowns make it impossible to estimate the benefits of these important potential measures at this stage of the project. This refinement of the mitigation will be investigated at a later stage when detailed design is available.

7.9 LANDSCAPE AND VISUAL

7.9.1 Introduction

The full assessment of the impacts on air and climate is presented in *Appendix 2.7* of *Volume III* of this ESIA Report. The Appendix presents the visual values and landscape characteristics of the region, assesses potential impacts and defines mitigation measures (where applicable). The sections below summarise the findings of this assessment.

The route mainly passes through agricultural areas. Forests and urban areas form the remaining land use characteristics. Sea view and strait view (the Dardanelles) is predominant in the coastal parts while at inner parts agricultural areas are ge6tting predominant. The area of influence for landscape has been taken as 400 meters and visual impacts as 2,000 meters (1,000 meters to the left and right by taking the motorway axis as the center) that are thought to be sufficient to make a detailed assessment.

The bridge, located on the strait (the Dardanelles), will take place as a highly visible architectural element especially for two important settlements on the coasts; Lapseki and Gelibolu. In this respect, a corridor with a total width of 2000 meters with an equal distance of 1000 meters from right and left side of the motorway centreline was taken into consideration for visibility assessment.

7.9.2 Summary of Baseline Findings

It is important to identify similar landscape characters in presenting the baseline features. For this purpose, areas with similar characteristics are defined by the overlay method and the character of each segment is determined. Within the scope, the route was divided into 10 segments. These 10 segments represent the areas where the behaviour against the impacts is expected to be similar and are the following:

- Segment 1: Farmlands of Sindal with Small Woodlands;
- Segment 2: Plain Farmland of Umurbey;
- Segment 3: Fruit Gardens and Farmlands in parallel with Existing Bursa-Canakkale Road ;
- Segment 4: Dardanelles;
- Segment 5: Rolling Farmlands of Gelibolu;
- Segment 6: Saros Bay and Flat Farmlands of Bolayir;
- Segment 7: Plantation Woodland and Farmland between Kavakkoy and Yenikoy;

- Segment 8: Plain and Rolling Farmlands of Yuluce;
- Segment 9: Woodland with Farmlands between Yuluce and Balabancik;
- Segment 10: Open Farmlands between Cimendere and Ahievren.

These 10 segments listed above have also been used for the determination of visual features along the Project route.

7.9.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-23* and for operation in *Table 7-24*. For the assessment of impacts of minor or negligible significance see *Appendix 2.7* of *Volume III.*

Table 7-23 Significant Construction Landscape and Visual Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**Change of landscape due to changes in land use** The area where the impacts on landscape are observed is determined as a corridor with a total width of 400 meters, 200 meters on the right and left sides of the route. Land use and topographic structure and vegetative pattern are factors affecting the corridor width. When deciding for this area, it was considered that impacts on landscape would be basically the physical impacts of the project in terms of land-take and change of the landscape due to the changes in the land use. It should be also added that the route mostly passes through agricultural lands (no unique landscape value).	**Major** impact on Segment 4: Dardanelles	• Working areas will be kept as small as practicable. Visual barriers will be implemented if the area is subjected to high visual impacts • The construction sites will be kept tidy and workers will have necessary knowledge/training about the issue • Temporary fencing will be implemented to obstruct intense construction activity areas • The options for reducing the duration of the impact by reducing the duration of the bridge construction as much as possible or decreasing the impact magnitude by separating construction activities into small scale parts.	TBD
2	**Visibility of new structures** Visual impacts may occur in a wide area when topography allows. The activities and structures can be observed from further distances. The bridge, located on the strait (the Dardanelles), will take place as a highly visible architectural element especially for two important settlements on the coasts; Lapseki and Gelibolu.	**Major** impact on Segment 3: Fruit Gardens and Farmlands in parallel with Existing Bursa-Canakkale Road; Segment 4: Dardanelles; and Segment 5: Rolling Farmlands of Gelibolu.		TBD

Table 7-24 Significant Operation Landscape and Visual Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**Change of landscape due to changes in land use**	**Major** impact on Segment 4: Dardanelles **Moderate** impact on Segment 3: Fruit Gardens and Farmlands in parallel with Existing Bursa-Canakkale Road ; Segment 5: Rolling Farmlands of Gelibolu; Segment 6: Saros Bay and Flat Farmlands of Bolayir; Segment 9: Woodland with Farmlands between Yuluce and Balabancik.	• Planting will be implemented to restore or compensate for lost habitats. Detailes are provided in Chapter 2.4 Biodiversity and Conservation of the ESIA. • 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 throughout the area is important in order that the Motorway planting will, over time, become almost indistinguishable from the vegetation naturally occurring in the surrounding area. Detailes are provided in Chapter 2.4 Biodiversity and Conservation of the ESIA. • Planting will be implemented to reconnect hedgerows or areas of planting formerly severed as a result of the construction works in order to maintain wildlife corridors and reinstate local landscape character • Landscape design will be coherent with regional landscape identity to the extent possible • Planting treatments will be designed to visually screen road structures and earthworks from nearby housings and settlements • Planting treatments will be interrupted to open up key views and vistas which reinforce local identity and minimize driver monotony	TBD
2	**Visibility of new structures**	**Major** impact on Segment 3: Fruit Gardens and Farmlands in parallel with Existing Bursa-Canakkale Road ; Segment 4: Dardanelles; and Segment 5: Rolling Farmlands of Gelibolu. **Moderate** impact on Segment 6: Saros Bay and Flat Farmlands of Bolayir.		TBD

7.10 SOCIO-ECONOMIC ASSESSMENT

7.10.1 Introduction

The full assessment of the impacts on the socio-economic environment is presented in *Appendix 3.1* of *Volume III* of this ESIA Report while the socio-economic baseline report is included as *Annex III.3* to this *Volume III*. The Socio-Economic Baseline Report presents a detailed description of the socio-economic environment while the Impact Assessment chapter discusses significant impacts and mitigation measures. The sections below summarise the findings of this assessment.

The Social Area of Influence (AoI) of the Project that has been defined to include the major communities potentially to be affected by the Project (in addition to users of Motorway during operation) is as follows:

- the primary Project site which encompasses a corridor of 1000 m (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;
- the extended Project area would include access roads, quarries and construction camps realized due to the Project. However, the exact locations were not known at the time of preparing this chapter and have not been considered in the assessment.

7.10.2 Summary of Baseline Findings and Vulnerable Receptors

Demographics

Key baseline information to consider for Demographics includes the following:

- **Aging Population:** The mean ages in the Survey Settlements are above the average of Turkey and the Turkey's rural communities. Except two district centres, population under the age of 18 has been decreasing in the 27 communities within the SAoI. There is also in-migration of elderly-retired people from big cities to the smaller communities, eg Kemiklialan;
- **Gender distribution:** In all the 15 Survey Settlements, female population is more numerous than the male population;
- **Household Size:** 59 out of 386 households interviewed consist of only one person. The members of 44 out of these 59 households are females. The average size of the households within the 15 Survey Settlements is 5.96;
- **Decrease of Population:** The significant decrease in population is mainly caused by out-migration of especially young population. The main places

of destination of out-migration are firstly district centres (eg Lapseki and Gelibolu) and secondly big cities.

- **Community Cohesion:** No conflict was identified between individuals, groups or communities in the 15 Survey Settlements. There are no ethnic minorities in the Survey Settlements.

Economy, Employment and Income

Key baseline information to consider for the assessment of impacts on the local and national economy includes the following:

- **Education and skills level of the local and national population**: Çanakkale and Tekirdağ provinces are among those with highest literacy rate in Turkey. The schooling ratios for all education levels including higher education are higher than the national average with ratios over 85%.
- **Availability of goods and services for local/regional procurement**: construction is an important industry in the region and in some of the SAoI villages, after agriculture and animal husbandry. The food processing industry is also quite important.
- **Unemployment rates at local and national level**: high unemployment rate among young people in the SAoI settlements (55%), which fosters out-migration from the communities to the district and city centres. Most people in the villages are self-employed.
- **Household income levels:** In the SAoI, the rural communities rely mostly on agriculture and animal husbandry, which makes them more vulnerable to seasonal and periodical changes.
- **Stakeholder feedback and concerns during consultations**: Concerns were raised regarding the possibility of inflation during the operation stage. Opportunities raised included employment opportunities for young people, and the enhancement of commercial activities between Istanbul and the region through improved access and transportation which would also improve access to certain goods and services in the region. Other opportunities mentioned included the boost of tourism and associated private sector investments.

Infrastructure and Public Services

Key baseline information to consider for the assessment of impacts on infrastructure and services includes the following:

- **Road transportation**: All the settlements along the motorway are connected to district centres through asphalt roads and distances to these centres vary between 6 km – 60 km. Internal community roads are mainly

asphalted; however, roads made of stone or dirt roads are also quite common.

- **Irrigation infrastructure:** Suluca, Sındal, Sütlüce, and Gökköy communities are primarily engaged in irrigated farming and fruit farming, which is the most profitable agricultural activity on irrigated land. Although the other communities in the SAoI also grow fruits, it is generally for subsistence use. Considering the importance of irrigated farming for some of the communities in the SAoI, it can be assumed that irrigation infrastructure may be present throughout the Project area, including the 7 irrigation ponds and 11 irrigation areas or water transmission lines previously identified in the national EIA.
- **Flood protection infrastructure:** the Project route passes through six flood protection facilities controlled by the State Hydraulic Works Region 11.
- **Water supply**: All 15 Survey Settlements are connected to a water supply system and use water in their kitchens and bathrooms. However, 63.3 % of the population in the Survey Settlements complain about water-supply related issues. Main issues include low quality, frequent interruption of supply, high price of water, and limited access to water.
- **Electricity supply:** The electricity infrastructure in the 15 Survey Settlements was deemed sufficient by the interviewees and in appropriate condition to supply electricity without problems. No complaints have been expressed regarding electricity supply.
- **Health infrastructure:** There are no health facilities in the 15 Survey Settlements. Some settlements have health centres. Most people in the Survey Settlements prefer to use health centres in the district centres, having to travel to access them. A very small share of the local population uses the health centre in the village, which is attended by a doctor on a weekly basis.
- **Education infrastructure**: Education facilities present in the 15 Survey Settlements include one active primary school in Bolayır and Kavakköy each (Çanakkale Province) and one active elementary school also in Bolayır.
- **Stakeholder feedback and concerns raised during the field survey:** The main concern is the issue of access to agricultural fields that the motorway may pass through and the concern that the underpasses built by the Project may not be easily accessible (few underpasses or diversions built at long distances of the fields).

It should be noted that there are a number of aspects of the Project that are unknown at this stage and that influences the magnitude of impacts to infrastructure and utilities. This includes the road network that will be used to transport project equipment, personnel and material to the construction areas, temporary traffic

management (ie road diversions, road closures, etc.), and site drainage and waste management. The location of access roads and traffic counts are also not known at the time of writing.

Identification of vulnerable groups

People who by virtue of gender, locality, age, physical or mental disability, economic disadvantage, or social status may be more adversely affected by the Project than others and who may be limited in their ability to claim or take advantage of support measures and development benefits are considered as vulnerable groups.

Vulnerable groups among the Project affected population were identified through the FSS field work. In this context, the following groups have been identified as vulnerable:

- women-headed households and disabled persons who rely on the support of other residents of their villages and/or on government support and who are affected by the Project (eg loss of land, limited freedom of movement during construction due to safety issues);
- fishing households, relying on fishing as main or only economic activity, with overall low competiveness on the labour market. However, these people are expected to only be affected temporarily during the construction phase of the Bridge;
- directly affected elderly, ill or infirm people/households with elderly heads of households as these people would have very limited possibilities to acquire alternative skills in cases where the Project affects existing sources of income;
- female employees with low skills, who are expected to have significantly limited or no access to alternative sources of income if they are affected by the Project (eg losing their jobs);
- poor people dependent on other villagers or the state for their livelihood;
- illiterate people (of which greatest portion are women) who may need additional assistance in both understanding potential Project impacts, including land acquisition, and in finding alternative livelihood strategies should they be impacted;
- refugees coming from countries such as Afghanistan or Syria and working seasonally to pick fruit, not shown in official labour statistics, who may be losing their source of income through the Project.

Vulnerable groups will be considered in a targeted way with mitigation- and support measures and through continuous consultation in order to assure meaningful implementation of all types of compensation- , support – and development measures.

The specific vulnerable households/individuals affected by land acquisition will be identified during the detailed census and survey as part of the Land Acquisition, Compensation and Resettlement Framework Policy (LACRFP) at a later stage.

7.10.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-25* and for operation in *Table 7-26*. For the assessment of impacts of minor or negligible significance see *Appendix 3.1* of *Volume III.*

Table 7-25 Significant Construction Socio-Economic Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**In-migration and rejuvenation of the local population due to economic growth** The procurement of goods and services from the local markets is likely to have a positive impact on economic growth and result in employment opportunities during the six-year construction period by creating new businesses and jobs servicing the needs of the construction activities and workforce (eg food and transport services and support staff in the construction camp). An increase in demand of goods and services will lead to a need to increase supply. This will likely create the pull factors which are needed to restore the attractiveness of the local communities and keep young people in the local villages and even encourage those who have left already to come back. Consequently, the employment of personnel and procurement of goods and services are considered to have an overall *positive* impact on the size and composition of the population in the SAoI.	**Positive** impact on the size and composition of the population in the SAoI	• HR& Worker Management Plan / Recruitment procedures will aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to vulnerable persons. Priority will be placed on hiring skilled, semi-skilled and unskilled labour from within the SAoI, then the region, then Turkey. • Seek to employ local personnel residing in project-affected communities on different portions of the motorway. Subcontractors will be encouraged to employ local personnel. • The recruitment processes will be transparent, public and non-discriminatory, providing equal opportunities with respect to ethnicity, religion, language, gender and sexuality. • The Contractors will provide information on the recruitment process, with particular emphasis on informing local communities of employment opportunities through different channels such as headmen and local associations. • COK A.Ş. will also seek to deliver long term local community benefits through promoting local employment (including job training) and purchasing local goods and services during the operation of the Motorway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project. • Supply-chain opportunities for local people/businesses will be facilitated through the Community Liaison Officers - CLOs.	The impact will remain **Positive**
2	**Community tensions and loss of cohesion due to implementation of the Project** People within the SAoI are mainly living of agriculture and animal husbandry. They use the crops and animals for the household consumption and even sell these products on	**Moderate** on the communities within the SAoI	• Impacts related to land use and livelihoods are assessed and relevant mitigation defined in Appendix 3.2 of the ESIA Volume III and the LACRF documents. • Legitimate requests of local people regarding the avoidance and/or minimization of the restriction of access between their settlement areas and agricultural lands will be considered by the Project Sponsors' design	**Minor** With the implementation of the mitigation measures, the impact

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	the local markets. In the context of the local communities practising irrigated agriculture and fruit farming (eg Suluca, Sındal, Sütlüce, and Gökköy), there is an existing level of stress in relation to the Project due to past experience with other infrastructure projects and due to the fact that the Project is perceived to be taking some of the most fertile lands from the owners. People in the communities engaged in dry agriculture (eg wheat farming) mentioned that compensation for land taken for the Project could be higher than the earnings produced through wheat farming. This could make some people richer than others and lead to certain changes in the community hierarchy. Also the presence of external, mainly male workers may cause conflicts with the existing population due to potential relationships between workers and local women or illegitimate children. It is difficult to predict at this stage how tensions could exacerbate with the start of the activities required for Project implementation as well as whether conflicts between settlements will emerge as the Project progresses and community investment is implemented.		team and feasible solutions will be developed and implemented, where possible. • All utility distribution networks intersected by Project Components will be identified and appropriate construction techniques will be used to reduce disruptions. • Any planned disruption of utility distribution services will be communicated to local authorities and local communities with at least 72 hours' notice; where planned disruptions are expected to last more than 12 hours, a specific risk analysis will be performed to assess impacts expected on local communities and to identify additional mitigation measures. • Any damage to utility distribution networks will be repaired promptly in accordance with the network owner or operator. Any unplanned disruption of utility distribution services will be managed through communication to local communities, written information to explain event occurred and repair measures needed. • A Project specific Grievance Mechanism will be used to record and solve the relevant incidents results. • Training on community relations will be provided to workers during induction and regularly throughout their employment; workers will be informed on the code of conduct including health awareness to keep according to local customs and on approach to be used when interacting with local communities and individuals. • Contract termination of the construction workforce following the completion of construction activities will be done in compliance with all legal and contractual requirements related to notification of public authorities, and provision of information to, and consultation with workers and their organizations. • COK A.S. is to develop/developing the Code of Conduct and discipline procedure and other key controls to be used for to ensure appropriate behaviour of the workforce.	magnitude is reduced to small. Therefore, it is anticipated that the overall impact significance will be minor.
3	**Employment opportunities and procurement of services**	**Positive** impact on local and	In order to enhance local employment and procurement opportunities, the Project proponent shall develop and agree an Employment Policy and	The impact will remain **Positive**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	The construction of the Motorway-Bridge Project will result in temporary employment for the duration of the construction programme at the local, regional, and national levels. This includes people employed by the Project as well as contractors and subcontractors for pre-construction and construction works (direct). Around 250 personnel are expected to be employed during the early works phase, and approximately 1,000 on average and near 1.900 during peak times during the construction phase.[1] Employment opportunities also include jobs supplying the goods and services needed to support the construction process, including food and transport services and support staff in the construction camp (indirect). In addition, the increased income of the employees will lead to an increase in general spending on goods and services as well as potentially related job creations (induced).	national economy and employment	subsequent plans and procedures (e.g. HR&Worker CMP) with primary contractors. Specific measures of the Policy include the following measures: • Conduct a comprehensive demand-and-supply-side analysis to identify and quantify local content potential, identify potential employees, Contractors and suppliers. • Recruitment procedures will aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to vulnerable persons. Priority will be placed on hiring skilled, semi-skilled and unskilled labour from within the SAoI, then the region, then Turkey. • Seek to maximise the benefits from the Motorway to local communities in terms of direct and indirect employment, and purchasing of local good and services during construction. This will include measures such as adopting local employment and purchasing policies, establishing tenders for procurement of subcontracted goods and services at a scale that local businesses can respond to, ensuring opportunities are advertised locally, and providing training for local people to allow them to obtain jobs with the Project as much as possible. • Outline and require a fair and transparent recruitment process for all openings. • Seek to employ local personnel residing in project-affected communities on different portions of the motorway to cover 40% of the jobs based on man-handling and 15% for other jobs. • Provide advance information on tendering opportunities to local businesses through trade and industry chambers and local business organizations in the region. • Break tendering opportunities into smaller components to increase the likelihood of granting individual pieces of work to Turkish companies. • In order to enhance Project impacts on long-term employment and procurement during operations, the Project proponent will implement the	

1 Deloitte, *Economic Impact of Canakkale 1915 Bridge and Motorway Project,* draft report, 23 August 2017

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			EmploymentPolicy and subsequent plans and procedures (e.g. HR& Worker CMP) , which will outline and require a fair and transparent recruitment process for all openings. • COK A.Ş. will also seek to promote local employment (including job training) and purchase local goods and services during the operation of the Motorway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project. • Supply-chain opportunities for local people/businesses will be facilitated through the CLOs as part of the LACRF implementation. • Increase capacity enhancement benefits through training programs for contractors and subcontractors on Project HSE policies, as well as phased capacity building and targeted training programs for national and local suppliers agreed with local government and industry organizations.	
4	**Capacity Enhancement of Workforce** The Project will result in long-term capacity enhancement for the local workforce during the construction period. Specifically, this includes long-term benefits from on-the-job and formal training opportunities for individual workers (direct), and the possibility for capacity enhancements for local and national companies who would have won tenders for work on components of the motorway and bridge construction. These companies would also reap reputational benefits from working on a major Project with specialised technology (direct). In turn, capacity enhancement of local and national workforce and companies will also contribute to creating long-term employment opportunities for individuals and businesses, independent of the project (indirect). In	**Positive** impact on capacity enhancement of local and national workforce and companies	See item #3 above.	The impact will remain **Positive**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	addition, it is considered that the 5 year time-frame of the construction phase would provide good training opportunities.			
5	**Damage and disruption to road transport and infrastructure** The main potential impacts on the local road network as a result of project construction activities (transport of personnel, material and equipment, waste disposal, etc.) are disruption to traffic and transportation due to road crossings, and damage to local roads from heavy truck movement to and from construction sites, worker camps, landfill areas, etc. Disruption to road infrastructure and reduced access due to road cuttings could result in impacts to livelihood or quality of life and if unmanaged properly and in time, could result in health impacts (eg inability to pass roads in an emergency etc.).	**Moderate** impacts on road traffic and infrastructure	The following measures have been identified to mitigate impacts on road traffic and infrastructure: • The Project will maintain the existing road network by keeping it open to the public during construction through the use of diversions when closure of a given road is required. • Where roads are closed, local solutions (including diversions if necessary) will be put in place. • CLOs will be present at work fronts to ensure that impacts from planned disruptions are minimised.	**Minor** If issues arise there is the opportunity for communities to address these through the Project Grievance Mechanism.
6	**Pressure and cuts on existing utility supply and on existing social and educational infrastructure** The establishment of a construction camp with worker accommodation and additional facilities may lead to temporary increased pressure and potential cuts of utility supply such as electricity, water supply, and waste management, in particular for settlements located closer to the camp. Disruption to utilities could result in impacts to livelihood or quality of life and if unmanaged could result in health impacts (e.g. water	**Moderate** impact on infrastructure and services	Mitigation measures for impacts on utility supply during construction include: • The Project will conduct an assessment of public utilities including connection points to electricity grid, sewer system, and water supply at local and regional levels and will assess the situation of settlements and industry close or in the vicinity of the construction camp and other associated facilities to ensure no reduction in services available to local settlements occurs. • A detailed hydrogeological investigation report shall be prepared and submitted to State Hydraulic Works before the start of construction in order to make sure that boreholes for drinking, utility and irrigation purposes located near settlements, in particular in the areas of Gelibolu-Bolayır and Evreşe, Çan, Yenice and Savaştepe settlements, are identified	**Minor** If issues arise there is the opportunity for communities to address these through the Project Grievance Mechanism.

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	restrictions, inadequate sanitation, electricity cuts, etc.). Pressure on utilities as well as on existing social and educational infrastructure (for example, school in Lapseki) may also result from potential influx of migrants from other villages or provinces in search of jobs as well as from incoming construction workforce who may bring along by their families.		and taken into consideration in the project design (Section 2.6 of National EIA). • Where sites are established close enough, and there is sufficient capacity, services and utilities (ie water supply, wastewater and sanitation services, electricity supply, potable water supply, and solid waste management) will be purchased from local suppliers. Local utility providers will be commissioned to extend transmission lines or water pipes to worksites. • Engagement 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. Disruption will not exceed a 12 hours period. • COK A.S. will monitor the number of workers moving with their families. If this is relevant, additional measures will be considered to support municipal infrastructure.	
7	**Temporary loss of water flow due to disruption to flooding an irrigation systems during construction** The motorway route passes through seven irrigation ponds and 11 irrigation areas or water transmission lines as well as six flood protection facilities controlled by the State Hydraulic Works. Construction works may also lead to damages to irrigation systems and potentially cause temporary loss of flow in both flooding channels and irrigation system, which would also lead to associated impacts on the livelihoods of farmers and agricultural labourers in the SAoI, in particular in the settlement of Suluca, Sındal, Sütlüce, and Gökköy which are primarily engaged in irrigated farming and fruit farming.	**Major** impact on the livelihoods of farmers and agricultural labourers in the SAoI, in particular in the settlement of Suluca, Sındal, Sütlüce, and Gökköy	Mitigation measures for impacts on water flow due to disruption to flooding controls and irrigation systems include: • The Project will conduct a detailed pre-construction survey that will be signed off by land owners. • Channels will be reinstated within one month of trench filling to at least pre-construction status. • A CLO will be present at each work front. • The Project will implement a grievance procedure, which will specify required response times. • Compensation for businesses and households will be made available in the event that water flow is unexpected disrupted by project related activities. Compensation for loss of livelihoods is discussed under land and livelihoods impacts in Appendix 3.2 of ESIA *Volume III*.	**Moderate-minor** The embedded controls and the implementation of these measures is considered sufficient to bring down the residual impact significance to *Medium-Minor*.

Table 7-26 Significant Operation Socio-Economic Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**In-migration due to economic growth** Although not under-developed compared to Turkey, the region is behind provinces such as Istanbul, Izmir and Bursa. The Project will be connecting the two sides of the Dardanelles as well as agricultural lands, concentrated industrial zones and touristic destinations. With shorter distances to be travelled and faster travel times, the Region will have a significant economic growth potential through attracting in-migration of qualified active workforce.	**Positive** impact on the demographics at regional level during operation	• The Project is expected to result in attraction of younger population through the demand for goods and services. Enhancement measures such as the provision of priority employment or the consideration of local businesses within the supply chain for construction are planned in order to provide access to Project benefits for project affected people. • COK A.Ş. will also seek to deliver long term local community benefits through promoting local employment (including job training) and purchasing local goods and services during the operation of the Motorway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project. • Supply-chain opportunities for local people/businesses will be facilitated through the Community Liaison Officers - CLOs.	The impact will remain **Positive**
	Increased urbanization One of the main concerns expressed during the socioeconomic baseline survey was that the Project would contribute to a high degree of urbanization, making the wider region more accessible to people. The improved access and increase in touristic and economic activities may lead to an accelerated urbanization of settlements which may have a negative impact on the existing social structures, cultural practices and traditions. Also the loss of arable land and risks to local population's livelihoods may be a result. At the same time it must be considered that tourism is also an economic benefit that increases the demand for goods and services, especially in the summer time. Summer house vacationists provide a significant source of income in both Lapseki and Gelibolu.	**Moderate impact** on the population in the region along the Project	• No mitigation can be defined for this impact at project level.	The impact remains **Moderate.**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
2	**Employment opportunities** Under Project operation, employment for the operation and maintenance activities of the motorway, bridge and tolls will be required, resulting in long-term employment opportunities for the local, regional and national workforce. Local contractors and subcontractors as well as national and local companies will have the opportunity to be involved in maintenance and repair works. It is assumed that operation and maintenance work will require a mix of skilled and semi-skilled labor, which may be employed from the local or regional workforce base considering the high level of education in the region.	**Positive** impact on the local and national economy and employment	• Conduct a comprehensive demand-and-supply-side analysis to identify and quantify local content potential, identify potential employees, Contractors and suppliers. • Recruitment procedures will aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to vulnerable persons. Priority will be placed on hiring skilled, semi-skilled and unskilled labour from within the SAoI, then the region, then Turkey. • Seek to maximise the benefits from the Motorway to local communities in terms of direct and indirect employment, and purchasing of local good and services during construction. This will include measures such as adopting local employment and purchasing policies, establishing tenders for procurement of subcontracted goods and services at a scale that local businesses can respond to, ensuring opportunities are advertised locally, and providing training for local people to allow them to obtain jobs with the Project as much as possible. • Outline and require a fair and transparent recruitment process for all openings. • Seek to employ local personnel residing in project-affected communities on different portions of the motorway to cover 40% of the jobs based on man-handling and 15% for other jobs. • Provide advance information on tendering opportunities to local businesses through trade and industry chambers and local business organizations in the region. • Break tendering opportunities into smaller components to increase the likelihood of granting individual pieces of work to Turkish companies. • In order to enhance Project impacts on long-term employment and procurement during operations, the Project proponent will implement the Employment Policy and subsequent plans (e.g. HR& Worker CMP) and procedures , which will outline and require a fair and transparent recruitment process for all openings.	The impact will remain **Positive**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
			• COK A.Ş. will also seek to promote local employment (including job training) and purchase local goods and services during the operation of the Motorway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project. • Supply-chain opportunities for local people/businesses will be facilitated through the CLOs as part of the LACRP implementation. • Increase capacity enhancement benefits through training programs for contractors and subcontractors on Project HSE policies, as well as phased capacity building and targeted training programs for national and local suppliers agreed with local government and industry organizations.	
3	**Economic growth through improved connectivity and accessibility** The operational stage of the Project is expected to improve connectivity for the transport of goods, services and people between the provinces of the region leading to a better economic growth potential of the region (indirect). This would include improved trade and access to tourism points as well as better accessibility for businesses in the region to expand their geographical markets and resources to other more economically developed provinces such as Istanbul. As for tourism, the continuous connection and improved access enables people to have more time and easier access to the different touristic spots in the Region, which may also generate greater opportunity for private sector investment.	**Positive** impact on the local and national economy and employment	Same as item #2.	The impact will remain **Positive**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
4	**Decreased ferry business** Given the importance of the ferry businesses at the local level in terms of income generation and employment, the Project will lead to a decreased ferry business.	**Moderate** impacts on the ferry businesses	The implementation of the mitigation measures already defined for other types of impacts identified will reduce the residual significance of the impact related to decreased ferry business.	**Minor**
5	**Taxes revenue** The Project will generate tax revenue for the Turkish government which will contribute to the national budget. Tax revenues will be generated through VAT, income taxes and corporate taxes on expenditures, operational and corporate revenues and incomes of employees. Operational revenues will be generated primarily through toll fees on the motorway and bridge and rental income from the service stations.	**Positive** impact on the local and national economy and employment	Same as item #2.	The impact will remain **Positive**
6	**Physical presence of the road and bridge and thus improved mobility and access to services** The motorway and bridge project would enable the a more efficient and effective transfer of goods, services and people which would improve access to goods and services, and reduce travel time and distances for local communities, businesses, and other road users. According a Deloitte Economic Impact Assessment of the Project, the "estimated travel time is around 20 minutes excluding the waiting time between Gelibolu and Lapseki, which peaks at high season, while the Çanakkale 1915 Bridge will shorten this time to 3-4 minutes and will resolve ferry service cancellations due to the unfavourable weather conditions". In addition to shortening travel distance and eliminating waiting time for ferries, the Project is also	**Positive** impact on community access to education, employment, services and road safety	Same as item #2.	The impact will remain **Positive**

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
	expected to reduce the traffic density in peak seasons and as a result create travel time-savings for household and business road users.			
7	**Reduced access to agricultural fields** The operation of the Motorway has the risk of reducing access to agricultural fields if appropriate road underpasses are not put in place. The perception is common among residents that the agricultural lands will be divided into two by the motorway, which would inevitably limit access to the agricultural and pasture lands. The common concern is that only a few underpasses will be built and that they may not be located close enough to the affected fields, which would not solve the issue of reduced access and in fact lead to increased costs to the farmers who would have to spend more money on fuel. The construction of underpasses is an embedded measure in Project design, with the aim to mitigate such potential impacts.	**Moderate** impact on local farmers within the SAoI	• A Project specific Grievance Mechanism will be used to record and solve the relevant incidents results.	**Minor**

7.11 DISPLACEMENT OF EXISTING LAND, USE, PROPERTY AND PEOPLE

7.11.1 Introduction

The full assessment of the impacts of the Project on use of land and land-based assets along the route is presented in *Appendix 3.2* of *Volume III* of this ESIA Report. The Appendix presents land use characteristics, assesses impacts on land use and property and defines relevant mitigation measures. The sections below summarise the findings of this assessment. Reference is frequently made to further information on expropriation in the Land Acquisition, Compensation and Resettlement Framework (LACRF), which is presented separately as Vol V of the ESIA package.

Please note that at the time of this ESIA the expropriation plans of the KGM for the Motorway and the Bridge were not finalized yet; the KGM considers the plot-specific information to be confidential, and therefore only consolidated information at village-level has been available (this information provided in the LACRF). Thus this impact assessment could not take into account any plot-specific information.

In scoping the assessment, the following types of impacts were identified as potential consequences of the Project:

- impacts on people, households and communities resulting from economic displacement as a result of loss of assets or access to them, loss of employment or other aspects of livelihood, welfare and/or amenity, due to direct changes in land use on which the Motorway and its ancillary facilities will be constructed;
- impacts on people, households and communities resulting from physical displacement to facilitate the construction and operation of the Motorway;
- severance issues (such as households no longer having direct access to some of their land, schools, shops, other neighbourhoods etc, due to barrier posed by Motorway)
- impacts of the Motorway on the overall access to resources and on the spatial fabric of social and economic relations;
- impacts on planned developments; and
- indirect land use changes as a result of the operation of the Motorway (such as changing the zoning or development plans in the vicinity of the Motorway route).

The construction corridor varies between 80 m and 500m, where the land withdrawn (both permanent and temporal) will take place. The size of the corridor has been selected to accommodate for potential smaller changes in the motorway routing during final design.

For several kilometres, the proposed Malkara-Canakkale will go in parallel with existing E87 (D-550) Motorway (Edirne - Canakkale road), resulting in limiting the access to the lands and facilities located between the two highways.

The location of access roads, quarries and some of the construction camps was not known at the time of writing and, therefore, the scope of this assessment does not cover these in detail.

The Land use Area of Influence (AoI) has been defined as the area likely to be affected by the Project activities during the construction and operation of the Project.

The area of Project socio economic impact for the purposes of conduction of socioeconomic baseline survey has been defined as the area likely to be affected by the Project activities during construction, operation, decommissioning and closure phases. The Social AoI includes the primary Project site which encompasses a corridor of 1000 m (being 500 m on each side of the Motorway centreline).

7.11.2 Summary of Baseline Findings and Sensitive Receptors

Outcomes of Socio-economic Baseline Survey

The SAoI includes 29 communities. The primary data collection of the socioeconomic survey was conducted in 15 communities located in the SAoI, including a qualitative and quantitative socioeconomic, sociocultural, sociodemographic database on these 15 communities. Data collection on the 14 remaining communities, which were not selected for the primary data collection, was accomplished using secondary data sources.

Those 29 communities can be categorized under three groups in demographic and administrative basis:

- Urban Communities: Large population (District centers)
- Rural Communities: Mediumpopulation (Sub-district municipality)
- Rural communities: Small population (Village)

The Socio-economic baseline report analyses data on two urban communities, Gelibolu and Lapseki district centers, which are in Çanakkale province. Although these two districts are outside the area of impact in geographical terms, they are the administrative centers of the communities which will likely be affected from the Project.

Land Use and Property

The land use can be classified as artificial surfaces, agricultural areas, forest and semi-natural areas and water bodies. In artificial surfaces, there is discontinuous rural fabric and in agricultural areas there are non-irrigated

complex cultivation, irrigated complex cultivation and land principally occupied by agriculture with significant areas of natural vegetation. Moreover, forests areas include broad-leaved, coniferous and mixed forests. Moreover, natural grassland and transitional woodland also exist in these forest areas. Water bodies have sea and ocean. Maps demonstrating the land-use character of the route are presented in *Annex A* to *Appendix 3.2* of the *Volume III* to this ESIA.

The key findings of the land use capability analyses are summarized below:

- about 85 % of the land use is for agriculture, the majority (71 %) being non-irrigated farming;
- the remaining 15 % is for other land use classes (artificial surfaces, forest and semi natural areas and water bodies.

The former Turkish General Directorate for Rural Services (GDRS) developed national land use databases for all provinces based on the surveys performed by the General Directorate for Soil and Water (TOPRAKSU) in 1966-1971 and updated in 1982-1984 (*Ministry of Environment and Forestry, 2004*).

The key findings of the land use analyses are summarized below:

- Dry Farmland (non-fallow) covers more than half of the entire study corridor (nearly 70%),
- Military Zone covers about 6% of the entire study corridor,
- The remainder of the study corridor (24%) is mainly covered by irrigational farmland, orchard, pasture, forestry, shrubbery,
- Settlement areas, sea and rivers cover only %0.44 of the study corridor.

7.11.3 Summary of Significant Impacts

Significant impacts are summarised for the construction and operation in *Table 7-25*. Mitigation measures are identified in the tables below also. For the assessment of impacts of minor or negligible significance see *Appendix 3.2* of *Volume III.*

Note: The topic of cumulative impacts due to potential "double-expropriation" for some property owners (expropriation from this Project and also other projects in the area such as the TANAP pipeline) is addressed in *Appendix 3.2 Volume III* and especially in Chapter 8 of this report. No significant impacts to Displacement are identified at this time; general mitigation measures are presented in Chapter 8.

Table 7-27 Significant Construction and Operation Land Use and Property Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Physical Displacement /Effects on livelihood from agricultural activities** During the Project construction the main impact will be on the land-use and the change of the existing type of those uses in the construction corridor and for the construction of the associated and affiliated facilities to be needed for the main project. In this regard, the footprint of the corridor mainly occupies the farmlands (about 69 % for dry farmlands and 5 % irrigated farmlands). Then shrubbery (10%) and forestry (7 %) areas follow the agricultural lands. The scoping report identified the need for physical resettlement in several locations, which will affect few residential areas, small local business, few sheepfolds and a corner of an industrial park. Effects on livelihoods could also arise as a result of including information about expropriation in the title deeds of the respective plots. This could lead to difficulties in accessing credits or to a decreased of the mortgaged value of land/property.	**Moderate** impact on Livelihood and Economic Displacement	The expropriation will be done by KGM in line with the applicable Turkish regulations (as common practice for all such projects in Turkey). Main Mitigation will be preparation of the LACRF (see ESIA – Vol V) and a Community-Level Assistance programme (CLAP) where the expropriation process and compensation approach will be described in detail. • Borders of the construction areas and expropriation corridor will be identified by suitable markings. • Construction crew will be trained to stay within the border of the construction areas and expropriation corridor. • For exceptional cases when the privately-owned land has to be used but the expropriation or court processes have not been finalized yet, no work will be started until bilateral agreements are settled and official consent letters are taken from the legal owners. In such cases, official commitment letters will be provided to legal owners by the Project Sponsors regarding the scope of works and compensation of probable damages and the works will be conducted in accordance with those consent and commitment letters. • If complaints related with unauthorized use of privately-owned lands, damages on adjacent lands, etc. are received through Project's Grievance and Comment Mechanism, evaluation/inquiry will be conducted on a case-by-case and where necessary, corrective actions will be planned and implemented. • In accordance with KGM's technical specifications, in case of any direct or indirect damage on state or personal property as a result of the activities of the Project contractors or sub-contractors, Project Sponsors will ensure that relevant	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			corrective measures (e.g. repair, maintenance, rebuilding, restoration, etc.) are implemented at its own cost in line with the instructions of the KGM or other related governmental agencies. • Engagement will be maintained by COK A.S. with Affected Communities, including host communities, through the process of stakeholder engagement and the CLOs; • A grievance mechanism will be established as early as possible in the Project development phase. • Where involuntary resettlement is unavoidable the expropriation will be carried out by KGM per the Turkish regulations to identify the persons who will be displaced by the Project and determine who will be eligible for compensation and assistance. Persons eligible for compensation are those who own the land (or part-owners) including persons (i) who have formal legal rights to the land or assets they occupy or use, and (ii) who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law. • Additional compensation method will be available for the affected communities through supplemental support measures by COK A.S. as compiled in a Community-Level Assistance Programme (CLAP). • Development of Land Acquisition, Compensation and Resettlement Framework (LACRF), including the CLAP, establishment of procedures to monitor and evaluate its implementation and introducing corrective action as necessary. The LACRF will describe the expropriation process and compensation approach by KGM in line with Turkish regulations. The CLAP will include additional measures by COK A.S. in the affected communities – as selected in a Community Needs Assessment and based on the ESIA results - to support affected	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			landowners/users and other community residents to supplement the KGM measures. • If people living in the project area are required to move to another location, displaced persons will be offered cash compensation in accordance with standard KGM policy and in line with the Turkish Expropriation Law. • Close collaboration will be maintained throughout the process with the KGM as the responsible government agency. • Land owners facing difficulties in accessing credits as a result of expropriation information in the title deeds shall address KGM and the Project, through the grievance mechanism. COK will address such grievances through coordination with KGM. During disclosure, KGM informed they can investigate each such claim and issue a paper to support the credit accessing process until the actual expropriation shall be implemented.	
2	**Effects on livelihood from livestock activities** The Project implementation will cause the fragmentation of certain land plots.	**Moderate** impact on Livelihood and Economic Displacement	• Several underpasses and culverts have been included in the design to ensure access of local people to agricultural lands. These underpasses and culverts will ensure sufficient dimensions for the passage of harvesters, vehicles, etc. where required. • Access roads will be constructed in parallel to the Motorway near agricultural areas/zones to provide access to agricultural lands. • Legitimate requests of local people regarding the avoidance and/or minimization of the restriction of access between their settlement areas and agricultural lands will be considered by the Project Sponsors' design team and feasible solutions will be developed and implemented, where possible. • For the pasturelands that will be separated by the Motorway (fragmentation of land), impacts on the public users of the pasturelands will be mitigated by ensuring access between	**Minor**
3	**Effects on livelihood from livestock activities** The Project implementation will cause the access limitation to several of them, especially in the area where the Project Motorway goes in parallel to existing E87 motorway Edirne Canakkale Yolu.	**Major** impact on Livelihood and Economic Displacement		**Moderate**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			severed lands. In this scope, culverts, underpasses and over bridges have already been included in the design. However, additional passage ways that will be requested by local communities will be considered by COK A.S. if feasible and subject to KGM approval for design revision.	
4	**Loss of economic forestland function within the Motorway's expropriation corridor and at related facilities** Permanent withdrawal of forest lands by the Project will result in loss of its economic function as well as socio-economic value for local communities including ecosystem services use.	**Moderate** impact on land use structure	• Loss of forest lands will be minimized by taking relevant design measures (i.e. construction of viaducts). • An ecological bridge should be constructed at suitable point (s)in line with the requirements of related forestry directorates. • An Afforestation Plan will be implemented. • Project Sponsors will require all contractor and sub-contractor personnel to take necessary measures to avoid forest fires and immediately respond to any fire event including: o Project personnel will be trained to immediately inform forestry authorities about the location and scale of any fire incident. o Fire fighting equipment will be provided at construction sites (as relevant for different types of fires), and staff trained to use them. o Smoking will be allowed only in designated, safe areas of the construction sites	**Minor**
5	**Loss of forest socio economic value (including ecosystem services)** Permanent withdrawal of forest lands by the Project will result in loss of its economic function as well as socio-economic value for local communities including ecosystem services use.	**Moderate** impact on land use structure		**Minor**
6	**Loss of agricultural lands suitable for soil cultivation**	**Major** impact on land use structure	• When displacement cannot be avoided, displaced persons will be provided with appropriate compensation for loss of assets per the Expropriation Law. The details of the compensation approach by KGM are provided in the LACR Framework. • Impacts to agricultural and pasture lands will be minimised as far as possible by keeping the Project construction footprint as narrow as possible, and efficiently restoring any damaged areas.	**Major**
7	**Loss of pasturelands available for public use**	**Major** impact on land use structure		**Moderate**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
8	**Future urban development potential** A delayed consequence of the Project can be assumed to be the urban development which may be triggered by the Motorway construction. Such development may result in both positive and negative impacts to current baseline and land users. No details are available (nor will be available in the foreseen future) to perform the impact assessment of this effect.	**Major** impact on Regional Land Use Character	None proposed.	**Major**

7.12 LABOUR AND WORKING CONDITIONS

7.12.1 Introduction

The full assessment of the impacts related to labour and working conditions is presented in *Appendix 3.3* of *Volume III* of this ESIA Report. The Appendix discusses labour and working conditions including the occupational health and safety aspects of The Motorway-Bridge Project and defines relevant mitigation measures. The sections below summarise the findings of this assessment.

As defined during the Scoping of the ESIA, the following Project activities are relevant for this topic:

- Construction Phase:
  - Construction and operation of dry docks, facilities, accommodation for project workforce and subcontractors and access roads;
  - Employment of personnel and procurement of goods and services (from local market);
  - Subcontractor management;
  - Physical presence of construction workers;
  - Construction traffic (transportation of workers and materials);
  - Pile driving of the foundations;
  - Operation of construction machinery, equipment and generators, hazardous materials;
  - Borrow pits/Quarry mining;
  - Wastes/ Wastewater handling and disposal.
- Operation Phase:
  - Maintenance of road and bridge.

7.12.2 Summary of Baseline Findings and Sensitive Receptors

Labour and working conditions

Turkish labour law and related regulations cover the basic principles of international labour standards and the IFC PS 2 in the issues of *equal treatment of employees*, *restrictions on the working age* and *employment of children*, *avoidance of forced labour* and ensuring *occupational health and safety at the workplaces*.

Child labour

In 2015, Turkey made advancement in efforts to eliminate the worst forms of child labour. The Government of Turkey implemented a project in cooperation

with the ILO that provided services to more than 1,000 children working in commercial hazelnut production and amended the Labour Law to provide protections for children working in the arts and commercial advertising. However, children in Turkey are also engaged in child labour in street work and mobile seasonal work in agriculture.

The Government does not have laws that protect children working in agricultural enterprises employing fewer than 50 workers. Although the Government took important steps to increase Syrian refugee children's access to education and other services nationwide, many Syrian refugee children in urban areas of Turkey had low or no access to education and other social services, leaving significant numbers at increased risk of exploitation in the worst forms of child labour.

Work accidents

Turkey is characterised by high rates of work accidents in comparison with the EU[1]. According to Turkstats, a total of 1737 people had work accidents in activities related to construction of roads and motorways in 2016.

Health Services

The health services capacity of the region is well developed. State and private hospitals located in the Project area.

7.12.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-27* and for operation in *Table 7-28.* For the assessment of impacts of minor or negligible significance see *Appendix 3.3* of *Volume III.*

[1] http://www.ilo.org/ilostat/

Table 7-28 Significant Construction Labour and Working Conditions Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Health and Safety Risks due to General Occupational Health and Safety Hazards**	**Moderate**	COK A.S. is committed to develop and implement an OHS management system, aligned with GIIP such as OHSAS 18001 / ISO45001. This management system is intended to reflect the risks to the workforce as a result of the project and to identify and ensure the implementation of appropriate mitigation during construction and operation. The OHS management system will ensure that the following measures will be taken to avoid and/or minimize risks due to moving equipment and vehicles or works to be conducted at height or elevated/overhead works, etc.: • Good cooperation with the local medical services will be ensured. • A system will be established for the reporting and recording of occupational accidents and dangerous occurrences/incidents. • PPEs will be selected based on the specific hazards and risks of the task to be performed and properly maintained to keep them effective and operational throughout their use. In addition to orientation trainings, all the direct and contracted workers will be provided with relevant trainings prior to commencement of new assignments (change of workplace/task, change of working machinery and equipment, introduction of new technologies, etc.). Workers with rescue and first-aid duties will be provided with dedicated training. Through appropriate contract specifications and monitoring, it will be ensured that service providers, as well as contracted and subcontracted Labour, are trained adequately before assignments begin. • In the case of any accident arising from technology and material to be used, Occupational Health and Safety Plan will be complied with. • A visitor orientation and control program will be established to ensure visitors do not enter hazard areas unescorted. In this respect, relevant checkpoints and record keeping practices will be used for ensuring both safety of the works and the visitors.	**Negligible**
2	**Health and Safety Risks due to Physical and Chemical Hazards**	**Moderate**	To minimise the negative impacts caused from physical hazards on labour, following mitigation measures will be complied with:	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• The area around which elevated work is taking place will be barricaded to prevent unauthorized access and working under personnel on elevated structures will be avoided. • Hoisting and lifting equipment will be rated and properly maintained, and operators trained in their use. Elevating platforms will be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings), equipment movement protocols (e.g. movement only when the lift is in a retracted position), repair by qualified individuals, and installation of locks to avoid unauthorized use by untrained individuals. • Ladders will be used according to pre-established safety procedures for proper placement, climbing, standing, as well as the use of extensions. • When working at height, proper fall protection measures will be implemented. Fixtures will be installed on bridge components. Safety belts with proper thickness and of suitable materials ensuring sufficient strength will be used. Rope safety belts will be replaced before signs of ageing or fraying of fibres become evident. When operating power tools at height, workers will use a second (backup) safety strap. • Personnel exposed to high levels of noise will be required to use personal hearing protection devices/equipment that will be provided by COK A.S. (or subcontractors) at no cost. Where required for specific works, work rotation programs will be implemented to reduce cumulative exposure. • Weather forecasts will be monitored for outdoor work to provide advance warning of extreme weather and schedule the work accordingly. Protective clothing will be used where required.. To minimise the negative impacts caused from chemical hazards on labour, following mitigation measures will be complied with: • Properly maintained construction machinery, equipment and vehicles will be used to minimize air emissions. • Engine idling time will be reduced in construction sites. • Direct diesel exhaust will be properly removed to minimize exposure of the operators.	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• Indoor working areas where vehicles or engines are operated will be ventilated or the exhaust gases will be properly diverted. • Lead-containing paint will be avoided and appropriate respiratory protection will be used when cutting galvanized steel. • At work sites where dust levels are excessive, dust masks will be used by relevant personnel.	
3	**Health and Safety Risks due to Emergencies**	**Moderate**	Emergency Response Plan (ERP) for Spill Containment and Clean-up, engineering contingencies, marine collisions and other emergencies (e.g. natural hazards) should be prepared. The EPRP to include: • The emergency response in the event of spills, fire, accidents, earthquake, flood; • A spillage risk assessment will be undertaken in accordance with the UK Design Manual for Roads and Bridges (DMRB) for operation phase; • Where medical rescue and fire-fighting resources and spill response equipment will be available along the route. Locations to be informed by the spill risk assessment for operation phase; • Procedure for staff and subcontractors to report any incidents and the investigation, remediation and preventive actions taken; • Regular emergency response training including in the use of spill response equipment; • Emergency Communication Procedure (under the SEP and the Emergency Response Plan) including with local communities and authorities. Contractors and Sub-Contractors will develop and prepare site-specific EPRPs in line with this overarching plan. The ERP will be updated and expanded as needed for implementation in the Operation Phase of the Motorway. Effective implementation of the measures/actions that will be defined in the ERP, emergency situations can be controlled without causing significant risks and/or impacts on the health and safety of the Project personnel as well as local communities. Relevant emergency preparedness and response measures will be taken during emergency situations arising at the construction/work sites and Camp Sites. The labours will be informed about Emergency action plan against any accident, fire, sabotage, natural disaster and so on.	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
4	**Health and Safety Risks due to Construction Traffic**	**Moderate**	• To minimise the negative impacts caused from construction traffic, following mitigation measures will be complied with: • Safe work zone will be established to separate workers on foot from the traffic; • For the construction works to be conducted at location where traffic exists, safe work zones will be established by taking relevant measures (closure of roads, diversion of traffic, use of protective barriers, cones, warning lights, etc.); • Weather forecasts will be monitored to provide advance warning of extreme weather to drivers and schedule the work accordingly.	**Negligible**
5	**Health and Safety Risks due to Poor Accommodation Conditions**	**Moderate**	As it define in IFC and EBBD guidance on accommodation[1], the standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Conditions ensuring a good standard of personal hygiene and hygiene in canteens need to be ensured to prevent contamination and the spread of diseases which result from inadequate sanitary facilities and may affect the community health and safety as well. Medical facilities (first-aid facilities, additional medical facilities) are also important to maintain workers' health and to provide adequate responses in case of health emergency situations. Additionally, basic leisure, social and telecommunication facilities are important for workers to rest and also to socialize during their free time. Since accommodation will be provided at Camp Sites in the scope of the Project, all these requirements at the facilities will need to be optimized to minimize potential impacts on the workers' welfare and risk of work-related accidents and maximize the overall productivity. The Camp Sites will include facilities such as cafeteria, medical room, shower and toilets, wastewater treatment plants/septic tanks, water supply facilities (i.e. water well) etc. Only concrete plants will be located at the Camp Sites; asphalt and mechanical plants will be sited close to the quarries to the extent feasible. General measures to be taken at the workers' accommodation facilities (*IFC Environmental, Health, and Safety General Guidelines, 2017*) will be as follows:	**Negligible**

[1] IFC, EBRD. (2009). *Workers' accommodation: processes and standards. A guidance note by IFC and the EBRD.* Retrieved from: http://www.ebrd.com/downloads/about/history/workers.pdf Date of reference: October 10, 2017

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			• The accommodation to be provided will be clean and safe and meet the basic needs of workers, providing minimum amounts of space for each worker; sanitary, laundry and cooking facilities. Overcrowding will be avoided. • Heating, air-conditioning and ventilation will be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time. • Drinking water to be provided to Project workforce and water to be supplied to food preparation, washing and bathing areas will meet the requirements of the Turkish Regulation Concerning Water Intended for Human Consumption. • Adequate lavatory facilities (toilets, urinals, washbasins and showers) will be provided for the number of people expected to work in the facility and allowances will make for indicating whether the toilet facility is "In Use" or "Vacant". Toilet facilities will also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices. • Domestic wastewater and waste to be produced at Camp Sites will be properly managed and disposed of in line with the requirements of relevant Turkish regulations as well as good site practices described in this ESIA. • First aid and medical facilities as well as provisions for safety against potential hazards (fire, etc.) will be provided at the camp sites. • Residents of the Camp Sites will be made aware of any rules governing the accommodation. • Project's Grievance Mechanism to be established will provide means to the Project personnel to lodge their complaints. COK A.S.will ensure that the workers are informed of the grievance mechanism at the time of recruitment and make it easily accessible to them. • There will be infirmary and domestic wastewater treatment plant and leisure centre in the construction site.	
6	**Labour Risks and Impacts Related to Local Recruitment and Capacity Enhancement**	**Positive**	Local recruitment and influx management controls • HR&Worker Planagement Plan / recruitments procedures will aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to	**The impact will remain Positive**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			vulnerable persons. Priority will be placed on hiring skilled, semi-skilled and unskilled labour from within the SAoI, then the region, then Turkey. • The Project will seek to employ local personnel residing in project-affected communities on different portions of the motorway to cover 40% of the jobs based on man-handling and 15% for other jobs. • The recruitment processes will be transparent, public and non-discriminatory, providing equal opportunities with respect to ethnicity, religion, language, gender and sexuality. • The Contractors will provide information on the recruitment process, with particular emphasis on informing local communities of employment opportunities through different channels such as headmen and local associations. • COK A.Ş. will also seek to deliver long term local community benefits through promoting local employment (including job training) and purchasing local goods and services during the operation of the Motorway to the extent possible. Measures will include the facilitation of access to alternative employment for people affected by the loss of jobs through the Project. • Supply-chain opportunities for local people/businesses will be facilitated through the Community Liaison Officers - CLOs. <u>Employment terms and conditions</u> • COK has made a number of policy commitments for its own performance and that of its contractors and subcontractors to ensure that workers' terms and conditions of employment are clearly documented in writing and communicated to them, including their entitlement to wages, hours of work, overtime arrangements and overtime compensation, benefits, and the grievance mechanism for workers. • As reflected in the COK's Employment Policy Document decisions will not be made on the basis of personal characteristics that are unrelated to inherent job requirements, such as language, race, sex, political opinion, philosophical belief, religion, sect, nationality, ethnic origin, disability, age or sexual orientation, in	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			accordance with Turkish and EU legislation on anti-discrimination and equal opportunities. COK will provide, as per Turkish Labor Law, workers the right of collective bargaining and forming a union/related organization.	
7	**Labour Risks and Impacts Related to Women Employment and Non-Discrimination and Equal Opportunity**	**Positive**	COK A.Ş. will follow Turkish law, while applying equal opportunities to women in all other branches where law does not prohibit women workers. Further measures will be put in place to encourage female participation in non-employee workforce, such as providing specific training where required, enabling flexibility and job-sharing opportunities for women with children to participate.	**The impact will remain Positive**
8	**Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced Labour Risks)**	**Moderate**	Child and forced labour controls • COK A.Ş. will not employ nor permit any subcontractor to use child labour, and in accordance with Turkish legislation, any person under the age of 18 may not be assigned to any hazardous work within the Project. Workers under 18 if any will usually be involved in an apprenticeship role; however the minimum age in any case will be 15 years. Workers will be hired only after a legitimate proof of age is presented that meets the local age qualification laws. • Similarly, COK A.Ş. will prohibit the use of forced labour by ensuring full compliance with national legislation and the provisions of relevant conventions and other international standards. These measures will be reflected in the Project's Employment Policy Document.	**Neglijible**

Table 7-29 Significant Operation Labour and Working Conditions Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Health and Safety Risks due to General**	**Moderate**	COK will ensure that the operation and maintenance personnel are properly trained in their specialty and successfully completed the necessary security investigations.	**Negligible**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	Occupational Health and Safety Hazards		The Operation and Maintenance Plan will be submitted to the KGM four months ahead of the start of Motorway- Bridge's operation. In accordance with the related terms of the BOT contract, 1 year ahead of the end of the contract duration, personnel designated by the KGM will be trained by COK on the aspects related with the operation and maintenance works of the Motorway. Sub-contractors to be involved in the operation of service areas will be subject to the same contractual conditions with the Project Sponsor and sub-contractors will be required to apply same occupational health and safety measures implemented for the whole Project. Healthcare services of the Workers who are employed in Maintenance of highway will be obliged to the contractor company.	
2	**Health and Safety Risks due to Physical and Chemical Hazards**	**Moderate**	Following measures will be taken to ensure safety during the road maintenance or landscaping works: • Pavers with exhaust ventilation systems will be used and proper maintenance of such systems will be ensured to maintain worker exposure to crystalline silica (millers and grinders) and asphalt fumes (pavers) below applicable occupational exposure levels. • Correct asphalt product will be used for each specific application and application at the correct temperature will be ensured to reduce the fuming of bitumen during normal handling. • Tollbooths will be equipped with proper ventilation systems; • Protective clothing will be used when working with cutbacks (a mixture of asphalt and solvents for the repair of pavement), diesel fuel, or other solvents. • Appropriate respiratory protection will be used when removing paints.	**Negligible**
3	**Health and Safety Risks due to Emergencies**	**Moderate**	An Emergency Response Plan, covering the emergency situations (involving vehicles and pedestrians) that may occur during the Motorway's operation, should be prepared and implemented by trained personnel in order to avoid significant risks. No additional mitigation measures are required.	**Negligible**

7.13 COMMUNITY HEALTH AND SAFETY

7.13.1 Introduction

The full assessment of the impacts on community health and safety is presented in *Appendix 3.4* of *Volume III* of this ESIA Report. The Appendix presents how the Project may change the community exposure to risks and impacts arising from traffic flows, equipment accidents, structural failures, release of hazardous materials, exposure to diseases and the activities of workers and defines relevant mitigation measures. The sections below summarise the findings of this assessment.

The impacts identified in relation to community HS are the following:

- Traffic accidents
- Community health and nuisance related to air and noise emissions
- Injury from unsafe equipment use
- Exposure to hazardous materials
- Increased community risk from exacerbated natural hazards (i.e. flooding, earthquake stability, fire, landslides)
- Community exposure to disease and anti-social behaviour
- Conflict and with security personnel

Source of potential impacts on community HS that have been identified are the following Project activities:

- Construction activities (e.g. dust, noise, use of hazardous materials, machinery operations and truck traffic);
- Motorway operation during operation (e.g. dust, noise);
- Traffic movements during construction and operation resulting in accidents and unplanned events (e.g. spills/leakages, earthquakes);
- Presence of construction personnel in the area during construction; and
- Physical change within the Project area (eg changes in topography leading to flooding events) following the construction phase.

The Project route starts in *Malkara* District of Tekirdağ Province passing through *Gelibolu* District of *Çanakkale* Province and connecting to *Lapseki* District of Çanakkale Province via the 1915 Çanakkale Bridge.

The Social Area of Influence (AoI) of the Project that has been defined to include the major communities potentially to be affected by the Project (in addition to users of Motorway during operation) is as follows:

- the primary Project site which encompasses a corridor of 1000 m (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;
- the extended Project area would include access roads, quarries and construction camps realized due to the Project. However, the exact locations were not known at the time of preparing this chapter and have not been considered in the assessment.

7.13.2 Summary of Baseline Findings and Sensitive Receptors

The primary source of income of Tekirdağ Province is from agricultural and industrial activities. There are a total of 13 Organized Industrial Zones in Tekirdağ Province, including Çerkezköy Organized Industrial Zone which is one of the largest one in Turkey. Approximately 60% of the total land size of the Tekirdağ Province is cultivated agricultural land and AoI of the Project shows similar characteristics according to aerial photographs. There are in general considered to be fewer community HS risks within industrial areas due to lower population density and increased distance to communities within these areas. Within agricultural areas, the risks to the community HS risks are considered to be higher than industrial zones.

The Çanakkale Province part of the Project is located close to tourism sites, fisheries, industrial areas and agricultural areas. The community of Çanakkale Province is therefore considered more vulnerable to HS impacts of the Project than the communities located at Tekirdağ Province.

7.13.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-30* and for operation in *Table 7-31*. For the assessment of impacts of minor or negligible significance see *Appendix 3.4* of *Volume III.*

Key embedded controls are present in the design criteria of the Motorway and 1915 Canakkale Bridge. Detailed discussion of the design considerations that pertain to community health and safety are provided in a number of chapters including Chapter 2.2 Geology, Soils and Contaminated Soils and Chapter 2.3 Fresh Water and Marine Environment. Furthermore, mitigation measures have been proposed with the following plans and procedures applicable to COK A.Ş. and their contractors, with monitoring of conformance by COK A.Ş.:

- *Transport Control and Site Access Procedure* (on-site and off-site)
- *Environmental and Social Management Plan*
- *Community Health & Safety & Security CMP*
- One plan will be developed for the construction phase and subsequently for operations.

It should be noted that assessment and mitigation presented in the ESIA is based on a high-level overview of the likely community HS risks and identification of overarching mitigation. A more formal community health and safety risk assessment, inclusive of consultation with relevant third party (e.g. community) stakeholders will be used to further define community HS risks and related impacts. These will be reviewed and revised to capture any additional mitigation that may be required based on the findings of that risk assessment process.

Table 7-30 Significant Construction Community Health and Safety Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	**Traffic accidents** Other risks involving the public associated with construction could include physical accidents on sites, impacts from construction traffic and accidents involving handling of hazardous materials during construction. Children and youths are amongst those vulnerable to the physical hazards associated construction traffic, for example, especially in event of unauthorised entry or in proximity to roadways. The impact significance of traffic accidents induced from repair and maintenance activities of the Motorway and Bridge is considered as moderate to high. Accidental access to the Motorway is another potential risk that may be present during the operation phase. Children and youths are again amongst those vulnerable to the physical hazards associated with unauthorised entry to the Motorway. There was no traffic assessment conducted in to date however it is likely that the existing roads near communities and existing motorway entrance and exits may not have the capacity to manage the large amount of truck traffic that will be present during the construction period.	**Major** on the receptors using the community roads	A range of specific measures to protect the community from adverse effects during construction and operation is presented in the Volume III *Appendix 2.1 (Resources and Waste), Appendix 2.5 (Air and Climatic Factors), Appendix 2.6 (Noise and Vibration), Appendix 3.3 (Labour and Working Conditions)* as well as in the ESMP (*Volume IV*). Measures will be in place to prevent members of the local community, especially children, from unauthorised entry to Project-related sites/installations, thus prevent or lower the risks of accidents. Such measures will include, e.g.: • Awareness training about construction site hazards to children/youths in nearby village schools; • Placement of fencing or other barricades around dangerous construction installations with warning signs of the hazards; • Use of professionally trained security guards at construction sites. Temporary traffic control planning will be developed when the normal function of the Motorway is suspended for the continuity of the movement of vehicles and transit operations. The traffic control planning will have the objective to provide for safe and efficient movement of road users through and around temporary traffic control zones which protecting workers, responder to traffic incidents and equipment. The planning will include KGM standards such as "Road Construction and Maintenance Traffic Signage Use Standards". The Management System of the Project will contain an *Emergency Response Plan* (ERP) that considers the role of communities and community infrastructure as appropriate in responding to emergency events. Community health and safety information will be disclosed to the communities in line with the Stakeholder Engagement Plan (SEP). The stakeholder engagement activities will include the community meetings with the vulnerable and marginalized groups such as children and young persons	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			(including visits to schools) and local postings to inform the public regarding the relevant hazards for their particular locations. COK A.Ş. will develop and update a Community Health& Safety & Security Procedure , with commitments to implement the following key measures to protect the community from adverse effects during construction (noise, dust, other emissions risks with material and hazardous substances and accidents) and operation (traffic noise and air quality). The EPC construction contractor will have management procedures which will include these elements. In addition, the contractor will be obliged to monitor driver behaviour, especially for routes that are subject to frequent accidents, and implement corrective action to prevent recurrence. • Minimise pedestrian interactions with the construction vehicles by implementation components of the traffic management plan and community interaction through the SEP as well as collaborating with local communities on education concerningtraffic and pedestrian safety; • Improve local traffic signage by collaboration with the responsible local authorities and communities; • Implementation of appropriate temporary traffic control planning during repair and maintenance works on the Motorway and Bridge • Control and maintenance of embedded control obstacles against ingress into the Motorway • Coordinate with emergency responders to ensure that appropriate first aid is provided in the event of accidents; • Details of the nature of the emergency will be communicated and the EPR Plan will be published and made accessible for the local communities; • As part of the Community Health& Safety & Security Procedure COK A.Ş. will develop and implement a series of security measures, particularly for the Construction stage of the Project; these will include the installation of sufficient and adequate site boundary and access controls near settlements to prevent unauthorised entry to construction	

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			sites especially by children (e.g. fencing of construction section in the vicinity of settlements or communities). Sufficient passages (vehicle and pedestrian) crossing the highway to ensure that pedestrians or others do not enter the highway at unauthorized points.COKCOK	
2	**Disturbance and nuisance generated by dust and air emissions** Impacts on the health and safety of the community may arise during construction as a result of noise, vibration, dust and other emissions from earthmoving, blasting, piling, and operation of equipment and vehicles. Motorway construction will affect specific settlements along the route with air and noise emissions for a few weeks during the period of local activities and for some longer.	**Moderate** impacts at Lapseki, Sütlüce, Bolayır, Koruköy settlements	Impacts from air and noise emissions during the construction phase including piling driving for the bridge foundation can be effectively mitigated through good management practices and provision of well-established technical solutions. The *Environmental Management Plan* of the ESMP, the relevant IFC EHS Guidelines and EU Directives listed above will be followed. COK A.Ş. will develop a Community Health& Safety & Security Procedure, with commitments to implement the key measures to protect the community from adverse effects during construction (noise, dust, other emissions risks with material and hazardous substances and accidents) and operation (traffic noise and air quality).COK	**Minor**
3	**Injury from unsafe equipment use** Potential risks to the local communities could arise from the unsafe use of work equipment by workers and poor organisation of the construction sites, should they come in contact with the local population. Children and youths are amongst those vulnerable to the physical hazards associated with the construction activities, including fall from unguarded areas at height, especially in event of unauthorised entry.	**Major** in areas where the construction activities are close to settlements	Risks are to be minimised by reducing access to work areas, better access control such as fencing and sign posting, and construction site location selection, for example. The proposed mitigation plans are provided in the ESMP (Volume IV).	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
4	**Exposure to hazardous materials** Hazardous materials are likely to be used during construction, such as fuels, paints, and solvents, which may be used for specific purposes during construction of the major structures. If these materials are managed improperly there could be a risk to the local communities. 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); during operation and maintenance activities may include road resurfacing waste (e.g. removal of the old road surface material). If these materials are managed improperly there could be a risk to the local communities. Local communities can potentially be exposed to health and safety issues posed by service stations (or petrol stations) along the Motorway, including spills, fires and explosions.	**Major** in areas where the construction activities are close to settlements	Best practice measures to avoid and minimise risks from hazardous materials will need to be detailed in the *Control of Substance Hazardous to Health Procedure* and the ESMP (*Volume IV*). They will involve inter alia the following key principles: • Strict control of selection, storage, use and disposal of hazardous materials during construction in accordance with legal requirements regarding worker health and safety and environmental protection, and good industry practice. • Reducing inventories of hazardous material through inventory management to reduce or to eliminate the potential off-site consequences of a release. • Inclusion of buffer strips or other forms of physical separation around the project site to 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. • Immediate containment, clean up and disposal of spills of hazardous materials during construction and operation in accordance with the Environmental Management Plan. COK A.Ş. will ensure that adequate spill kits will be provided and staff trained in their use. • Transport of hazardous materials and wastes by licensed contractors only, and ensure all necessary authorisations are been held according to international requirements and correct procedures been followed. • Development and implementation of effective emergency prevention and response plans to minimise the occurrence of accidents and deal with their consequences if they occur – as already outlined in the COK A.Ş. EPR Policy. • Vehicles that transport hazardous and special loads will require a specific transport permission from the KGM to access the Motorway (similar measures are currently adopted at certain other Motorways in Turkey, e.g. for crossing of the Orhan Gazi Bridge in Izmit).	**Minor**
5	**Community exposure to disease and anti-social behaviour**	**Major** for communities	The construction workforce is planned to be recruited locally as much as possible and measures and actions in order to enhance local employment	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
	There is a potential that the social/recreational activities of construction workers might lead to anti-social behaviour (such as noise/rowdiness, drinking, brawls, socially inappropriate relationships/ prostitution etc) between each other and/or with local residents.	located close to construction camps	opportunities are described in a HR& Worker CMP and Employment Policy as a part of the Management System. The risks of antisocial incidences by Workers can be minimised through the provision of training with appropriate discipline measures in place, and to ensure that they are understood. Health awareness trainings amongst the workers, training of health workers in disease treatment, the provision of health services and performing immunisation programmes for workers will also be undertaken to minimise the risks of the spread of STDs and other communicable diseases in the local communities. The construction contractors will be required to provide orientation training to their workforces that underline the potential risks/impacts that exist with respect to the relations with the local communities, and the appropriate preventive measures.	
6	**Conflicts with security personnel** Security personnel will be hired by COK A.S. mainly during construction to prevent unauthorized access to the construction sites, and especially the bridges and viaducts. The risk of security personnel is that if they are not appropriately trained, 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	**Major** for communities located close to construction sites	COK A.Ş. will establish a Control of Substance Hazardous to Health Procedure to set out the security measures, particularly for the Construction Stage of the Project. In compliance with relevant Turkish legislation on this subject (e.g. Law No. 5188 on Private Security Services) and best practices, the Project Sponsors will undertake background review and assessment for candidates, are adequately trained in the use of force, will apply the correct conduct towards workers and members of the public and will act within all applicable laws. Violation of the required standards will result in corrective actions, including termination of sub-contracts with security firms. Sufficient training including clear instructions on the objectives and the permissible actions will be provided to the security personnel. The instructions will be based on the relevant Turkish law and will be communicated as terms of employment and reinforced through periodic professional training. Given regular contact with the local populations, training on Grievance Procedures, such as handling of community grievance will also be provided to the security staff as part of their periodic professional training.	**Minor**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			Complaints by the public (or other workers) with respect to behaviour of Security Personnel can be made via the Grievance Procedures for public and workers (see ESMS).	

Table 7-31 Significant Operation Community Health and Safety Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation/Enhancement Measures	Residual Impact
1	**Traffic safety** Due to the anticipated higher average vehicle speed on the Motorway (as compared to state roads), there is a potential that there may be more frequent high-speed accidents and correspondingly more severe injury implications; on the other hand, the risk of frontal collisions is greatly reduced for the Motorway as compared to the state roads. These roads include the European Roads E87 and E90. The E87 known as the Çanakkale-Izmir road whose section from Malkara through Gelibolu will be positively impacted by reducing the overall traffic load along these roadways. The E90 section running parallel to the East of the Dardanelles Straits will also be positively impacted.	**Positive** impacts on traffic safety	None proposed	The impact will remain **positive**
2	**Easier and faster response to emergencies** The Motorway will allow enhanced transport connections and may make it easier and faster to respond to emergencies/natural disasters affecting local villages, for example to evacuate local areas and/or to bring in	**Positive** impacts on traffic safety	None proposed	The impact will remain **positive**

No.	Impact Description	Impact Assessment	Mitigation/Enhancement Measures	Residual Impact
	emergency assistance personnel and materials from other cities. A further, regional aspect of Motorway operations is that it will facilitate growth in regional employment and commercial activity as a result of improved transport connections, which may also lead to improvement in public health and welfare.			
3	**Disturbance and nuisance generated by noise** During operation, the Motorway will introduce a new traffic corridor and affect flows of traffic on other roads in the wider region. This will have an influence on the existing noise emissions in the region. As mentioned in the Annex III Chapter.2.6. Noise and Vibration, of the fifty-two receptors identified in the initial scoping model, twenty-one are predicted to experience significant impacts (moderate or major) without mitigation, although in many cases the impacts are expected to be limited to a small number of properties on the perimeter of settlements (i.e. the closest properties) where buildings are not screened from noise from the new Motorway.	**Major** at the residential property in north of Koruköy (receptors R26-R31, R33) **Moderate** at Commercial/Administrative building (receptor R34), Commercial/Industrial Unit /Factory (receptor R35) **Moderate** at residential property in north of Koruköy (receptor R32) **Moderate** at residential property in north of Sütlüce (receptors R1-R7) - Section III: Gelibolu North to Gelibolu South **Moderate** at isolated residential property inside Güneyli junction (receptors R42, R43) - Section III: Gelibolu North to Gelibolu South	• providing low noise road surfacing the in the form of SMA (Stone Mastic Asphalt which is also referred to as Stone Matrix Asphalt); • maintenance of the road surface in good condition; • the provisions of the 'Regulation on Assessment and Management of Environmental Noise' will be followed; • advantage will be taken of the natural topography for noise shielding • routing the Motorway away from sensitive areas; • speed reductions; • landscape screening, either by lowering the Motorway or adding landscape bunds; • noise barriers adjacent to the Motorway;	At this stage it can be estimated that the noise level can be reduced between 0 to 21 dB(A) by implementation of various mitigation measures. However, the exact measures or a combination of measures to be applied especially for those areas where the impact is predicted as high cannot be currently established, due to the following factors: • insufficient information is available on the places where barriers could be installed and what their height could be; • the potential to re-align the junctions and motorway alignment will only be

No.	Impact Description	Impact Assessment	Mitigation/Enhancement Measures	Residual Impact
		Moderate at commercial area (receptor R13) – Section V: South of Bridge	• improving the housing isolation (e.g. sound proofing of windows and walls).	determined as design evolves; • the feasibility of imposing speed limits on sections of the main road and junctions (and what lowest speed could be tolerated) has not been investigated. These three unknowns make it impossible to estimate the benefits of these important potential measures at this stage of the project. This refinement of the mitigation will be investigated at a later stage when detailed design is available.
4	**Injury from unsafe equipment use** Potential risks to the local communities could arise from the unsafe use of work equipment by workers and poor organisation of the maintenance activities, should they come in contact with the local population.	**Major**	Risks are to be minimised by reducing access to work areas, better access control such as fencing and sign posting. The proposed mitigation plans are provided in the ESMP (Volume IV) which includes Control of Substance Hazardous to Health Procedure	**Minor**

7.14 ARCHAEOLOGY AND BUILT HERITAGE

7.14.1 Introduction

The full assessment of the impacts on archaeology and built heritage is presented in *Appendix 3.5* of *Volume III* of this ESIA Report. The Appendix, together with *Annexes III.4* (Marine cultural heritage baseline report) and *III.5* (Terrestrial cultural heritage baseline report), present a detailed description of the cultural heritage assets along the route, significant impacts and mitigation measures. The sections below summarise the findings of this assessment.

The greater part of the terrestrial works for identifying the archaeological and immovable cultural heritage assets were within the 400 m corridor spanning the highway route (200 m each side of the road).

For the marine survey, a wider area of the Dardanelles was considered.

7.14.2 Summary of Baseline Findings and Sensitive Receptors

The baseline study has identified a total of 46 Cultural Heritage assets along the route of the scheme, , 45 of which are located within the province of Çanakkale and one in the province of Tekirdağ. Thirteen are either registered (or in the process of being registered) sites, protected under Turkish Law, while the remaining 33 have been identified through field studies.

All of the registered assets are located within the province of Çanakkale. Among these, four are within the district of Lapseki and nine are within in the district of Gelibolu. All of the registered assets were visited during the field survey.

No marine Cultural Heritage assets were identified by the study.

Registered Assets within the Project Expropriation Borders

Nine are located within the project expropriation borders, with the remaining four close to the scheme. Four have been dated to the Bronze Age and to the Late Roman or Early Byzantine Period based on pottery observed across the sites.

Three registered assets have been dated to the Late Roman / Early Byzantine Period, based on pottery observed across the sites.

One registered site is a star-shaped fort built by the British Army to a French design in 1854, as part of the Crimean War campaign.

One asset is defined as a flat settlement of unknown date. *Haznedar Mevkii* is in the process of registration.

Registered Assets outside the Project Expropriation Borders

There are four registered assets within the 400-meter baseline corridor but outside the expropriation borders. One registered asset is a tumulus dating to the Roman Period. Three registered assets have been dated to the Late Roman / Early Byzantine Period, based on pottery observed across the sites.

Sites Identified by Field Survey

Thirty-three Cultural Heritage assets were identified during the field surveys. Of these, eight have been identified as archaeological sites and 25 as Historic sites. Thirty-two assets are located within the province of Çanakkale, with one in the province of Tekirdağ.

Sensitivity of Identified Cultural Heritage Assets

In total 13 of the assets were categorised as *'High'* Critical Cultural Heritage. These are *Gelibolu Alan 2*; *Gelibolu Alan 1*; *Gelibolu Alan 3; Tescilli Alan 4*; *Lapseki Alan 3*; *Lapseki Alan 1*; *Gelibolu Alan 5*; *Yıldız Tabya*; *Haznedar Mevkii*; *Kekliktepe Tümülüsü*; *Tescilli Alan 1*; *Tescilli Alan 2* and *Tescilli Alan 3.*

The remaining 33 identified Cultural Heritage assets were categorised as *'Medium'* Non-Replicable Cultural Heritage. These are *Menekşe Ağıl Tepesi; Keklikbayır; Hacıdönmenin Sırtı*; *Tütünlük Mevkii*; *Karayarık Sırtı*; *Domuz Deresi Mevkii; Şahinoğlu; Kocadere; Korugan 8*; *Korugan 21; Korugan 1*; *Korugan 2*; *Korugan 3*; *Korugan 4*; *Korugan 5*; *Korugan 6*; *Korugan 7*; *Korugan 9*; *Korugan 14*; *Korugan 10*; *Korugan 11*; *Korugan 12*; *Korugan 13*; *Şahinoğlu Tabya*; *Korugan 15*; *Korugan 16* (147+575 km); *Korugan 17*; *Korugan 18*; *Korugan 19*; *Korugan 20*; *Korugan 22*; *Korugan 23; Şahinoğlu Redoubt* and *Münipbey Deresi Köprüsü*

7.14.3 Summary of Significant Impacts

Significant impacts are summarised for the construction in *Table 7-32* and for operation in *Table 7-33.* For the assessment of impacts of minor or negligible significance see *Appendix 3.5* of *Volume III.*

Table 7-32 Significant Construction Archaeology and Built Heritage Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	Complete or partial removal of cultural heritage assets	**Major** impact on 14 sites: *Tütünlük Mevkii;Karayarık Sırtı; Lapseki Alan 3; Lapseki Alan 1; Gelibolu Alan 2; Gelibolu Alan 1; Korugan 8; Domuz Deresi Mevkii; Gelibolu Alan 3; Şahinoğlu; Keklikbayır; Haznedar Mevkii; Tescilli Alan 4 and Gelibolu Alan 5*	Under the Republic of Turkey Ministry of Culture and Tourism Law No: 2863, official decisions of the Directorate of the relevant Regional Boards for Conservation of Cultural Heritage Assets in relation to mitigation advice must be followed by COK A.S.. Under Turkish Law, all mitigation measures will be decided on by the relevant Regional Boards for Conservation of Cultural Heritage Assets for both registered and non-registered Cultural Heritage assets identified in this study. A number of decisions have already been made to date. No physical intervention is allowed on the identified Cultural Heritage assets prior to a decision taken by the relevant Board. For assets where a Major impact is predicted, *Avoidance (route change)* is recommended. If this is not possible, then *Avoidance (design change)* or *Preservation by Record* should be undertaken. For assets where a Moderate impact is predicted, *Avoidance (design change)* is recommended. If this is not possible, then *Preservation by Record* should be undertaken. The following mitigation measures are also recommended to be undertaken prior starting the construction phase of the motorway: • *Further Baseline Studies*: Further studies (such as remote sensing and historical research) will be undertaken to enhance the existing baseline data and to eliminate gaps. This will ensure that significant sites are identified and will allow them to be avoided or have further site specific mitigation to be proposed. Permission will be sought to survey previously inaccessible land, and any further field walking survey will be undertaken using a minimum transect spacing of 20m. These new baseline studies will be undertaken as soon aspossible so as to allow suffficient time for any archaeological excavation to be undertaken in all areas where excavation is identified as being possible or required, prior to construction;	**Major**
2	Removal of a significant part of the asset and significant change of the setting	Moderate impact on five sites *Hacıdönmenin Sırtı; Yıldız Tabyası; Korugan 21; Kocadere and Menekşe Ağıl Tepesi*		**Moderate**

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
			Additional marine heritage assessment will be undertaken in order to confirm that no marine CH items are located in the project area. In the first instance this will take the form of a specialist archaeological review of geophysical data of areas of the seabed where dredging/direct physical impacts are anticipated. Should this indicate the potential presence of archaeological remains, a diving or ROV survey may be necessary. In addition, for ensuring a good control of the works activities for avoiding affecting cultural heritage items or sites, we recommend the following actions: • *Chance Finds Procedure under the Cultural Heritage Management Plan:* A template for the Chance find procedure in presented in the Annex A of the current report. However, it is recommended that COK and its EPC contractor to revise it for being fit for the Project. A clear and detailed Chance Finds Procedure should be developed in conjunction with the relevant authorities and implemented for the project. It will detail the roles and responsibilities of individuals responsible for dealing with unexpected discoveries during construction of the scheme, including clear reporting structures and example scenarios. This will allow implementation of appropriate responses in the event of such discoveries, to the benefit of the Cultural Heritage. • *Cultural Heritage Management Plan*: A clear and detailed Management Plan should be developed in conjunction with the relevant authorities and implemented for the project. This will detail how the project manages and mitigates the Cultural Heritage as the scheme progresses, detailing a clear agreed framework for mitigation implementation. The plan will detail the roles and responsibilities of individuals responsible for dealing with known sites and unexpected discoveries during and after construction of the scheme, including clear reporting structures and example scenarios.	

Table 7-33 Significant Operation Archaeology and Built Heritage Impacts and Mitigation

No.	Impact Description	Impact Assessment	Mitigation /Enhancement Measures	Residual Impact
1	**Promotion of cultural heritage assets as "Points of interest"** Cultural heritage identified and preserved during construction phase activities could be promoted as "Points of Interest" during operation phase with users could be encouraged to visit these sites during their journey.	**Positive**	A catalogue of archaeological assets discovered during the project and delivered to the museums will be prepared, promoted and published as part of a corporate social responsibility activity.	The impact will remain **positive**

7.15 ECOSYSTEM SERVICES

7.15.1 Introduction

The full assessment of the impacts on ecosystem services is presented in *Appendix 2.4* of *Volume III* of this ESIA Report. The Appendix presents how the Project may change the services which ecosystems provide to people (including many resources that underpin basic human health and survival needs), support economic activities and provide cultural fulfilment.

The information within this Section report draws on other Appendices, such as:

- Biodiversity Appendix, of which this section is part;
- Socio-economic Appendix
- Cultural Heritage Appendix;
- Physical environment Appendix; and
- Land use and Livelihoods Appendix.

The sections below summarise the findings of this assessment.

7.15.2 Summary of Baseline Findings

In general land use capability analyses showed that 85% of the area is used for different types of agricultural activities and 15% of the area has artificial surfaces (or settlements and structures), forests, natural and semi natural areas and water bodies. Existing land use and soil types in the area can be summarized as follows:

- Settlement areas, sea and rivers cover approximately %0.5 of the study corridor;
- Dry Farmland (non-fallow) covers more than half of the entire study corridor (approximately 70%);
- The remainder of the study corridor (29.5 %) is covered by irrigational farmland, orchard, pasture and forestry.

The foot-print of the corridor mainly affects the farmlands (approximately 70 % for dry farmlands and 4.5 % irrigated farmlands). Then it affects semi-natural areas (approximately 9.5 %) and forestry (approximately 7.10 %).

In general coincidence with the land use, the sources of income in these communities are mainly agriculture and animal husbandry. Pensions rank as third income source. Tourism is also important, but focused in two areas, Lapseki and Gelibolu. There are also are plenty of historic attractions for tourists related with the World War I Battle of Canakkale. On the other hand there are only four communities having economic income from fishing, as this

latter is severely restricted in the Dardanelles Strait. However fishing is important in both sides of the Strait, Marmara and Mediterranean.

Beekeeping is not a key livelihood activity at the local level, however seems to be more important at regional level. Beekeepers would only be affected if the sunflower fields where these temporary beekeepers place hives are affected by the project during pollination periods. The size of the sunflower cultivated areas available is much larger than the potentially affected locations.

The wild species gathering is a complement to the local diet, and people do not depend on it as a main source of food or income. Forest areas are less extensive, when compared to sunflower fields.

Ground water resources are being used for drinking and/or domestic purposes. There are seventeen licensed groundwater wells near the Motorway-Bridge Project. The closest distance of these water wells vary between 250 m to 1 km from the project area. Other wells are spread in Gelibolu and Lapseki, between 1 km to 7 km from the alignment. It should be noted that besides these licensed groundwater wells, it is expected that there are other unlicensed, unofficial community and communal sources and groundwater wells used for irrigation and drinking water.

Water supply and quality were raised as issues during stakeholder engagement, with stakeholders noting that there is a general perception among the residents that piped water contains heavy metals and has adverse effects on human health.

Stakeholders further noted that there is a level of tension between communities and summer vacationist with regard to utilities during tourist season. This could be exacerbated by water demands from worker camps and construction requirements.

Flowing and stationary water resources provides water to animals. Also these resources (mostly dams) are used for irrigation of agricultural fields (fruit and vegetable orchards)

The Project is located within an area of varied biodiversity values, with locally high biodiversity components within a generally moderate biodiversity value. Whereas in general the project affects common habitats in the region, there are rare Turkey wide ecosystems (such as riparian forests with particular species) Also the Çanakkale KBA/IBA is the prime migratory pathway for the Yelkowan Shearwater.

7.15.3 Summary of Significant Impacts

A total of 25 ecosystem services have been identified as being potentially affected by the Project in the Project AoI. Provisioning ecosystem services that

have been scoped out of the assessment are those which are not significant in the Project AoI.

Climate regulation has been scoped out as the it is largely unaffected by the Project on a significant scale, and is proxied through other services (forestry, biodiversity, water cycling, etc) Additionally, the type and extent of vegetated areas within the Project footprint will not provide a significant climate regulating service at the global or local level. Fire does occasionally occur in some habitats but is a natural component of that Mediterranean climate ecosystem.

It is noted that all five supporting services defined by the Millennium Ecosystem Assessment (pollination, nutrient cycling, water cycling, soil formation, habitat provision) are present in the Project AoI. However, since supporting services are not directly used but rather support other ecosystem services, these services have not been directly assessed, with the exception of the habitat provision service. Instead they are addressed elsewhere in the assessment of the provisioning, regulating and cultural services that they support. For example, changes to primary production are addressed in the effects on food resources and non-use services of biodiversity.

Significant impacts are summarised for the construction and operation in *Table 7-32*. For the assessment of impacts of minor or negligible significance see *Appendix 2.4* of *Volume III*.

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	Food provisioning: wild plants, nuts, mushrooms, fruit, honey	**Moderate**	• The implementation of the mitigation measures described under Displacement of Existing Land, Use, Property and People are applicable and would reduce the impacts on forested areas, thereby, largely preserving areas where wild plants and mushrooms are gathers. • Windbreaks and noise embankments shall be placed around locations where bees may be affected from construction and operation activities. Given that the beekeepers place bee hives in different locations, it is not feasible to describe the areas where this mitigation will be required. Further detail pertaining to this mitigation measure will be developed in the Construction and Operation EMPs. • It is anticipated that the impact of the project on food provisioning services will have a significant impact on the incomes or livelihood strategies of the local communities provided the suggested mitigation measures are implemented.	**Minor**
2	Freshwater	**Moderate**	In addition to the mitigation measures in the Terrestrial Water Environment Appendix, the following should be developed: • Construction water management plan (particularly for worker camps) must be developed with an estimate of water requirements, identification of sources and measures for water saving/ sustainable water use (especially in summer). • The SEP should be updated to include local water providers as stakeholders, and ensure that the topic of water is discussed at future engagement meetings. •	**Minor**
3	Terrestrial Biodiversity Importance	**Minor/Moderate** depending on successful implementation of the habitat	The mitigation measures related to terrestrial biodiversity are applicable here and are described in detail in the Terrestrial Biodiversity Section of the Biodiversity Appendix. Dependent on successful implementation of the habitat restoration/compensation measures, no additional mitigation is required.	**Minor/Moderate** if No Net Loss requirements can be achieved as required by

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
		restoration/compensation measures		the Performance Standard 6.

5 *Significant Operation Ecosystem Services Impacts and Mitigation*

No.	Impact Description	Impact Assessment	Mitigation Measures	Residual Impact
1	Food provisioning: wild plants, nuts, mushrooms, fruit, honey	**Moderate**	• The implementation of the mitigation measures described under Displacement of Existing Land, Use, Property and People are applicable and would reduce the impacts on forested areas, thereby, largely preserving areas where wild plants and mushrooms are gathers. • Windbreaks and noise embankments shall be placed around locations where bees may be affected from construction and operation activities. Given that the beekeepers place bee hives in different locations, it is not feasible to describe the areas where this mitigation will be required. Further detail pertaining to this mitigation measure will be developed in the Construction and Operation EMPs. • It is anticipated that the impact of the project on food provisioning services will have a significant impact on the incomes or livelihood strategies of the local communities provided the suggested mitigation measures are implemented.	**Minor**
3	Terrestrial Biodiversity Importance	**Minor/Moderate** depending on successful implementation of the habitat restoration/compensation measures	The mitigation measures related to terrestrial biodiversity are applicable here and are described in detail in the Terrestrial Biodiversity Section of the Biodiversity Appendix. Dependent on successful implementation of the habitat restoration/compensation measures, no additional mitigation is required.	**Minor/Moderate** if No Net Loss requirements can be achieved as required by the Performance Standard 6.

8 CUMULATIVE IMPACTS

8.1 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

The international lender requirements of 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 (i) other existing projects or conditions gathered from baseline surveys, review of available published information and stakeholder engagement activities, and (ii) 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 (1).

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.

8.1.1 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 (ie 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.

(1) 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.

8.1.2 Assessment Methodology

The evaluation of potential cumulative impacts is highly dependent on the particular locations/activities under review, and therefore each situation will be assessed qualitatively on a case-by-case basis.

As above, the approach to the CIA has been 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 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. In line 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 this private sector sponsor.

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 five-step 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* [(1)].

The outcomes of these steps are carried out in the following sections. 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.

8.1.3 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

(1) 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.

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.

8.2 STEP 1 – DEFINING SPATIAL AND TEMPORAL BOUNDARIES

8.2.1 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 100m to 1000m (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 more narrow focus is then made as appropriate for the relevant assessment topics.

8.2.2 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.

8.3 STEP 2 – IDENTIFICATION OF VECS AND SCREENING OF OTHER PROJECTS IN 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 was 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 (including forest areas);
- Soil, groundwater and freshwater;
- Marine sediment and marine water quality;
- Marine habitats and fauna – marine mammals, sea grass;
- Local communities – property owners and residentis 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 8-1 Key VECs

Aspect	Impact	Impact Description	Residual Impact after Mitigation	VEC Identified
Resources and Waste Impacts	Risk of destruction of habitats and vegetation during earthworks and resource extraction	Major impact on forest areas and locations of the new quarries that will be built	Major	Sensitive habitats (including forest areas)
Resources and Waste Impacts	Disposal of excavated waste soil	Major impact on environment where the spoil is disposed	Moderate	Soil, groundwater and freshwater
Resources and Waste Impacts	Hazardous waste generation during construction activities	Major impact, generated hazardous waste has potential to contaminate the environment	Moderate	Soil, groundwater and freshwater
Resources and Waste Impacts	Hazardous waste generation during operations	Major impact may arise maintenance and clean-up activities of accidental spills during operation.	Moderate	Soil, groundwater and freshwater
Marine Water Environment	Impacts from Sipping Related Accidents and Accidental Spillages	Significance of impacts related to accidents cannot be assessed at this point	Residual impacts will be assessed following the navigational risk assessment results.	Marine sediment and marine water quality
Biodiversity And Conservation	Shipping-related accidents and accidental spillages	Given that the risk assessment has not been completed, the magnitude of these risks cannot be provided in the impact assessment.	Residual impacts will be assessed following the navigational risk assessment results.	Marine sediment and marine water quality
Noise and vibrations / Community H&S	Disturbance and nuisance due to noise from Road Traffic on the Motorway	Moderate to major	At this stage it can be estimated that the noise level can be reduced between 0 to 21 dB(A) by implementation of various mitigation measures. To be confirmed by further monitoring	Local communities
Landscape and Visual	Change of landscape due to changes in land use during construction activities	Major impact on Segment 4: Dardanelles	TBD (impacts can range from Major to Positive, depending on location and viewer perception)	Local viewsheds
Landscape and Visual	Visibility of new structures	Major impact on Segment 3: Fruit Gardens and Farmlands in parallel with Existing Bursa-Canakkale Road; Segment 4: Dardanelles; and Segment 5: Rolling Farmlands of Gelibolu.	TBD (impacts can range from Major to Positive, depending on location and viewer perception)	Local viewsheds
Land Use and Property	Effects on livelihood from livestock activities	Major impact on Livelihood and Economic Displacement	Moderate	Local livelihoods

Aspect	Impact	Impact Description	Residual Impact after Mitigation	VEC Identified
Land Use and Property	Loss of agricultural lands suitable for soil cultivation	Major impact on land use structure	Major	Local livelihoods
Land Use and Property	Loss of pasturelands available for public use	Major impact on land use structure	Moderate	Local livelihoods
Archaeology and Built Heritage	Complete or partial removal of cultural heritage assets	Major impact on 14 sites: Tütünlük Mevkii;Karayarık Sırtı; Lapseki Alan 3; Lapseki Alan 1; Gelibolu Alan 2; Gelibolu Alan 1; Korugan 8; Domuz Deresi Mevkii; Gelibolu Alan 3; Şahinoğlu; Keklikbayır; Haznedar Mevkii; Tescilli Alan 4 and Gelibolu Alan 5	Major	Cultural heritage
Archaeology and Built Heritage	Removal of a significant part of the asset and significant change of the setting	Moderate impact on five sites Hacıdönmenin Sırtı; Yıldız Tabyası; Korugan 21; Kocadere and Menekşe Ağıl Tepesi	Moderate	Cultural heritage

8.3.1 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 wider region of both Tekirdag and Canakkale Provinces. This list (see Table) includes a total of about 30 motorway projects, power plants, mines/ quarries and other 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 Canakkale 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 8-2 Other Projects and Developments - Screening Step 3

Characteristics of Other Projects					Screening Considerations				Result
No	**Name**	**Proximity to Project**	**Construction Period (start)**	**Operation Period (start)**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Comments**	**Screened in?**
Power Plants									
1	Şarköy Natural Gas Combined Cycle Plant	15 km east	Not known (not yet started)	Not known	Unclear if any	Slight	Possibly during Operations	There are several law suits reported on project; future development uncertain – too speculative for the CIA	No
2	Ağan Thermal Power Plant (2x790.1 MWe)	56 km east	Not known (not yet started)	Not known	None expected	No, too far away	Possibly during Operations	Overall too far away to be relevant for the CIA	No
3	Kirazlıdere Thermal Power Plant	27 km east	Not known (not yet started)	Not known	The water quality within the Dardanelles is a common VEC (concern is mainly thermal emissions from plant)	No, too far away	Possibly during Operations	No expected relevant common impacts	No
4	Cenal Thermal Power Plant	40 km east	2015	Construction is ongoing	The water quality within the Dardanelles is a common VEC (concern is mainly thermal emissions from plant)	No, too far away	Construction and Operations	No expected relevant common impacts	No
5	Ezine Natural Gas Combined Cycle Plant (600 MW)	60 km south	Not known (not yet started)	Not known	None expected	No, too far away	Possibly Construction and Operations	Overall too far away to be relevant for the CIA	No
6	Gürpınar Natural Gas Combined Cycle Plant	75 km east	Not known (not yet started)	Not known	None expected	No, too far away	Possibly Construction and Operations	Overall too far away to be relevant for the CIA	No
7	Karaburun Thermal Power Plant (1320 MW)	40 km east	Not known (not yet started)	Not known	None expected	No, too far away	Unlikely for Construction possibly Operations	Strong public dispute on Project; future development uncertain – too speculative for the CIA	No

Characteristics of Other Projects					Screening Considerations				Result
No	**Name**	**Proximity to Project**	**Construction Period (start)**	**Operation Period (start)**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Comments**	**Screened in?**
8	Çırpılar coal power plant	60km south	Not known	Not known	None expected	No, too far away	Possibly during Operations	Overall too far away to be relevant for the CIA	No
9	Odaş Çan 1 Thermal Power Plant	35 km southeast	Operational	Operational	None expected	No, too far away	Operations	Any plant emissions/impacts to AoI would be reflected in the ESIA Baseline conditions	No
10	Odaş Çan 2 Thermal Power Plant	35 km southeast	2016 start	2018/2019	None expected	No, too far away	Construction and Operations	Overall too far away to be relevant for the CIA	No
Mines&Quarries									
11	Orta Truva Mining Ind.Trade.Co Quartz Mine (License No: 200810227)	15 km east	Not known	Not known	None expected	Slight	Unknown	There are several law suits on project.	No
12	Limestone Quarry (License No: 200901721)	90 km north	2015	From 2015 onwards	None affected	No, too far away	Operations	Overall too far away to be relevant for the CIA	No
13	Biga Maden Ind. Trade. Ltd.Co Limestone Quarry (License No: 66796)	50 km South	Not known	Not known	None affected	No, too far away	Unknown	There is public dispute on project. In addition to that, its capacity is rather small.	No
14	Limestone Quarry (License No: 200703731, 200703733, 200703733 and 200703734)	15 km east	Not known	Not known	Air emissions, natural habitats and species	Slight	Possibly during Operations	Insufficient information; given all the unknowns, inclusion would be highly speculative	No
15	Ayhanlar Ind. Trade. Co. Basalt Mine (License no: 20059203 and 20059211)	50 km north	Not started	Not started	None expected	No, too far away	Unknown	There are several law suits on Project. Overall too far away to be relevant for the CIA	No

Characteristics of Other Projects					Screening Considerations				Result
No	**Name**	**Proximity to Project**	**Construction Period (start)**	**Operation Period (start)**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Comments**	**Screened in?**
16	Biga Maden Ind. Trade. Ltd.Co Limestone Quarry (License No: 47936)	50 km south	Currently operational	Currently operational	Natural habitat (forests)	No, too far away	Operations	Overall too far away to be relevant for the CIA. Different forest areas will be affected.	No
17	Koza Gold and Silver Mine (201001197)	20 km south	Not known	Not known	None expected	No, too far away	Unknown	There is long-standing legal dispute on the Project; future development uncertain – too speculative for the CIA	No
18	Mustafa Kansu Stone Pit	46 km southwest	2009	2009	Natural habitat (forests)	No, too far away	Operations	Overall too far away to be relevant for the CIA. Different forest areas will be affected.	No
19	Sağlamtaş Mining Co. Basalt Mine (License No: 200811209)	9 km north	2009	2009	Local communities in relation to traffic risks and community health & safey as well as local infrastucture integrity	Slight	Operations	Potential for spatial and temporal overlaps. Incude in CIA to further evaluate	Yes
20	Baztaş Mining Co. Basalt Mine (License No: 72340)	50 km Northeast	2009	2009	None affected	No, too far away	Operations	Overall too far away to be relevant for the CIA	No
Other Motorways and Airport									
21	Northern Anotolia Motorway	100 km Northeast	2016	2020	Projects have similar local impacts, but no spatial or temporal overlap of these VECs. Both projects are region's big motorway Projects and part of same overall masterplan	No	Construction and Operations	Overall too far away (no spatial overlap) to be directly relevant for the CIA.	No

Characteristics of Other Projects					Screening Considerations				Result
No	**Name**	**Proximity to Project**	**Construction Period (start)**	**Operation Period (start)**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Comments**	**Screened in?**
22	Kinali-Malkara Section of Kinali- Savastepe Motorway Project	Adjoining Project to the north at Malkara Junction	Unknown	Long-term, same as Project	Many common issues due to adjacent proximity, eg Terrestial flora/ fauna, habitats, watershed, landowners	Yes, Adjoining to Project at Malkara	Unlikely (but possible) for Construction Operations	Part of same overall project, so reasonable to be in scope of CIA	Yes
23	Canakkale-Savastepe Section of Kinali-Savastepe Motorway Project	Adjoining the Project to the south at Canakkale Junction	Unknown	Long-term, same as Project	Many common issues due to adjacent proximity, eg Terrestial flora/ fauna, watershed, landowners	Yes, Adjoining to Project at Canakkale	Unlikely (but possible) for Construction Operations	Part of same overall project, so reasonable to be in scope of CIA	Yes
24	İstanbul Third Airport	150 km Northeast	2014	2020	Too far away for common direct receptors.	No, too far away	Construction and Operations	Overall too far away to be relevant for the CIA	No
Oil and Gas Infrastructure									
25	TANAP Trans Anatolian Natural Gas Pipeline Project	Projects intersect at KM 139+250	Started 2015 (no ongoing at Project area)	Starts 2019	Terrestial flora/ fauna, habitats, watershed, landowners	Yes	Construction (possibly) and Operations	Highly relevant for the CIA	Yes
26	Onshore gas in Thrace Region (Malkara Block 4094)	Appears to overlap near Malkara	Not known	Not known	If currently active, then eg Terrestial flora/ fauna, watershed, landowners	Yes	Unknown now, in future probably	Although many issues unknown, the overlapping geography warrants inclusion in the CIA	Yes
Other Projects									
27	İçdaş Steel Factory and Shipyard	42 km east	1970	Operational	Marine traffic considerations within the Dardanelles is a VEC.	No, too far away	Operations	Overall too far away to be relevant (i.e. outside of defined spatial boundaries) for the CIA	No
28	2 – Sütlüce 2 Submarine Cable	2 km west	2016	2016	None expected	Yes?	Operations	Project already operational; any impacts would be reflected in the ESIA Baseline conditions.	No

Characteristics of Other Projects					Screening Considerations				Result
No	**Name**	**Proximity to Project**	**Construction Period (start)**	**Operation Period (start)**	**Common VEC?**	**Spatial Overlap?**	**Temporal Overlap?**	**Comments**	**Screened in?**
29	Çanakkale-Lapseki Recreational Marina	5 km east	Not known (possibly 2019)	Starting ca 2020 (?), will be long-term	Marine traffic considerations within the Dardanelles is a VEC.	No	Construction (possibly) Operations	Close proximity to the Project (i.e. within the spatial boundary and possible overlap in construction schedules) warrants consideration in CIA.	Yes

8.3.2 Results of Screening

A review of the information in the Screening Table shows that many projects were screened out mainly due to the relatively large distance to the Project, eg. 30 km or more, which is well-beyond the spatial boundaries of the VECs identified. Other projects are screened out because the 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.

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:

Mines & Quarries

- **[#19 from list] Sağlamtaş Mining Co**. Basalt Mine, 9 km north;

Other Motorways

- **[#22] Kinali-Malkara Section** of Kinali- Savastepe Motorway Project; Adjoining Project to the north at Malkara Junction
- **[#23] Canakkale-Savastepe Section** of Kinali-Savastepe Motorway Project; Adjoining the Project to the south at Canakkale Junction

(These above two projects are the other two segments of the Malkara-Canakkale (and 1915 Bridge) Project, together constituting the entire Kinali-Savastepe Motorway project. These two projects are addressed together in the following Step).

Gas and Mining

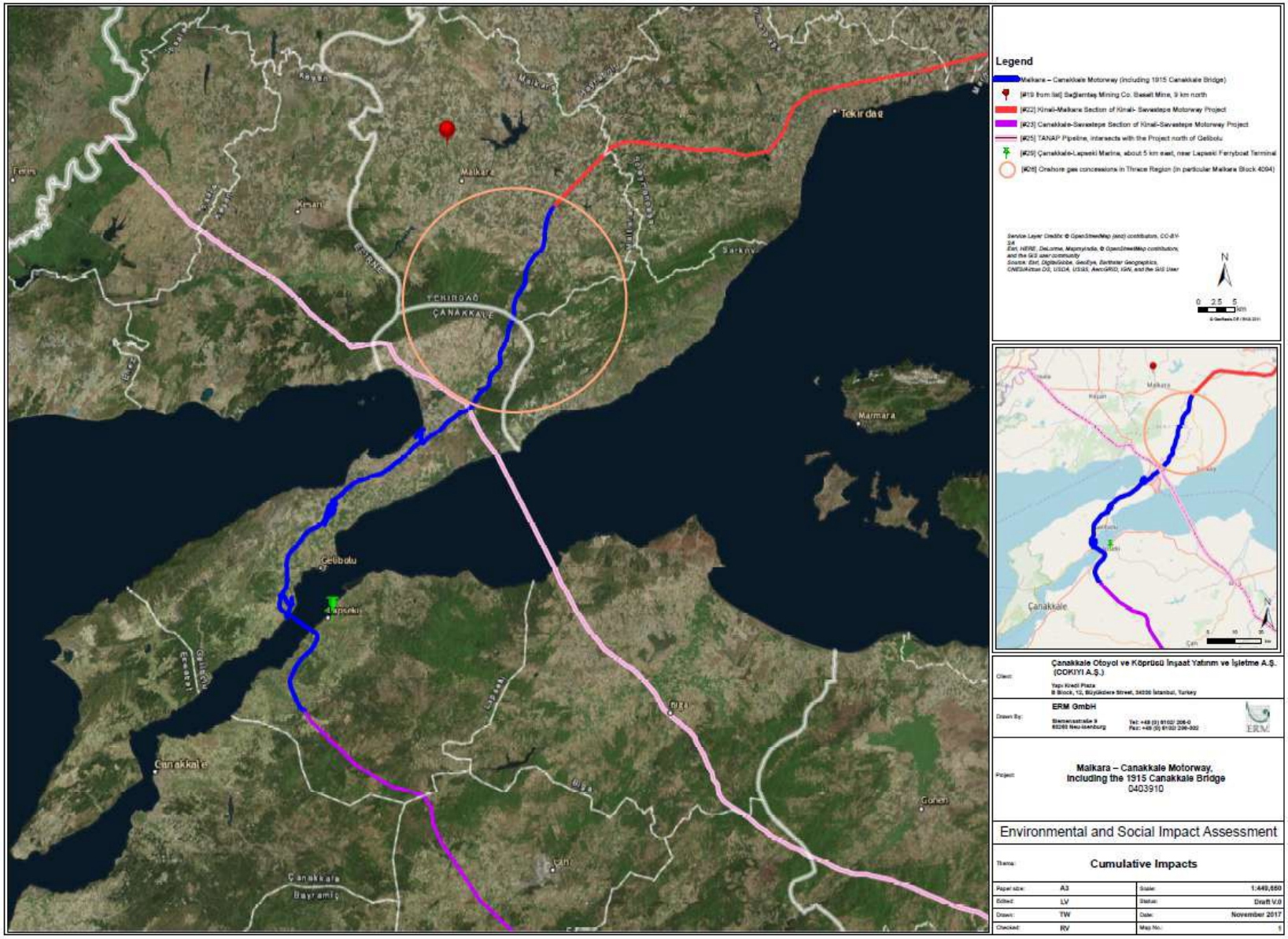
- **[#25] TANAP Pipeline**, intersects with the Project north of Gelibolu at KM 139+250 near Kavakköy village
- **[#26] Onshore gas concessions** in Thrace Region (in particular Malkara Block 4094), overlaps with Project.

Other - Local Marina

[#29] Çanakkale-Lapseki Marina, about 5 km east, near Lapseki Ferryboat Terminal.

The locations of the above items are shown in *Figure 8-1*.

Figure 8-1 Locations of Relevant Projects for the Cumulative Assessment



8.4 STEP 3 – DETERMINE PRESENT CONDITIONS OF THE VECS

The present conditions of the VECs identified are described in the respective baseline sections of the ESIA report contained in Volume III. Please refer to the relevant sections for these descriptions.

The current understanding of baseline conditions has been used to identify and assess the potential cumulative impacts presented in Section 8.5 below.

8.5 STEP 4 & 5 & 6 – ASSESSMENT OF CUMULATIVE IMPACTS AND IDENTIFICATION OF MITIGATION MEASURES

8.5.1 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.

8.5.2 *Mining & Quarries*

[#19] Project Name: Sağlamtaş Mining Co. Basalt Mine			
Brief Description: This mine (operating reportedly since 2009, under License No: 200811209) is located about 9 km north/northwest of the Project area near the Karaiğdemir Dam. This facility was screened in for the CIA on the basis of its proximity to the Project area and the potential for common use of small roads through the same villages, thus cause impacts to local residents and community health and safety. Any environmental emissions/impacts would be reflected from the ongoing operations in the baseline conditions.			
Potential cumulative impacts: Upon further review of the mine location, it was determined that it is situated *north* of the D110 (E84) motorway running east-west from Tekirdag to Ipsala; the new junction will be built off the D110 as part of the Project heading *south* to connect to the Malkara-Canakkale Motorway. As such, there is not really any spatial overlap of the mine with the Project; truck traffic from the mine and the Project would not normally need to pass through the same small roads or villages. Consequently, this mine is now scoped out of further review for the CIA.			
Cumulative Assessment: **Ecological VECs** *NA* **Social-Landuse VECs** *NA*			
Sensitivity of Receptor(s): *NA*	Magnitude of Impact: *NA*	Planned Mitigation for Project: NA	Resulting Impact Significance of Project: **NA**
Discussion: NA			Resulting Cumulative Significance: **NA**
Additional Mitigation Measures:	None		

8.5.3 *Other Motorways*

[#22,23] Project Name: Kinali-Malkara Section and Canakkale-Savastepe Section of the Kinali- Savastepe Motorway Project

Brief Description:

An overview of the regional motorway network is shown in the figure below. These two segments directly adjoin the Malkara-Canakkale (and 1915 Bridge) Project: Kinali-Malkara to the north (connecting there at Kinali to the North Marmara Motorway – shown as part of the Edirne-Istanbul motorway in yellow), and Canakkale-Savastepe to the south (connecting there at Savastepe/Balakesir to the Gebze-Izmir Motorway shown in green).

The entire Kinali-Savastepe Motorway project (ie all three segments) is considered as one overall project by the project owner, KGM, and is being developed as part of the national Vision 2023 master plan for improvement of infrastructure. The Malkara-Canakkale (and 1915 Bridge) segment has been tendered first by KGM under a BOT arrangement; presumably the tendering, planning and construction of other two segments will follow in the coming years to complete the overall route. As described in the ESIA, a Turkish EIA has already been completed for the entire route.

The nature of the motorway construction for the other two segments will be very similar to that of the Malkara-Canakkale Project, along with the types of expected impacts.

Timing: Given the current status, presumably the construction of the Malkara-Canakkale Project will likely be largely (or fully) completed before the construction of the other segments begins. Resources and receptors affected by the Malkara-Canakkale Project are unlikely to be impacted again significantly later by the construction of the other two segments, mainly due to the large distances between most of the project areas.

Operations of the three segments will, after completion of construction, continue for many years as one integrated motorway and each segment will affect different geographical areas, except for the connections.

Potential cumulative impacts:

Each segment of the overall motorway will be expected to have similar impacts in their respective spatial footprints as have been described in this ESIA for the Malkara-Canakkale segment (except for the unique Bridge components), during both construction and operations. 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.

The overall impact of the Kinali-Savastep Project for the wider region is expected to be positive in many respects (as also intended by the Vision 2023): together with the afore-mentioned North Marmara and Gebze-Izmir Motorways, the Project creates an alternative western-route for south-north traffic from western Anatolia to Europe as a bypass to the huge bottleneck at Istanbul. 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 Istanbul.

Cumulative Assessment:

Impacts on Ecological VECs *NA*

Impacts on Social-Landuse VECs *NA*

Sensitivity of Receptor(s):	Magnitude of Impact:	Planned Mitigation for Project:	Resulting Impact Significance of Project: **Same as in this ESIA**
NA	*NA*	*NA*	
Discussion: NA			Resulting Cumulative Significance: **Same as in this ESIA**
Additional Mitigation Measures:	• Once the BOT contractors (or other contractors if not a BOT model) are selected by KGM for the other segments, COK A.S. should engage with these firms to sort any potential logistical issues and include these firms as stakeholders in the Project SEP. • The CLO should pay special attention to landowners/residents in the nodal areas where the different segments overlap, and should build up dialogue with CLO-counterparts (if any) in the other segments.		

8.5.4 *Oil & Gas Infrastructure*

[#25] Project Name: TANAP Pipeline

Brief Description:

The TANAP natural gas pipeline extends about 1800 km east to west across Anatolia, and crosses the Dardanelles Strait to the Gallipoli Peninsula, where it intersects with the Project alignment at KM 139+250 near the village of Kavakköy north of Saros Bay. The pipeline then extends further northwest to the Greek border.

The pipeline is mainly buried underground; at water-crossings the pipeline is laid on the sea bottom. Terrestrial construction works involve clearance of the corridor, excavation/trenching, pipe-laying and re-instatement including removal of sensitive habitats. Temporary areas are also needed for laydown of piping and equipment, worker camps, etc. The required landplots are mainly leased from the landowners; permanent land acquisition is usually only needed for permanent above-ground installations (AGIs) such as for the many Block Valves/Metering Stations (small areas) or a larger Compressor Station but does impact on local land uses and livelihoods.

According to publicly available aerial images, there is apparently a worker-camp and/or other smaller AGI located along the pipeline route near Kavakköy.

During normal pipeline operations there is little impact to local residents or the environment. Whilst many types of land uses can continue on the pipeline right-of-way after reinstatement, there are some restrictions such as the prohibition of building construction and planting of deep-rooted plants and trees. Also, the disturbed/compacted soil may no longer be as productive for agriculture as prior to construction.

Timing: The construction of the pipeline in the Project region is currently underway; as such, the pipeline construction will likely be completed before start of Motorway construction at that location.

Potential cumulative impacts:

Several types of impacts result in impacts to the following VECs, namely:

- 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; and
- Landuse restrictions, potential income reduction for local communities and local livelihoods.

There are not expected to be any noteworthy common impacts during operations.

Cumulative Assessment:

A. Impacts on Ecological VECs during Construction

- Sensitive habitats (including forest areas)
-

Sensitivity of Receptor(s):	Magnitude of Impact:	Planned Mitigation for Project:	Resulting Impact Significance of Project:
High	*Major*	See Ch. 7.5	**Minor**
Discussion: The relative impact of the pipeline construction is less than that of the wider 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.** **Note**:TANAP is subject to international financing and known to be required to abide by IFC and EBRD standards; TANAP has a very informative website that suggests a robust approach to ESIA topics.			Resulting Cumulative Significance: **Minor**
Additional Mitigation Measures:	Project planners should meet with the TANAP representatives to confirm details of the Pipeline routing and construction time-line to minimise any potential logistical interference and minimise common areas of land disturbance. Also to harmonise in respect of re-instatement/revegetation measures. As part of this, the TANAP environmental assessment documentation should be reviewed and discussed to align findings and mitigation actions as related to cumulative impact contributions from the Project.		

B. Impacts on Social-Landuse VECs

- Local communities – property owners and residents living near construction areas/ access roads
- Local livelihoods

Sensitivity of Receptor(s):	Magnitude of Impact:	Planned Mitigation for Project:	Resulting Impact Significance of Project:
High	*Varies from Positive to Major*	See Ch. 7.8, 7.8, 7.11, 7.13	*Varies from* **Positive to Minor**
Discussion: The social and landuse impacts of the Motorway Project on the local communities will be of wider scale and more permanent than those of the TANAP pipeline project. Nevertheless, there will likely be a small number of landowners/residents who are affected twice: first for the pipeline construction and then for the Motorway, whereby the pipeline construction process is simpler and 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 PAP, overall the			Resulting Cumulative Significance: **Positive to Minor**

cumulative impact on the social-landuse topics will remain Positive to **Minor.** Note: as above, based on website information it appears that TANAP are implementing social mitigation measures in line with international standards.	
Additional Mitigation Measures:	The Project Community Liaison Officer (CLO) should pay special attention to landowners/residents in this nodal area where the two projects overlap, and should reach out early to TANAP representatives to ensure a mutual understanding of the commonly affected PAPs. The Motorway SEP should include TANAP as an interested stakeholder.

[#26] Project Name: Onshore Gas in Thrace Region (Malkara Block 4094)

Brief Description:

From publicly available media it is known that the Turkish government has established a number of license areas (referred to here as "Blocks") for exploration and production of natural gas across much of the Thrace Region of Turkey in the so-called Thrace Basin. Although exact acreage data are not readily available, based on maps showing these various Blocks it appears that over one-third of Thrace is under license, in particular from the Marmara Sea around Tekirdag to the north and northwest. The region has been subject to oil and gas exploration for a number of years, and reportedly has significant potential for increased production, especially of gas. Numerous Turkish and international firms are involved in the region.

Based on a review of on-line information, it appears that the Project will intersect with one of the license areas, namely Malkara Block 4094, near Malkara with potential interactions on marine water quality and marine habitats and fauna VECs. No further details of the exact coordinates of this Block are available, nor can information about the current license holders or status of gas exploration or production be readily ascertained from publicly information (public records show that the USA firm Transatlantic Petroleum[1] was the license operator until 2013).

No obvious visible indications of gas field activity were noted during any of the several field trips to the Project area, and this topic was not mentioned during any of the interviews or other discussions with local residents. No information is available to determine the nature or timing of any potential future activities related to Malkara Block 4094.

Potential cumulative impacts:

Gas-field exploration and production is associated with a number of activities that could potentially have a cumulative impact with Project construction impacts, such as clearance and construction of access roads, vegetation and soil damage, worker camps, construction-site noise and nuisance, etc, with impacts to local communities. Nevertheless, given the uncertainty around the gas-field activities (if any) in the subject Malkara Block 4094, any predictions around such impacts to these marine VECs are purely speculative and it cannot be conclusively

(1) [1] https://www.sec.gov/Archives/edgar/data/1092289/000119312513222765/d447621d10k.htm

considered that there impacts to these VECs, and this is therefore not carried forward into a CIA.			
Cumulative Assessment: **Impacts on Ecological VECs** *NA* **Impacts on Social-Landuse VECs** *NA*			
Sensitivity of Receptor(s): *NA*	Magnitude of Impact: *NA*	Planned Mitigation for Project: NA	Resulting Impact Significance of Project: **NA**
Discussion: NA			Resulting Cumulative Significance: **NA**
Additional Mitigation Measures: ***(Recommendation)***	COK management and CLOs should be aware of any gas-field activities in the Malkara area. If appropriate (and responsible operators identified), liaise with the gas-field operators to clarify any logistical or other issues to prevent negative impacts, and include the operators in the Project SEP.		

8.5.5 *Other - Local Marina in Lapseki*

[#29] Project Name: Çanakkale-Lapseki Recreational Marina			
Brief Description: A private developer is planning to expand the marina at Lapseki, located about 5 km north of the Project area (ie Bridge ramp on Asian side) on the Dardanelles. The marina location is just to the north of the Ferryboat Terminal in Lapseki. The developer has filed an EIA Application File to the authorities in September 2017, a pre-step to commencing the full EIA process. According to the publicly accessible parts of the Application File, the Marina will service private yachts and other non-commercial vessels, and comprise a variety of restaurants, malls, sports and game centers. Total investment of the Project is stated as about 50,000,000 TL (about 10 mio EUR) in total. The Project area is 14.42 ha, the capacity will be 200 yachts offshore and 50 yachts onshore. Timing: Assuming EIA preparation and approval in 2018, construction would be expected to commence no sooner than 2019.			
Potential cumulative impacts: Although the marina development will presumably involve some marine construction works to provide berths for the yachts, much of the construction will likely be onshore for the stated recreational facilities and will be typical of urban construction such as for hotels and businesses. The overall scale of this project, at about 10 mio EUR, is relatively small compared to other infrastructure projects of relevance for this CIA, and is tiny compared to the Project. By the time of the assumed construction begin in 2019 for the marina, the dredging works for the Bridge tower foundations will have been completed. In any case, the extent of the disturbance to the marine sediment and water quality; and marine habitats and fauna VECs is likely to be minor within the overlap in extent of the activities from the two projects. Thus any potential cumulative interactions are expected to be negligible and the marina project is therefore not considered relevant for this CIA.			
Cumulative Assessment: **Impacts on Ecological VECs** *NA* **Impacts on Social-Landuse VECs** *NA*			
Sensitivity of Receptor(s): *NA*	Magnitude of Impact: *NA*	Planned Mitigation for Project: NA	Resulting Impact Significance of Project: **NA**
Discussion: NA			Resulting Cumulative Significance: **NA**
Additional Mitigation Measures:	None		

8.6 *CONCLUSION*

A total of 29 other infrastructure projects in the region were identified that might be relevant for this CIA. These projects were systematically screened, considering the potential for similar and potentially cumulative impacts with the Project and either spatial overlap with the Project Area of Influence and/or temporal overlap with Project activities. As a result, six projects were identified through the project screening process. The assessment found that for various reasons outlined in the Section 8.5.4, two of the six projects were not relevant and the following projects were considered for further assessment of potential cumulative impacts:

- TANAP Pipeline (ongoing construction, contact persons are identified);
- Onshore gas development (status unknown) at Malkara Block 4094 (if/when contact persons can be identified);
- Sağlamtaş Mining Co. Basalt Mine; and
- Canakkale-Lapseki Marina.

For the other two projects screened in, but not further considered, the other two segments of the Kinali-Savastepe motorway will become relevant in due course, and COK should liaise closely with the KGM and the project contractors in due course.

Through the detailed consideration of the four projects and the impacts on the identified VECs for each project, only the TANAP Pipeline was subject to an assessment of the cumulative impacts identified. 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**, sometimes positive).

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.

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