REPORT

Hatay Dörtyol-Hassa Highway and Railway Tunnel Construction Works Project (25 km)

Biodiversity Management Plan (BMP)

Submitted to:

DOĞUŞ - EZE Joint Venture

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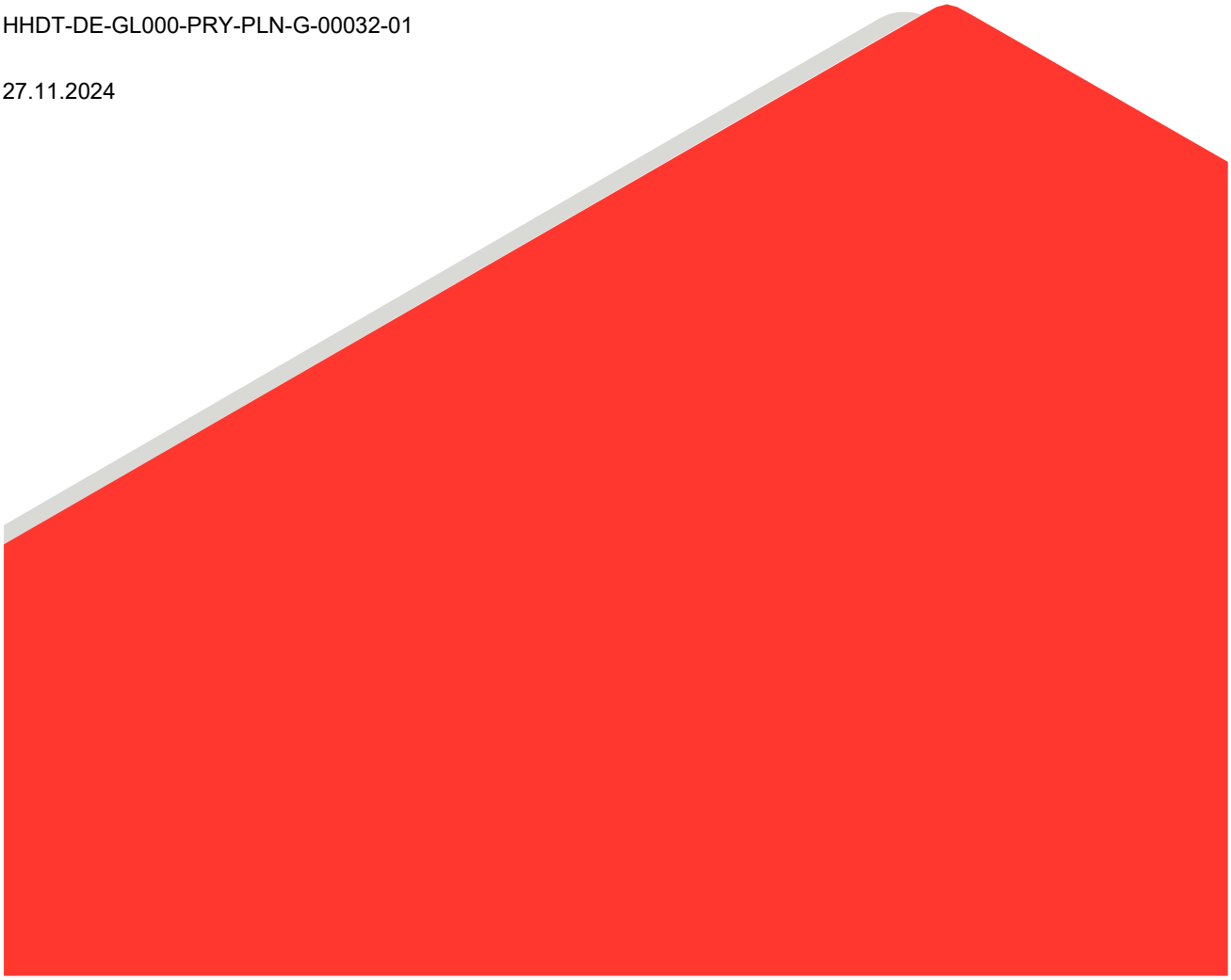
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ABBREVIATIONS AND DEFINITION

BIO	Biodiversity
BMP	Biodiversity Management Plan
CH	Critical Habitat
CR	Critically endangered
Doğuş-EZE or Contractor	Doğuş-EZE Joint Venture
EHS	Environmental, Health and Safety
EN	Endangered
EPC	Engineering Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management Systems
IBA	Important Bird Area
IFC	International Finance Corporation
KBA	Key Biodiversity Area
KPI	Key Performance Indicator
LSA	Local Study Area
Project	Hatay Hassa Dörtyol Tunnels Project
RSA	Regional Study Area
RR	Restricted Range (species)
VU	Vulnerable
WSP	WSP Danışmanlık ve Mühendislik Ltd. Şti..

1.0 INTRODUCTION

This document is the Biodiversity Management Plan (BMP) for the Hatay Hassa Dörtyol Tunnels Project (“the Project”) whose construction contractor is Doğuş- EZE Joint Venture (referred as “Doğuş-EZE”, “Contractor”).

This BMP identifies and presents the framework and the strategy for implementing Environmental and Social Management System (ESMS) in relation to Biodiversity (BIO) aspects. It has been developed in accordance with Doğuş-EZE, with the commitments undertaken in the Environmental and Social Impact Assessment (ESIA), with Turkish legislative framework, with International Finance Corporation (IFC) Performance Standards PS6 and IFC General and Sector Specific EHS Guidelines.

Hatay Dörtyol-Hassa Highway and Railway Tunnel Construction Works Project (25 km) (hereinafter “the Project”) comprises a 2x2 highway and 1x1 (single line) railway connecting the Gulf of Iskenderun to the Southeastern Anatolia Region in a more linear manner. The tunnel to be built within the scope of the Project is planned to consist of 3 different tubes and the tunnel length will be 18,780 m.

2.0 PURPOSE AND SCOPE

The main objective of this document is to develop and implement policies and plans to integrate biodiversity aspects within the overall project management framework throughout its lifecycle.

This BMP applies to both construction phase and operation phase of the Project. It provides guidelines to the contractor in charge for the Engineering Procurement and Construction (EPC) activities of the Project for addressing biodiversity aspects according to the standards mentioned above.

The Purpose of this BMP is to define:

- Project standards for managing BIO matters during the construction and operation phase;
- the scope and applicable interphases for addressing BIO management and monitoring activities during the construction and operation phases;
- responsibilities, commitments, operating procedures and instructions for the implementation of this MP;
- the mitigation measures applicable to the Project in relation to BIO aspects, and;
- the monitoring activities performance in relation to BIO aspects.

This BMP applies to normal operating conditions during the construction and operation activities and does not address any emergency situations. Emergencies are addressed in a specific Emergency Preparedness and Response Plan (EPRP).

The overall objective of this BMP is to identify the mitigation and monitoring measures in order to:

- adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize and restore impacts on the environment;
- develop and implement policies, plans and procedures to integrate environmental aspects within the overall project management framework throughout its lifecycle;
- establish a monitoring program to assess the effects of residual impacts on the environment;
- report the results of periodic audits and provide for corrective actions, if necessary, to reach the planned objectives.

It is recommended to subject this plan to a systematic review process during construction phase and before operation starts to encompass and consider any information relevant to biodiversity matters.

The Project is expected to achieve whichever is more stringent amongst national standards and IFC Performance Standards (including EU Regulatory framework).

3.0 STUDY AREA

The Project is located within the Hatay province of southern Türkiye, at an elevation ranging from approximately 8 meters to 1799 meters above sea level.Two types of study areas were identified for the preparation of the ESIA. A wider Regional Study Area was identified and considered during the initial literature review in order to assess the species and habitats potentially occurring, while a Local Study Area more focused on the Project was identified for future detailed field studies and mapping.

The areas identified as RSA and LSA for the Biodiversity Management Plan are described in detail in the sections below.

3.1 Regional Study Area (RSA)

The biodiversity Regional Study Area (RSA) is a broad area containing a geographically distinct assemblage of species, natural communities, and environmental conditions. The RSA is defined in order to assess, based on literature review, the species and habitats potentially occurring within and in the vicinity of the Project.

For this Project a terrestrial RSA and a freshwater RSA have been identified based bio-geographic characteristics (Figure 1):

- terrestrial RSA corresponds to the "**Southern Anatolian Montane Conifer and Deciduous Forests** (PA1220)" and "**Eastern Mediterranean conifer-sclerophyllous-broadleaf forests**" (PA1207) terrestrial ecoregion (Olson *et al*., 2001[1]);
- freshwater RSA corresponds to the Asi River Basin, and it is part of the "**432 - Southern Anatolia"** and "**437-Orontes"** freshwater ecoregion**.**

[1] Olson, David M., *et al*. "Terrestrial Ecoregions of the World: A New Map of Life on Earth. A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity." BioScience 51.11 (2001): 933-938.

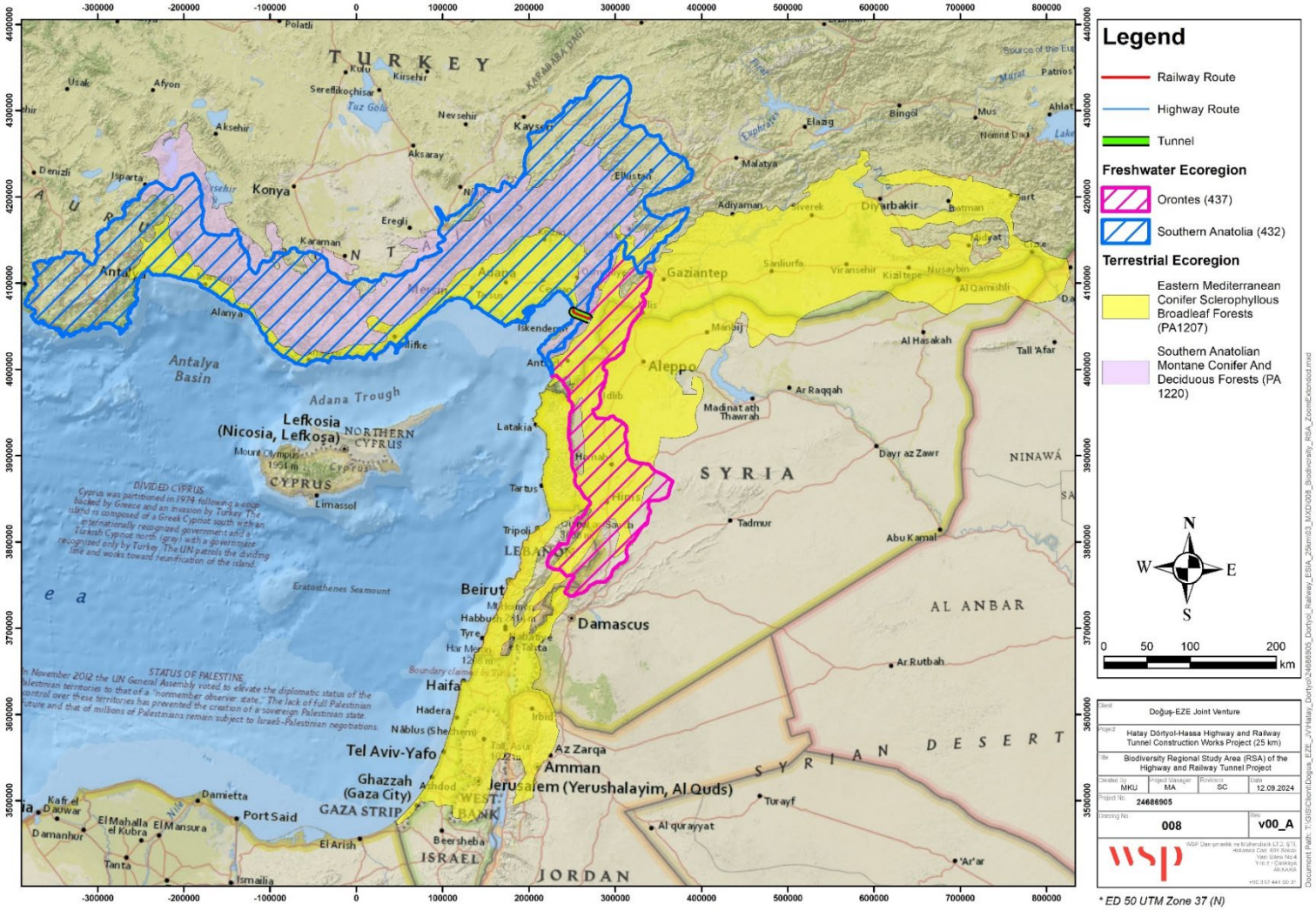


Figure 1: Terrestrial and freshwater Regional Study Areas (RSA).

3.2 Local Study Area (LSA)

The Local Study Areas (LSA) was identified for terrestrial and freshwater habitats to include all the Project components, both permanent and temporary, as well as the expected Area of Influence of the Project (i.e., the area beyond which no detectable effects on biodiversity are expected).

The LSA is part of the wider RSA and, as there are no clear physical boundaries, it has been designed as a 500 m buffer around the proposed route of the motorway and railway tunnel and the footprint of all project components. The designed LSA consists of 4 separate areas in the Hatay province of southern Türkiye, covering a total area of approximately 41 km^2. The Biodiversity LSA is illustrated in Figure 2 below.

Field surveys were conducted in July and August 2024 according to the work instructions and literature review in the scoping report with the objective of describing the status of the biodiversity as well as habitats within the LSA. Thus, the field studies were conducted on the following components:

- terrestrial flora and habitats;
- terrestrial fauna;
- freshwater fauna.

Field studies on the terrestrial flora, habitats and fauna were carried out at 18 different sampling points (SPs, PC-SPs and Q-SPs) within the LSA along the Hatay Dörtyol-Hassa Highway and Railway Tunnel route on the 21st and the 22nd of July 2024 by the expert botanist Prof. Hayri Duman of University of Gazi (Faculty of Science, Dpt. Biology) and expert zoologist Dr. Safak Bulut (Figure 3).

Field studies for freshwater fauna were conducted on the 13th of August 2024 by freshwater expert Prof. Aydın Akbulut of Hacettepe University (Faculty of Science, Dpt. Biology) at 16 sampling points (FWs), which were identified in correspondence of permanent or seasonal waterbody areas crossed by the LSA (Figure 4).

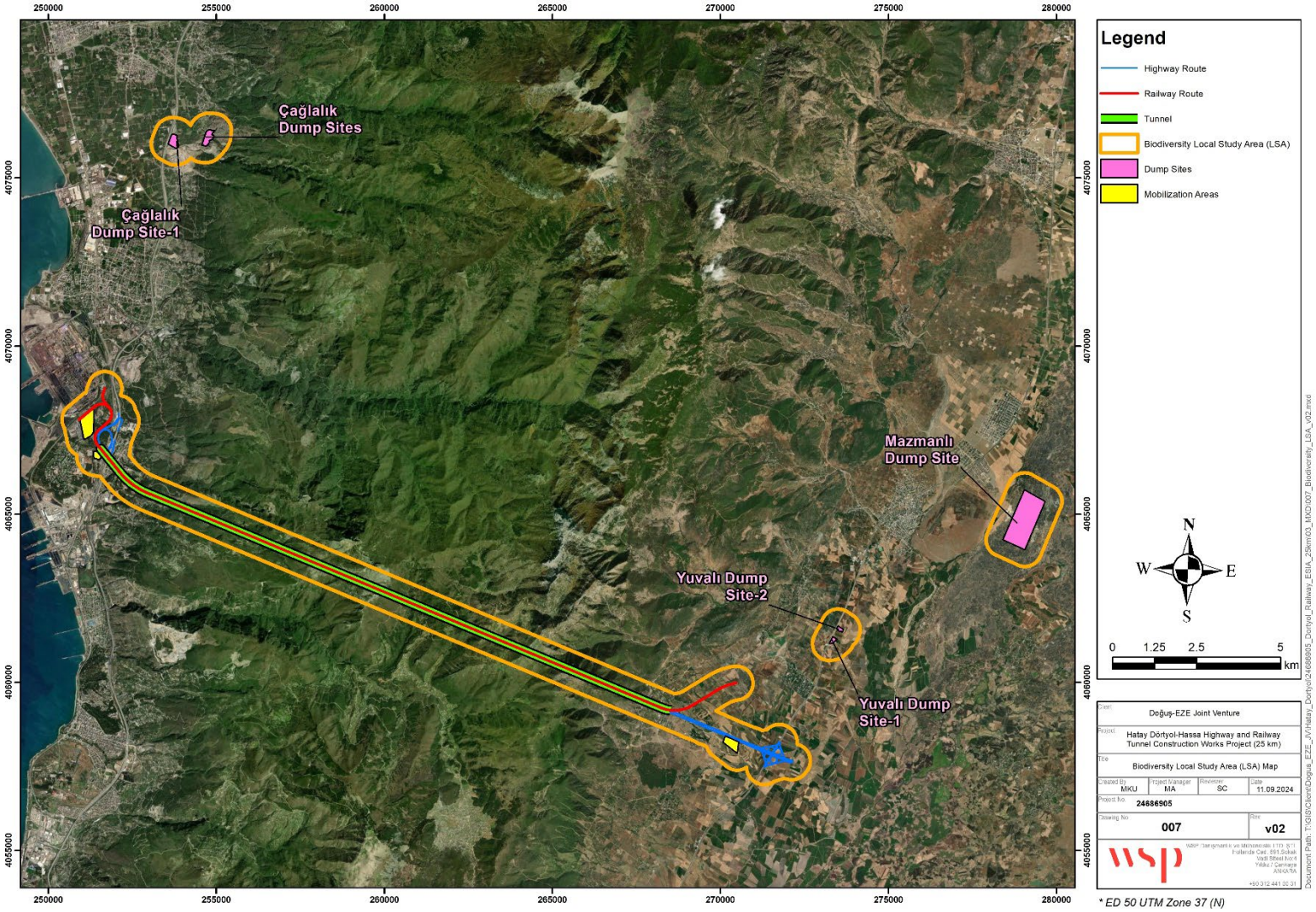


Figure 2: Biodiversity Local Study Area (LSA)

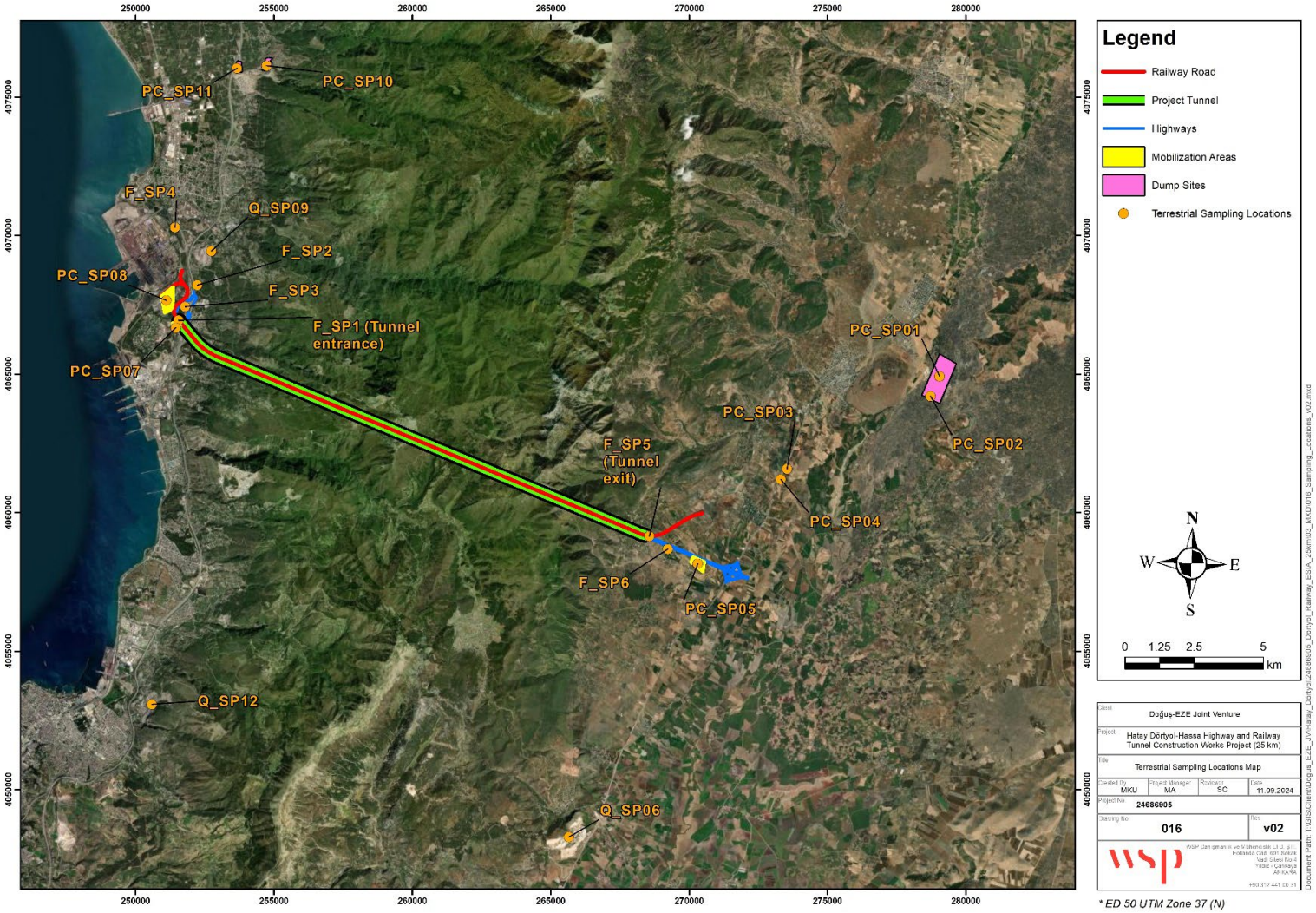


Figure 3: Terrestrial flora, habitats and fauna sampling point locations

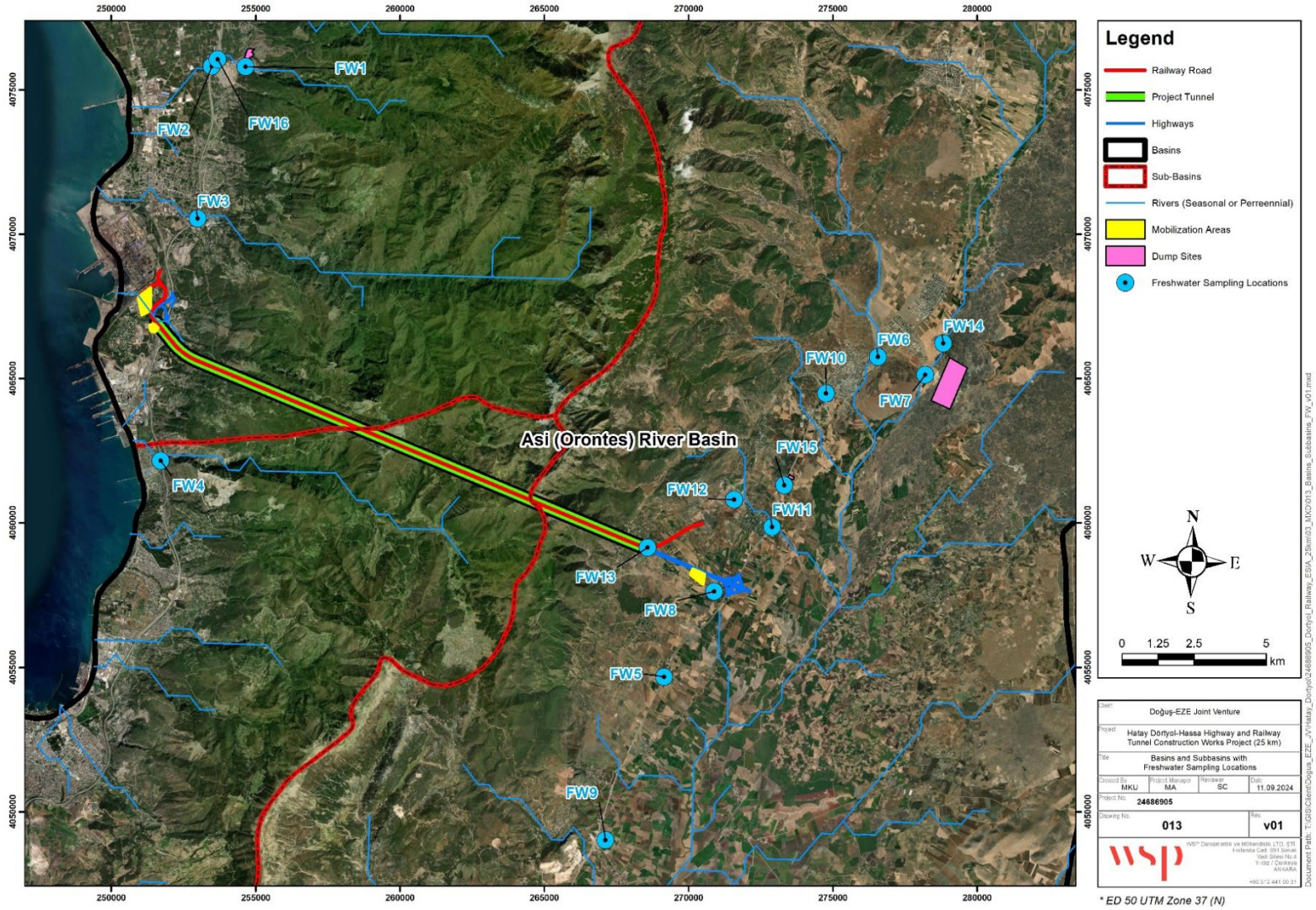


Figure 4: Freshwater fauna sampling point locations

4.0 SUMMARY OF NATURAL HABITATS, CRITICAL HABITATS, AND SIGNIFICANT BIODIVERSITY VALUES

4.1 Natural and Modified Habitats

The great majority of the habitats present within the LSA are characterized by Modified habitats (77%) and in particular by evergreen orchards and groves (G2.9, 25%), mixed crops of market gardens and horticulture (I1.2, 17%) (Figure 8).

Natural habitats present in the LSA (23%) mostly consist of Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity (H5.3, 13%) (Figure 8). Flora species in the sparsely or unvegetated mineral substrate habitat in the region are generally drought-adapted species. The other components of natural habitats in the LSA consist of eastern garrigues (F6.2, %), lowland to montane Mediterranean pine woodland (G3.7, 3%), subnitrophilous annual grassland (E1.6, <1%), southern riparian galleries and thickets (F9.3, <1%), thermo-Mediterranean scrub (F5.5, <1), permanent non-tidal, smooth-flowing watercourses (C2.3, <1%), reedbeds usually without free-standing water (D5.1, <1%).

The habitat map of the LSA according to the EUNIS habitat classification system is available in Figure 5 and illustrated in more detail (zooming into the habitat loss areas) in Figure 6 and Figure 7. The extensions of each habitat are presented in Table 1.

Table 1: EUNIS habitat types present in the LSA

EUNIS Habitat Type	Total LSA (4,020.33 ha)	
	ha	%
Natural Habitats		
C2.3: Permanent non-tidal, smooth-flowing watercourses	7.49	<1
D5.1: Reedbeds normally without free-standing water	3.16	<1
E1.6: Subnitrophilous annual grassland	20.48	<1
F5.5: Thermo-Mediterranean scrub	15.70	<1
F6.2: Eastern garrigues	87.50	4
F9.3: Southern riparian galleries and thickets	7.14	<1
G3.7: Lowland to montane mediterranean pine woodland (excluding black pine [*Pinus nigra*])	65.98	3
H5.3: Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity	278.35	13
Subtotal	485.80	23.34
Modified Habitats		
G2.9: Evergreen orchards and groves	523.60	25
G3.F: Highly artificial coniferous plantations	75.40	4
G4.F: Mixed forestry plantations	135.75	7
I1.2: Mixed crops of market gardens and horticulture	346.37	17
I1.5: Bare tilled, fallow or recently abandoned arable land	94.50	5
J1.4: Urban and suburban industrial and commercial sites still in active use	103.75	5
J1.6: Urban and suburban construction and demolition sites	63.41	3
J1.7: High density temporary residential units	72.55	4
J2.2: Rural public buildings	62.11	3
J3.2: Active opencast mineral extraction sites, including quarries	14.21	<1
J4.2: Road networks	83.87	4
J5.3: Ponds and lakes with completely man-made substrate	3.34	<1
J6.1: Waste resulting from building construction or demolition	2.36	<1
X10: Mosaic landscapes with a woodland element (bocages)	13.45	<1
X11: Large parks	1.24	<0.1
Subtotal	1,595.88	76.66
TOTAL	2,081.68	100

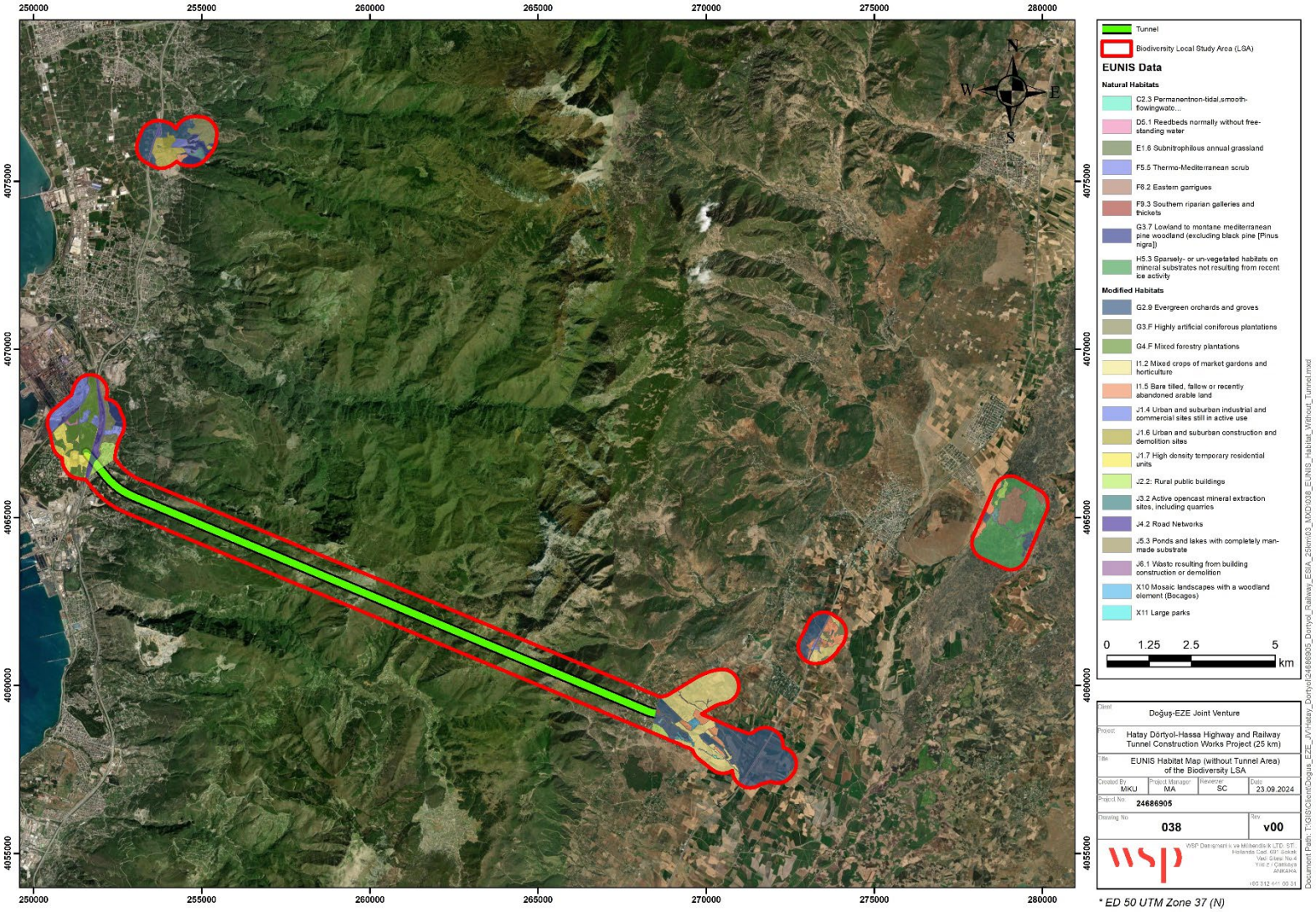


Figure 5: EUNIS Habitat Map of the Biodiversity LSA (general view)

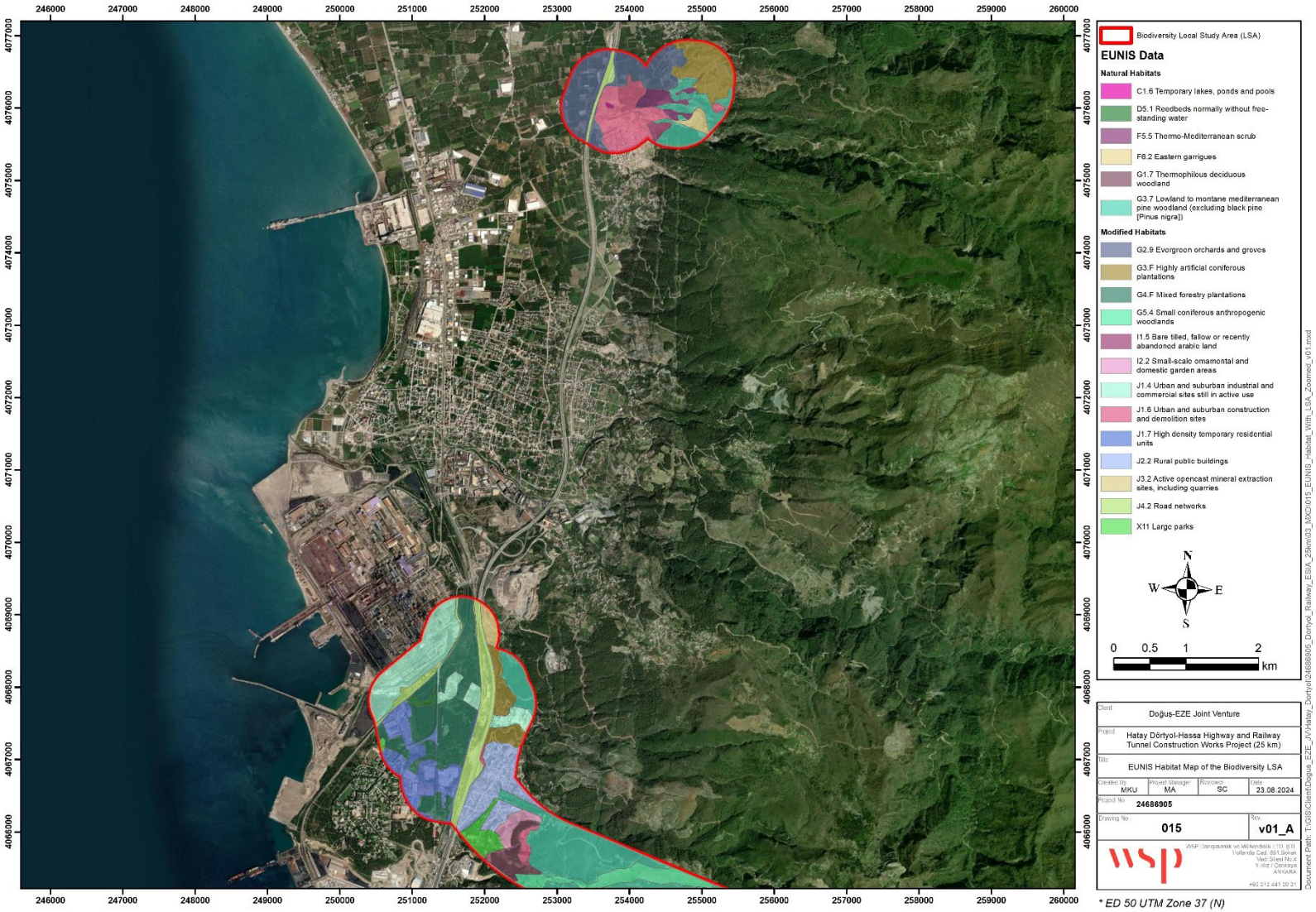


Figure 6: EUNIS Habitat Map of the Biodiversity LSA (the west section view)

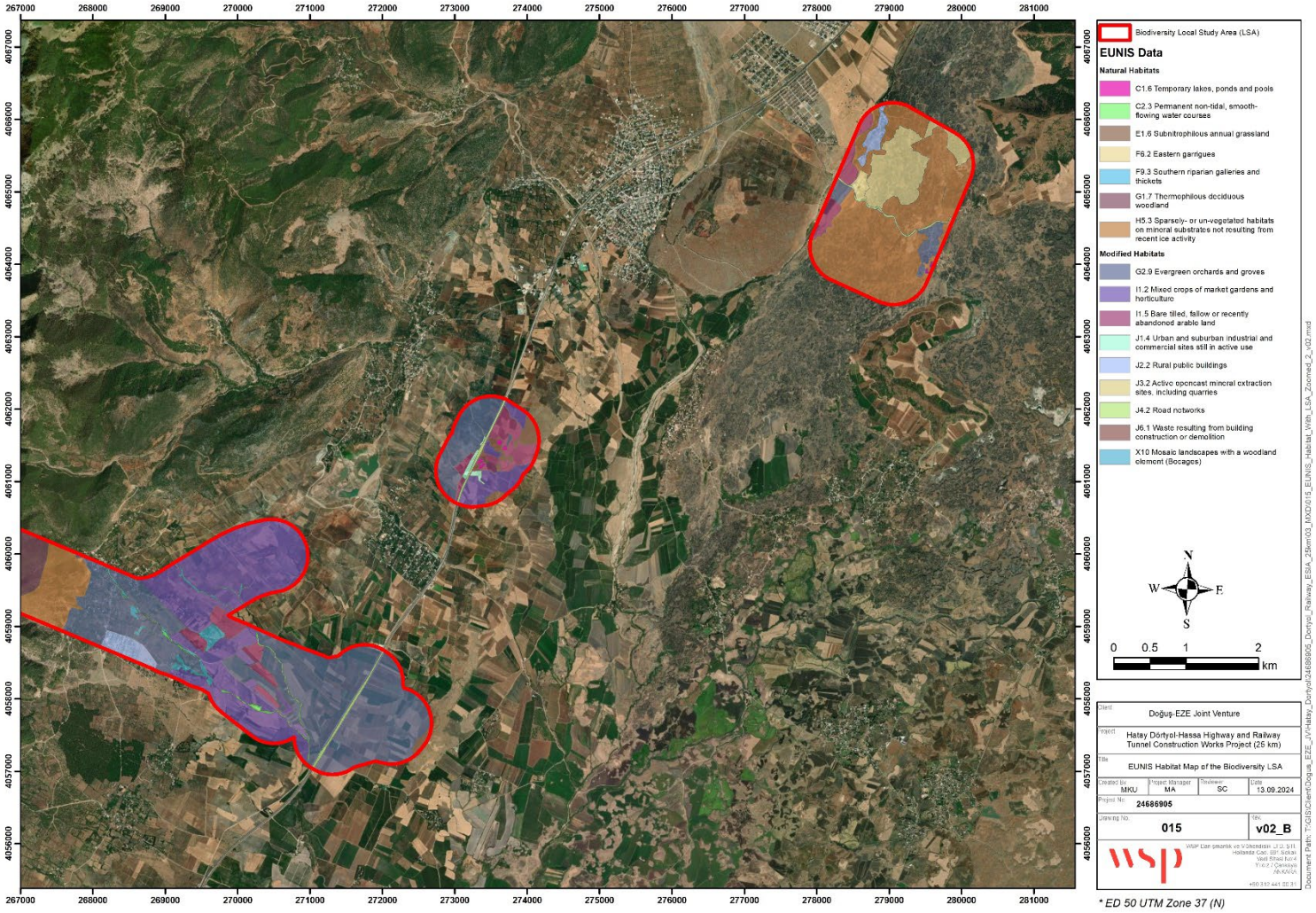


Figure 7: EUNIS Habitat Map of the Biodiversity LSA (the east section view)

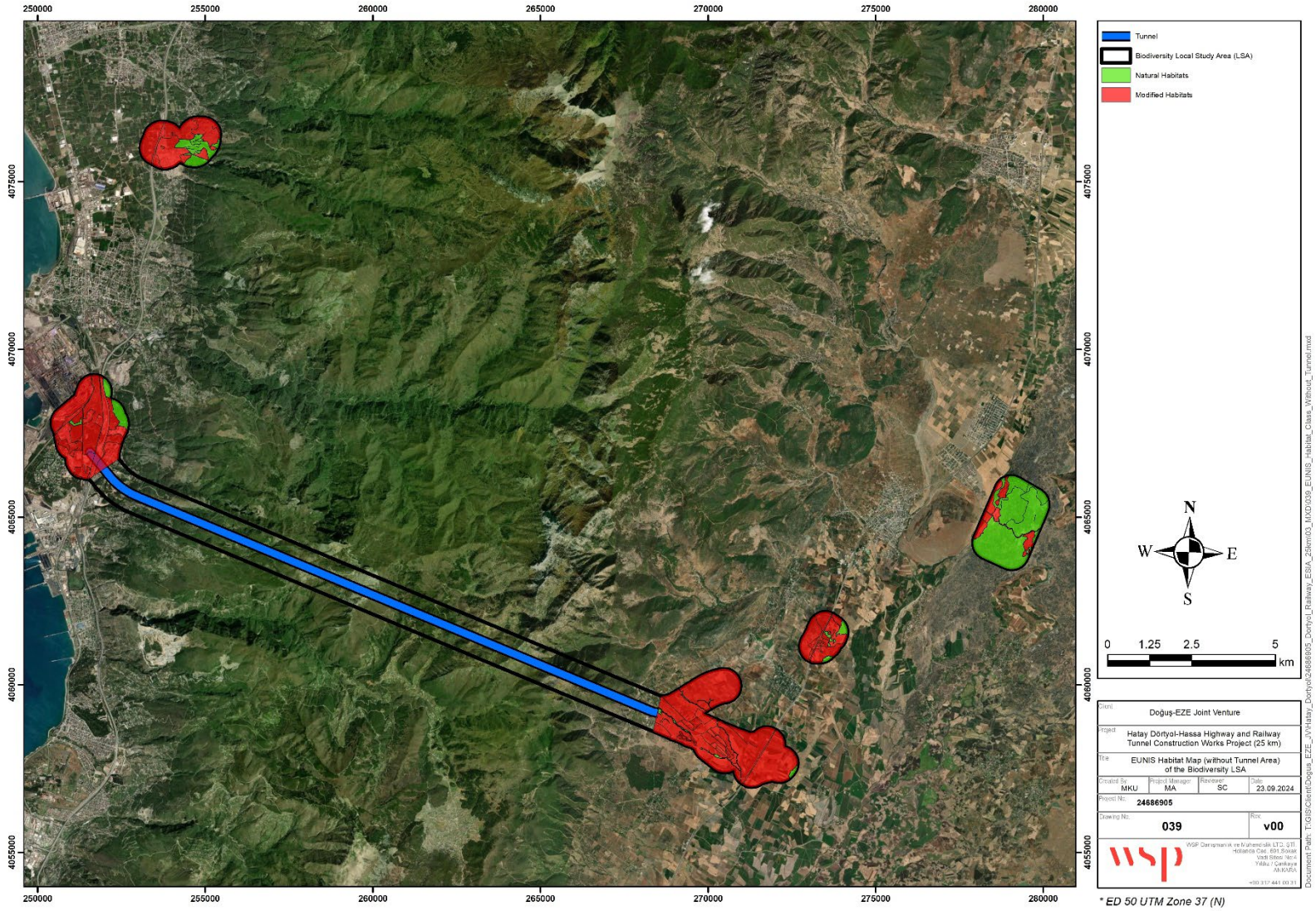


Figure 8: Natural and Modified Habitat Map of the Biodiversity LSA

4.2 Critical Habitats and Significant Biodiversity Values

The objective of this Biodiversity Management Plan is to provide guidelines for the implementation of mitigation measures/actions and monitoring actions according to the mitigation hierarchy (IFC PS6, 2019) for the species identified as triggering or potentially triggering Critical Habitat for the Hatay Dörtyol-Hassa Highway and Railway Tunnel route.

The Critical Habitats identified within the LSA are triggered by 1 mammal species and 5 fish species. These species are presented in Table 3.

In addition, among the flora and fauna species identified as present or potentially present within the LSA, a list of species identified as of "Significant Biodiversity Values" was prepared; it includes all the species classified as Vulnerable (VU), Endangered (EN), or Critically Endangered (CR) at a global or national[2] level according to IUCN Red List of Threatened Species[3], as well as the locally, regionally, or widespread endemic species. This list is presented in Table 2 And was prepared to offer a broader overview of the sensitive species, based on which some of the mitigation measures/actions and the monitoring actions presented in the following sections were defined.

Table 2: Flora and fauna species identified as of Significant Biodiversity Value.

Group	Species	Global IUCN Red List	National Red List	End./ RR	Presence
Fish	*Anguilla anguilla*	CR	-	-	Lit.
	Cobitis levantina	EN	-	-	Lit.
	Capoeta barroisi	EN	-	RR	Obs.
	Acanthobrama centisquama	CR	-	-	Lit.
	Alburnus orontis	VU	-	RR	Lit.
	Chondrostoma kinzelbachi	EN	-	-	Lit.
Reptiles	*Testudo graeca*	VU	-	-	Obs.
Birds	*Aquila heliaca*	VU	-	-	Lit.
	Aquila nipalensis	EN	-	-	Lit.
	Clanga clanga	VU	-	-	Obs.
	Neophron percnopterus	EN	-	-	Obs.
	Streptopelia turtur	VU	-	-	Lit.
	Falco cherrug	EN	-	-	Obs.
	Falco vespertinus	VU	-	-	Obs.
	Larus audouinii	VU	-	-	Obs.
	Puffinus yelkouan	VU	-	-	Obs.
Mammals	*Gazella gazella*	EN	-	-	HS.
	Hyaena hyaena	NT	VU	-	HS.
	Miniopterus schreibersii	VU	-	-	Lit.
	Myotis capaccinii	VU	-	-	HS.
	Nyctalus lasiopterus	VU	-	-	Lit.
	Rhinolophus mehelyi	VU	-	-	Lit.

[2] Bulut, Şafak; Özkurt, Şakir Önder. "Türkiye Memelileri." Ankara (2020).

[3] The International Union for the Conservation of Nature Red List of Threatened Species – Source: https://www.iucnredlist.org/

Table 3: Flora and fauna species identified as triggering Critical Habitat (IFC PS6, 2019).

Taxon	Species	Common name	IUCN Red List	Endemic/RR	Lit./ Obs.	IFC criteria
Fish	Acanthobrama centisquama	Long-spine Bream	CR	-	L	Criterion 1a
	Capoeta barroisi	Orontes Scraper / Tigris Barb	EN	RR	O	Criterion 1a &2a&3a
	Alburnus orontis	Orontes Spotted Bleak	VU	RR	L	Criterion 2a
	Chondrostoma kinzelbachi	Levantine Nase	EN	-	L	Criterion 1a&3a
	Cobitis levantina	Orontes Spined Loach	EN	-	L	Criterion 1a
Mammalia	Gazella gazella	Mountain Gazelle	EN	RR	HS	Criterion 1a

5.0 ROLES AND RESPONSIBILITIES

Principal roles and responsibilities for the implementation of this plan are in Table 4 outlined below.

Table 4: Roles and responsibilities.

Roles	Responsibilities
Project Manager	Monitor the E&S performance of the Plan. Ensure adequate resources are provided for implementation of this Plan. Select Biodiversity specialist(s) for tasks such as biodiversity management surveys, monitoring, data analysis, and reporting as part of this Plan's implementation. Approval of this Plan.
Construction Manager	Ensure effective implementation of the management measures indicated in this Plan, by workers and subcontractors.
Project E&S Manager	Manage, improve, monitor and update this Plan. Ensure technical support is provided to subcontractors for implementation of the Plan. Conduct/organize periodic audits. Program inspections and audits to ensure the proper implementation of this Management Plan and the tasks of the Biodiversity specialist(s). Collect, review, and summarize monitoring data and reports from the Biodiversity specialist(s) to Management, stakeholders, and Lenders.
Biodiversity Specialists	Effective execution of the specific tasks assigned in conformity with this Management Plan and with contractual arrangements. Respect of EHS requirements included in the ESMS. Agree with the timing and logistics of the monitoring activities.
Project H&S Manager	Ensure health and safety practices are implemented, by workers and subcontractors.

Roles	Responsibilities
Human Resources Chief	Ensure the Plan is distributed to all subcontractors.
CLOs	Keep the record of the grievances in the Grievance Database with details (raised by who, date, status (open, awaiting or closed) etc.).
Subcontractors Project Managers and EHS Managers	Develop its own procedure to fully implement this Plan. Ensure compliance with Project standards and contractual agreements. Ensure related non-compliances are recorded and responded to immediately. Conduct internal audits and record identified incompliances. Provide related trainings. Provide construction staff, equipment and material for the implementation of measures defined in this Plan.
All Employees	Participate in the trainings. Ensure compliance with measures defined in this Plan. Reporting of any deviation from the planned activities, including incident or accident, which may cause additional unexpected impacts to biodiversity.

6.0 BACKGROUND POLICIES AND STANDARDS

This section includes all those policies, standards and requirements of reference for this Management Plan that are applicable to the Project during the construction phase.

This section includes references to:

- applicable national laws and regulations, including those laws implementing host country obligations under international laws and treaties;
- IFC Performance Standards on Environmental and Social Sustainability (2012);
- IFC Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (2019);
- IFC Environmental, Health, and Safety Guidelines (EHS).

7.0 MITIGATION MEASURES/ACTIONS

7.1 Construction

Based on the results deriving from the ESIA, the potential impacts on environmental components during the construction phase are mainly associated to the following Project activities:

1) vegetation and topsoil removal;
2) changes in local hydrology and water quality;
3) increase in vehicular traffic;
4) emission of pollutants, dust and particulate matter
5) emission of light;
6) emission of noise and vibrations;

7) introduction and spreading of alien species.

Table 5 details the environmental management and mitigation measures/actions identified for BIO management activities during construction phase. For each measure/action identified, the table shows:

- Item: the identification code of the mitigation measure/actions (ID.);
- Measure/Actions: description of the mitigation measure/actions;
- Source document: is the reference to one or more applicable standard (i.e. National Regulation and Permits, EU Regulations/Directives, IFC PS/Guidelines, or other GIIP);
- Timeline and frequency: frequency/timing of the measure/action;
- KPI (Key performance indicator): quantitative compliance indicator or qualitative acceptance criteria that can be used to verify the actual effectiveness of the mitigation measure/actions;
- Responsibility: resource responsible for implementing the measures/actions;
- Status: progress of the measures/actions.

The aim of the “mitigation hierarchy” (avoidance, minimization, rehabilitation/restoration, offset) is applied for the selection of the measures to limit as far as possible negative impacts to the environment.

This process is intended as an adaptive management system so that the mitigation and management approach will be adapted based on any new findings which could arise from the monitoring program described in the following section.

In case during monitoring non-conformities or unexpected residual impacts due to the Project are identified on site, the Biodiversity specialists will evaluate the situation and, if needed, propose changes and integrations to the mitigation and monitoring activities included in the present BMP. The proposed changes will be evaluated and approved by Project E&S Manager and by Project Manager who will also ensure that action/measures and monitoring activities are carried out timely and adequately.

Table 5: Mitigation measures/actions for the construction phase.

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
BIO01	**Additional studies: bird surveys** ■ Monitoring surveys will be conducted between March and August to monitor migratory birds along the highway and railway line, focusing on target species (globally EN, CR and VU species) and large-winged gliding birds. ■ Bird migration at the tunnel entry and exit points will be closely observed during migration periods. ■ Protective corridors will be established using netting to safeguard birds at tunnel entry and exit points. Specific work instructions will be developed to ensure effective monitoring and protection measures are implemented.	IFC PS6	Before the beginning of site preparation	Bird migratory survey performed in (March to end of August)	E&S Manager Biodiversity specialist(s)	Not started
BIO02	**Avoidance: micro-siting of project facilities** ■ Minimisation of the footprint of individual facilities. ■ Avoid/minimize impact on Natural Habitats: Construction of permanent facilities will be prioritized in areas comprising modified habitats. A significant section of the route is planned as a tunnel to limit habitat fragmentation or loss. Additionally, existing operational quarries will be used as supply sources, ensuring no increase in their capacity as a consequence of the Project.	IFC PS6	During detailed engineering phase	Final placement of project facilities.	Biodiversity specialists	Ongoing
BIO03	**Minimization: flora pre-construction surveys** To reduce the direct impact on flora species at risk, pre-construction surveys will be conducted before clearing vegetation to identify any flora species present. If species triggering Critical Habitat are found, efforts will be made to avoid disturbing them. Where avoidance is not possible, they will be translocated. For flora species deemed globally or nationally threatened but not triggering Critical Habitat, seeds will be collected within the Project Local Study Area (LSA) to support the rehabilitation of temporary facilities. Seed collection and preservation will follow Millennium Seed Bank	IFC PS6	Before the beginning of site preparation (vegetation clearing and topsoil removal)	Flora pre-construction survey performed in all areas to be developed	E&S Manager Biodiversity specialist(s)	Not started

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Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	best practices. Each sub-population's seeds will be stored separately with unique codes. A portion of the seeds will be donated to the Ankara Seed Bank, where they will be conserved or used for scientific research and, if needed, germinated to establish new populations.					
BIO04	**<u>Minimization: fauna pre-construction surveys</u>** ■ Before the beginning of site preparation (vegetation clearing and topsoil removal), an expert wildlife ecologist will perform pre-construction surveys in the areas to be cleared (no more than 7 days before). The survey will focus on fauna species with limited mobility that cannot move ahead of construction, such as the common tortoise (*Testudo graeca*, VU). If any of these species are observed, they will be collected by the ecologist and translocated to undisturbed but similar sites within the LSA. ■ In areas where rock blasting is planned pre-construction surveys will be performed in an area within 100 m from the planned blasting area to check for the presence of sensitive fauna (e.g., nesting birds or roosting species or species that inhabit setts/burrows). If fauna species are encountered during the above-listed surveys, the following measures will be implemented: ■ If fauna species with limited mobility that cannot move ahead of construction (e.g., reptile and amphibians) are observed, they will be collected by the ecologist and translocated to undisturbed but similar sites within the LSA. ■ If dens are observed the Project will provide a limited but progressive disturbance over the course of at least one week to encourage the autonomous relocation of the mammals. ■ If the presence of active bird nests is observed the Project will make is best effort to wait for the natural fledging before proceeding with the vegetation clearing.	IFC PS6	Before the beginning of site preparation (vegetation clearing and topsoil removal)	Pre-construction survey performed in all areas to be developed	E&S Manager Biodiversity specialist(s)	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	■ If nests of vulnerable bird species (e.g., *Aquila heliaca* and *Streptopelia turtur*) are observed they will be protected and no activities will be performed in a radius of 100m until fledging. ■ If permanent or temporary roost are observed in the areas to be cleared the Project will take action to allow the bats to leave on their own at sundown but keep them from returning at sun set (e.g., remove or obstruct the roost, close the roost entrance entrance). This will only be done only if no dependent young are present (e.g., maternity roosts are typically present between May through August). ■ If sensitive fauna is present in an area within 100m from blasting areas, blasting will be prohibited until nesting and/or maternity season is over and until the individuals can be safely removed and/or the roost closed as indicated above.					
BIO05	**<u>Minimization: topsoil management</u>** ■ Topsoil present under the temporary facility footprint shall be stripped before construction activities and it will be used for restoration at the end of the construction phase. Topsoil storage areas must be protected during the dry season from wind erosion by covering. If the topsoil and stockpiles are stored for a long period of time (more than 1 years), the topsoil stockpiles shall be seeded with appropriate methods in order to avoid erosion from wind/rain to protect the organic matter content. The revegetation of stockpiles areas will be performed favouring fast growing and ground covering flora species able to minimize soil erosion. ■ Topsoil stockpiles shall not exceed 2 meters and the lateral slopes of the soil stockpiles shall not exceed 45 degrees; compaction by heavy machinery or other means must be avoided; drainage of storage areas will be provided to avoid the formation of waterlogged areas; in dry condition topsoil will be sprayed with water or planted temporarily to avoid wind erosion and favour vegetation.	IFC PS6	During construction phase	Topsoil stockpiles properly managed	E&S Manager All employees and contractors	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	■ If the topsoil and soil stockpiles are stored for a long period of time (more than 1 year), they shall be planted with appropriate methods in order to avoid erosion from wind and rain, and to protect the organic matter content.					
BIO06	**Minimization: footprint creep** ■ Limits of clearing and construction areas will be clearly signed or fenced in order to reduce the risk of footprint creep. ■ Vehicle movement will be restricted to the existing roads that connect the construction sites with the surrounding areas and vehicle speed will be restricted to ≤35km/h. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation.	IFC PS6	During construction phase	No signs of footprint creep outside planned construction areas. No signs of off-road driving	E&S Manager All employees and contractors	Not Started
BIO07	**Minimization: fish management** ■ Construction activities involving modifications to river or stream beds and banks (including bridges) should be limited to low water periods—typically between July and October, November and January, or February and March, depending on the year—to minimize sediment release. ■ No construction activities affecting river or stream beds and banks should occur during the breeding and spawning period (April to June) of CH triggering fish species such as *Acanthobrama centisquama, Alburnus orontis, Chondrostoma kinzelbachi, Cobitis levantina,* and *Capoeta barroisi*, within their potential habitat range. ■ Regular inspections of the diverted river or streams areas must be conducted to remove fish from isolated in-water work zones, if necessary. ■ Particular attention shall be paid to rehabilitation of riverbed and riparian vegetation at river crossings. If necessary, environmental engineering techniques will be included to stop the erosion and ensure soil protection and the development of	IFC PS6	During construction phase	Construction during the breeding season from April to June is avoided at all watercourses	E&S Manager Biodiversity specialist(s)	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	natural vegetation (such as erosion control mat, live crib wall, rock mattresses, hydro seeding and afforestation with appropriate species).					
BIO08	**Minimization: wildlife management** ■ Install speed limits and animal crossing signs on the access road and enforce speed limit along the site access road. The use of construction vehicles at night should be avoided in order to minimize the risk of traffic collisions with fauna. ■ Speed limits and fencing of sections in proximity of PC-05 and Q-06 points will be put in place wherever possible, in areas of particular interest for *gazella gazella.* Roadkills and animal sightings in this area will be reported by construction/maintenance workers. ■ Anti-poaching measures will be reinforced for *Gazella gazella* in collaboration with the Directorate General of Nature Conservation and National Parks. ■ Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, especially amphibians. ■ Feeding of wildlife or stray cats and dogs will be prohibited on-site. Fauna carcasses will be removed, and organic waste will be carefully managed and disposed in order to avoid attraction of wildlife or stray cats and dogs. ■ Organic waste will not be left, and dogs will not be fed so that stray dogs that threaten mountain gazelles are less likely to approach the area. In addition, cooperation will be made with the municipality to sterilize dogs. ■ If fauna species are encountered, employees and contractors will wait until it moves on by itself or they will ask the assistance of the Environmental technician for its safe removal and relocation in a suitable environment. ■ Following the breeding period of the *Gazelle gazelle*, which spans from April to July, vehicle mobility will be restricted after sunset, as well as before and during this period, in and around PC-05 and Q-06 points. During this time, vehicles will utilise low headlights, particularly. If individuals of the species are observed during	IFC PS6	During construction phase	Implementation of all wildlife management actions within and around project construction sites	E&S Manager All employees and contractors	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	the spring period, vehicles will be stopped, and headlights will be switched off. Particular attention will be paid to young individuals. ▪ Common tortoise (*Testudo graeca*) passage tunnels will be constructed at suitable points along the railway and highway line. ▪					
BIO09	**<u>Minimization: Bat management</u>** ▪ To prevent bats from entering the tunnel, the tunnel entrance and exit should be covered with tarpaulin during evening hours until construction is complete. ▪ Tunnel construction will be carried out during daylight hours when bats are inactive. ▪ Insect attraction should be prevented by using lighting systems that do not emit heat. Emission of noise/vibrations and light mitigation measures will be followed to avoid disturbing bat species around the construction site (BIO12, BIO13). ▪ Bat species will be monitored throughout the construction period, including during the breeding and mitigation phases. Based on the results of these monitoring studies, additional mitigation measures will be implemented if necessary.	IFC PS6	During construction phase	No sign of bat fatalities or bat colonies in the tunnel construction site	E&S Manager	Not Started
BIO10	**<u>Minimization: local hydrology management</u>** ▪ Bridges/Culverts/channels will be used as appropriate in correspondence with a river crossing or drainage features to avoid the interruption of waterways and drainage features and the formation of stagnant water. These bridges/culverts/channels will be implemented and installed in a way that will ensure the continuity of the water feature and will not constitute a barrier to fish movement. ▪ A particular attention shall be paid to rehabilitation of riverbed and riparian vegetation at river crossings. ▪ Management of surface drainage and runoff from the construction site will be performed to minimize sediment release into the natural watercourses and the accumulation of stagnant water. ▪ Waste and hazardous materials will be stored in adequate stored in order and kept away from waterbodies or drainage features to prevent any contamination.	IFC PS6	During construction phase	No sign of waterways interruption around the construction site. Full implementation of all surface drainage and runoff. Proper waste and hazardous	E&S Manager	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	▪ Changes in surface water quality, mainly due to dust from blasting or morphological changes, will be managed by keeping blasting sites as far as possible from water sources appropriate.			material management. Reduce changes in surface water quality.		
BIO11	**Minimization: erosion management** ▪ The presence of erosion phenomena should be monitored monthly with particular regards for steep slopes, river crossings and areas cleared of vegetation. ▪ If erosion phenomena are observed in correspondence environmental engineering techniques will be put in place to stop the erosion and ensure soil protection and the development of natural vegetation. Plants that are native to the region will be used for shielding, soil improvement and erosion control. Environmental engineering techniques will include as appropriate: erosion control mat, live crib wall, rock mattresses, hydro seeding and afforestation with appropriate species etc.	IFC PS6	Erosion phenomena monthly monitored throughout construction phase.	No signs of erosion around the construction site.	E&S Manager	Not Started
BIO12	**Minimization: noise and vibrations** ▪ Care will be taken to select machines and equipment with low noise emissions. ▪ Night works in proximity of natural habitats will be avoided (from 8 pm to 6 am) to reduce impacts to nocturnal fauna species; ▪ Rock blasting activities will be performed during daytime and at regular times to enhance local fauna habituation to noise and to avoid disturbance during critical hours for many species (dusk and dawn).	IFC PS6	During construction phase	Implementation of all noise management actions within and around Project construction sites	E&S Manager All employees and contractors	Not Started
BIO13	**Minimization: management of light emissions** preferred types of lights for exterior lighting (e.g: lights on site due to security reasons) include: ▪ Low-pressure sodium lamps (SOX): orange lamps seen along roadsides;	IFC PS6	During construction phase	Implementation of all emission management actions within	E&S Manager All employees	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	▪ Light emitting diodes (LEDs): light source of choice, emitted more directional, warmer colour temperatures (~ 3000°K); ▪ lights triggered by presence detectors, and lights oriented to the ground; ▪ the following types of lights should be avoided: ▪ mercury lamps (MBF): bluish-white lamps (attract insects and tolerant bat species); ▪ high-pressure sodium lamps (SON): brighter pinkish-yellow lamps; used as road lighting.			and around Project construction sites	and contractors	
BIO14	**<u>Minimization: management of dust emissions</u>** ▪ Dust from material handling, such as conveyors, trucks processing equipment, including storage piles, will be minimized by using covers and/or control equipment (water suppression, bag house, or cyclone) and increasing the moisture content by water spraying. ▪ Speed limit for all vehicles will be implemented so as not to generate dust emissions, and all trucks will be properly maintained at all times. ▪ Any unpaved internal and access roads will be adequately compacted and periodically graded, maintained, and sprayed with water as needed, to minimize dust from vehicle movements. If water spraying is deemed insufficient, other means of surface treatment (e.g., hygroscopic media, such as calcium chloride, and soil natural–chemical binding agents) for unpaved internal and access roads, or exposed stockpiles, will be implemented, by using a sprinkler system or a “water-mist cannon”. ▪ Blasting will be scheduled considering meteorological factors (e.g., precipitation, temperature, wind direction and speed) to the extent practical. Excavation will be stopped in the event of strong wind (generally wind speeds of 10 m/s or more).	IFC PS6	During construction phase	Full implementation of all emission (pollutants, dust) management actions within and around Project Sites.	E&S Manager All employees and contractors	Not Started

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
BIO15	**Minimization: Introduction and spreading of alien species** ▪ Trucks coming from the outside of the Project area will be washed frequently in a controlled site, if necessary, where residues will be managed as waste. ▪ Residues of the clearing will be managed as green-waste and safely disposed in order to avoid spreading of the species. ▪ Progressive restoration will be performed on temporary used areas, stockpiles and slopes with natural vegetation or native flora species, to control the spreading of invasive alien species. ▪ The use of non-native flora species, and especially of species classified as invasive alien species (IAS) must be avoided during rehabilitation/restoration works. ▪ If spreading of invasive flora species is observed, an appropriate eradication program will be developed and implemented.	IFC PS6	During construction phase	No spread of alien species within and around Project Sites. Full implementation of all transport and residues of clearing management actions.	E&S Manager All employees and contractors	Not Started
BIO16	**Minimization: employees' awareness** ▪ Awareness among employees and contractor working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered. ▪ An environmental education program will be developed raise awareness about *Gazella gazella and Hyaena hyaena*. Meetings organized with local organizations taking care of conservation with DGF/NGOs/General Directorate of Nature Conservation and National Parks (The authority that manages Hatay Mountain Gazelle YHGS).	IFC PS6	During construction phase	Training of all employees and subcontractors	E&S Manager	Not Started
BIO17	**Rehabilitation/Restoration** ▪ Areas cleared during construction for temporary use will be restored, as soon as possible, with the goal of producing a stable vegetative cover to minimize erosion, dust and spreading of invasive alien species, and the aim of re-establish the original habitat with a positive impact on biodiversity.	IFC PS6	At the end of the construction phase and beginning of operation	Restore all areas temporarily used during construction	E&S Manager Biodiversity specialist(s)	Not started

Bu dokümanda HASSAS bilgi bulunmamaktadır. / This document does not contain SENSITIVE information.

Item	Mitigation Measures/Actions	Ref.	Timeline and frequency	KPI	Respons.	Status
	■ Vegetation and topsoil restoration activities will be performed in all temporary facilities (blasting areas, borrow pits, camp areas, quarries, storage areas and open-close tunnel) in order to restore their original habitat. ■ The use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation /restoration works. ■ Only plants that are native to the region will be used for restoration, soil improvement, erosion control, stream banks and habitat rehabilitation. Seeding and planting of grass shrubs and tree species typical of the local vegetation species, such as Mediterranean maquis and mixed forest vegetation succession, will be used to ensure optimal ground cover. ■ If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented. ■ The ideal time to remove and dispose of invasive plants is before they flower and produce seeds. This helps minimize seed dispersal. ■ The removed plant material will be disposed of properly. Plant material will be put in closed thick, durable, black or clear plastic bags place in a sunny location for several days or weeks (depending on the temperature) to kill and decompose the plants. After this process the material can be composted on site or send to the local land field.					

7.2 Operation

Based on the ESIA the potential impacts on environmental components deriving from BIO management during the operation phase are:

1) presence of new buildings/infrastructures;
2) changes in local hydrology and water quality;
3) emission of noise and vibration;
4) railway and highway traffic;
5) emission of light;
6) introduction and spreading of alien species.

The following table details the environmental management and mitigation measures/actions identified for BIO during the operation phase. For each measure/action identified, the table shows:

- Item: the identification code of the mitigation measure/actions (ID.);
- Measures/Actions: description of the mitigation measures/ actions;
- Source document: is the reference to one or more applicable standard (i.e. National Regulation and Permits, EU Regulations/Directives, IFC PS/Guidelines, or other GIIP);
- Timeline and frequency: frequency/timing of the measure/action;
- KPI (Key performance indicator): quantitative compliance indicator or qualitative acceptance criteria that can be used to verify the actual effectiveness of the mitigation measure/actions;
- Responsibility: resource responsible for implementing the measures/actions;
- Status: progress of the measures/actions.

The aim of the “mitigation hierarchy” (avoidance, minimization, rehabilitation/restoration, offset) is applied for the selection of the measures to limit as far as possible negative impacts to the environment.

This process is intended as an adaptive management system, so that the mitigation and management approach will be adapted based on any new findings which could arise from the monitoring program described in the following section.

In case during monitoring non-conformities or unexpected residual impacts due to the Project are identified on site, the Biodiversity specialists will evaluate the situation and, if needed, propose changes and integrations to the mitigation and monitoring activities included in the present BMP. The proposed changes will be evaluated and approved by Project E&S Manager and by Project Manager who will also ensure that action/measures and monitoring activities are carried out timely and adequately.

Table 6: Mitigation measures/actions for the operation phase.

Item	Mitigation Measures/Actions	Source document	Timeline and frequency	KPI	Responsibilities	Status
BIO18	**Minimization: bird management** ▪ The tunnel entrance and exit sections have been identified as potentially high collision risk for bird species. In these sections, barrier-like structures will be used to minimise collision risk at the entrances and exits of the tunnels. ▪ The need for barrier-like structures in other sections will be carefully assessed in the field, taking into account the morphology and operational monitoring results (BIO30).	IFC PS6	Before the beginning and during the operation phase	Implementation of effective bird management measures in all necessary areas (implementation need will be evaluated monitoring KPI of BIO30)	E&S Manager Biodiversity specialist(s)	Not started
BIO19	**Minimization: bat management** ▪ It is expected that bat species will not colonize the tunnel or use it due to noise and vibration during operations. The colonization status of bats in the tunnel will be monitored during the first two years of operation, with a focus on migration and breeding periods. ▪ The need for effective mitigation measures for bat species in the tunnel section assessed the result of the operational monitoring results (BIO33).	IFC PS6	Before the beginning and during the operation phase	Implementation of effective bat management measures in all necessary areas (implementation need will be evaluated monitoring KPI of BIO33)	E&S Manager Biodiversity specialist(s)	Not started
BIO20	**Minimization: wildlife management** ▪ Based on the baseline available, there is no evidence that the railway and highway will be crossing areas likely to create high collision risk. However, following a precautionary approach and adaptative management principle, if needed based on the results of	IFC PS6	During operation phase	Full implementation of all wildlife management actions within and	Biodiversity specialist(s) All employees and contractors	Not started

Item	Mitigation Measures/Actions	Source document	Timeline and frequency	KPI	Responsibilities	Status
	the monitoring (BIO26), additional mitigation measure could be planned in specific sections of the railway-highway: fencing of particular sections of the railway-highway to avoid wildlife crossing and conduct wildlife toward safe crossing locations; creation of underpasses or overpasses designed in a way to be conductive for wildlife. ▪ Following the breeding period of the CH mammal species *Gazelle gazelle*, which spans from April to July, vehicle mobility will be restricted after sunset, as well as before and during this period, in and around PC-05 and Q-06 points. During this time, vehicles will utilise low headlights, particularly. If individuals of the species are observed during the spring period, vehicles will be stopped, and headlights will be switched off. Particular attention will be paid to young individuals. ▪ Feeding of wildlife or stray cats and dogs will be prohibited on-site and organic waste will be carefully managed and disposed in order to avoid attraction of wildlife or stray cats and dogs. ▪ Organic waste will not be left out and stray dogs will not be fed so that stray dogs that threaten mountain gazelles are less likely to approach the area. In addition, cooperation will be made with the municipality to sterilize dogs. ▪ Anti-poaching measures will be reinforced for *Gazella gazella* in collaboration with the Directorate General of Nature Conservation and National Parks. ▪ Install speed limits and animal crossing signs on the access road and enforce speed limit along the site access road. The use of			around project construction sites (implementation need will be evaluate monitoring KPI of BIO26)		

Item	Mitigation Measures/Actions	Source document	Timeline and frequency	KPI	Responsibilities	Status
	vehicles at night should be avoided in order to minimize the risk of traffic collisions with fauna. ▪ During regular operation and maintenance, keep selecting and using machines and equipment with low noise emissions (e.g. suitable mufflers on engine exhausts and compressor components; machines and equipment with low noise emissions). ▪ If fauna species are encountered employees and contractors will wait until it moves on by itself or they will ask the assistance of the Environmental technician for its safe removal and relocation in a suitable environment.					
BIO21	**<u>Minimization: fish management</u>** ▪ Within the Critical Habitat rivers, fish passages will be installed at river crossings associated with the railway. A similar approach will be applied to non-Critical Habitat rivers. Fish stairs, channels, or culverts will be used as appropriate in correspondence with river crossing or drainage features to avoid the interruption of waterways and drainage features and the formation of stagnant water. Culverts/channels will be implemented and installed in a way that will ensure the continuity of the water feature and will not constitute a barrier to fish movement. ▪ Particular attention shall be paid to rehabilitation of riverbed and riparian vegetation at river crossings. If necessary, environmental engineering techniques will be included to stop erosion and ensure soil protection and the development of natural vegetation (such as erosion control mats, live crib walls, rock mattresses, hydroseeding and afforestation with appropriate species).	IFC PS6	During operation phase	Full implementation of all fish management actions in all necessary areas	E&S Manager Biodiversity specialist(s)	Not started

Item	Mitigation Measures/Actions	Source document	Timeline and frequency	KPI	Responsibilities	Status
	▪ Additional mitigation measures will be put in place if needed based on the results of the monitoring.					
BIO22	**<u>Minimization: local hydrology and erosion management</u>** ▪ If erosion phenomena are observed in correspondence of river crossing environmental engineering techniques will be put in place to stop the erosion and ensure soil protection and the development of natural vegetation. Environmental engineering techniques will include as appropriate: erosion control mat, live crib wall, rock mattresses, hydro seeding and afforestation with appropriate species etc.	IFC PS6	During operation phase	Implementation of culverts/ channels in all river crossing Implementation of effective erosion control measures in all river crossing	E&S Manager Biodiversity specialist(s)	Not started
BIO23	**<u>Minimization: employees' awareness</u>** ▪ Awareness among employees and contractor working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered. ▪ An environmental education program will be developed raise awareness about *Gazella gazella and Hyaena hyaena*. Meetings organized with local organizations taking care of conservation with DGF/NGOs/General Directorate of Nature Conservation and National Parks (The authority that manages Hatay Mountain Gazelle YHGS).	IFC PS6	During operation phase	Training in all site inductions of all employees and subcontractors on the presence of conservation areas on site and how to behave in case of wildlife encounter	E&S Manager Biodiversity specialist(s)	Not started
BIO24	**<u>Rehabilitation/Restoration:</u>** ▪ Areas cleared during construction for temporary use will be restored as soon as possible, with the goal of producing a stable vegetative cover to minimize erosion, dust and spreading of invasive alien	IFC PS6	At the end of the construction phase and	Restore all areas temporarily used during construction, as soon as possible	E&S Manager Biodiversity specialist(s)	Not started

Item	Mitigation Measures/Actions	Source document	Timeline and frequency	KPI	Responsibilities	Status
	species, and the aim of re-establishing the original habitat with a positive impact on biodiversity. ■ Vegetation and topsoil restoration activities will be performed in all temporary facilities (mobilization and storage areas) in order to restore their original habitat. ■ Only plants that are native to the region will be used for restoration, soil improvement, erosion control, stream banks and habitat rehabilitation. Seeding and planting of grass shrubs and tree species typical of the local vegetation species, such as Mediterranean maquis and mixed forest vegetation succession, will be used to ensure optimal ground cover. ■ The use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation/restoration works. ■ If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.		beginning of operation	(where possible even before the end of the entire phase)		

8.0 MONITORING ACTIONS

The following tables detail the monitoring actions identified for BIO management activities during the construction and operation phase. The aim of the monitoring actions is to verify whether the residual impacts are under control and the mitigation measures/action have been effective.

For each monitoring measure/action identified, the table shows:

- Item: the identification code of the monitoring activity (ID);
- Monitoring Activity: description of the monitoring activity;
- Source document: is the reference to one or more applicable standard or limit value (i.e. National Regulation and Permits, EU Regulations/Directives, IFC PS/Guidelines, or other GIIP);
- Timeline and frequency: frequency/timing of the monitoring activity;
- KPI (Key performance indicator): regulatory limit value or qualitative acceptance criteria to comply with;
- Responsibility: resource responsible for implementing the monitoring activity;
- Status: progress of the measures/actions.

8.1 Construction

Table 7: Monitoring actions for the construction phase

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
BIO25	**Wildlife management** ▪ Accidents involving wildlife or the observation of live animals or carcasses along the access road or on the construction site will be recorded. ▪ Additional mitigation measures to discourage wildlife presence on site and avoid roadkill will be taken if needed. ▪ Camera traps will be placed at PC-SP01, Q-SP06, F-SP 5 and F-SP 6 points and the presence of *Hyaena hyaena* in the areas will be monitored. ▪ Presence of *Gazella gazella* species individuals will be recorded.	IFC PS6	Before and during the entire construction phase. Reports of incidents/observations to be presented every 3 months.	No accidents involving wildlife or the observation of carcasses. Register of wildlife observations from employees/ contractors.	E&S Manager All employees and contractors	Not started
BIO26	**Bird management** ■ Before construction, monitoring surveys will be conducted between March and August to monitor migratory birds along the highway and railway line, focusing on target species (globally EN, CR and VU species) and large-winged gliding birds. ■ The tunnel entry and exit points will be monitored during bird migration periods in the construction phase. The effectiveness of protective corridors established with netting to safeguard birds at these locations will be monitored, and additional measures will be implemented if necessary.	IFC PS6	Before and during the entire construction phase. In bird migrations periods (March-May and September-November) Reports of incidents/observations to be presented every 3 months.	No accidents involving birds or the observation of carcasses. Register of wildlife observations from employees/ contractors.	E&S Manager All employees and contractors	Not started
BIO27	**Bat management**	IFC PS6	Before and during the entire construction phase.	No accidents involving bats or the	E&S Manager All employees	Not started

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
	■ Bat species will be monitored during the breeding and mitigation phases according to EUROBATS methodology4. ■ Based on the results of these monitoring studies, additional mitigation measures will be implemented if necessary.		In bat migration and breeding periods (May and October) Reports of incidents/observations to be presented every 3 months.	observation of carcasses. Register of wildlife observations from employees/ contractors.	and contractors	
BIO28	**Fish management** ■ Schedule of construction work that are expected to impact LSA streams, such as bridges and diversion channel, will be closely monitored in order to ensure that at the river crossing work on the riverbed is limited to low water periods (typically between July-October or November-January or February-March depending on the year). ■ Presence and population status of fish species downstream of the project area will be monitored twice a year during the vegetative season (March to October). ■ Restoration of river crossings (including bridges) will be monitored in order to ensure the correct re-vegetation of the area and intervene in a timely manner in case of signs of vegetation stress or erosion.	IFC PS6	During the entire construction phase. Reports of observations to be presented every 3 months. River crossing monitored at least twice a year for the next 3 years during vegetative season (March to October).	No direct impact during river in full. Register of fish observations. Correct re-vegetation of river crossing areas.	E&S Manager, Biodiversity contractors	Not started
BIO29	**Footprint creep and hydrology/ erosion management** ■ Indirect and direct inadvertent impacts on natural habitats and river crossing (including bridges) present around the construction site will be monitored in order to assess eventual footprint creep outside designated areas.	IFC PS6	Monthly monitoring of direct and indirect impacts during the entire construction phase.	No direct/ indirect impact outside project footprint.	E&S Manager	Not started

[4] Battersby, J. (2008). Surveillance and monitoring methods for European bats. Guidelines produced by the Agreement on the Conservation of Populations of European Bats (EUROBATS), 85.

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
	■ Monitoring within and around the construction sites of the presence of erosion signs or stagnant water accumulation, functioning of bridges/culverts/channels, waste or hazardous substances spill.		Erosion signs or stagnant water monitored every three months during entire construction phase.	No sign of erosion or stagnant water accumulation.		
BIO30	**Introduction and spreading of invasive species** Presence and spreading of invasive flora species within and around the site and will be monitored every three months during the vegetative season (March to October) by an expert botanist, if necessary, extirpation campaign will be put in place in order to avoid the spreading of the invasive species.	IFC PS6	Every 3 months during vegetative season (March to October) throughout the entire construction and operation phase.	Effective avoidance of invasive species spreading within and around the Project Site.	E&S Manager; Biodiversity specialist(s).	Not started

8.2 Operation

Table 8: Monitoring actions for the operation phase

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
BIO31	**Wildlife management and awareness** ■ Accidents involving wildlife or the observation of live animal or carcasses along railway and highway and/or on-board recordings will be collected for at least 3 years of operation. ■ Based on the observations, additional mitigation measures to discourage wildlife crossing will be taken if needed.	IFC PS6	Records collected for at least 3 years of operation phase. Reports of incidents/observations to be presented every 3 months.	No accidents involving wildlife or the observation of carcasses. Register of wildlife observations from employees/ contractors.	E&S Manager All employees and contractors	Not started
BIO32	**Bird management** ■ Accidents involving birds along railway-highway route and tunnel entrance will be estimated using on-board recordings for at least 3 years of operation. ■ The data collected will be analysed to estimate bird collision risk as well as the presence of eventual areas with higher collision risk. ■ Based on the observations additional mitigation measures to protect birds from collision risk will be taken if needed.	IFC PS6	During the entire operation phase. Reports of incidents/observations are to be presented every 3 months.	No accidents involving wildlife or the observation of carcasses. Register of wildlife observations from employees/ contractors.	E&S Manager Biodiversity specialist(s)	Not started
BIO33	**Bat management** ■ The colonization status of bats in the tunnel will be monitored during the first two years of operation, with a focus on migration and breeding periods according to EUROBATS methodology[5].	IFC PS6	In the first two years of the operation phase.	No accidents involving wildlife or the observation of carcasses.	E&S Manager Biodiversity specialist(s)	Not started

[5] Battersby, J. (2008). Surveillance and monitoring methods for European bats. Guidelines produced by the Agreement on the Conservation of Populations of European Bats (EUROBATS), 85.

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
	■ The need for effective mitigation measures for bat species in the tunnel section assessed the result of the operational monitoring results.		In bat migration and breeding periods (May and October)	Register of wildlife observations from employees/ contractors.		
BIO34	**Fish management** ■ The presence and population status of fish species downstream of the project area will be monitored twice a year during the vegetative season (March to October). ■ Restoration of river crossings will be monitored at least twice a year for three years during the vegetative season (March to October) in order to ensure the correct re-vegetation of the area and intervene in a timely manner in case of signs of vegetation stress or erosion. ■ River crossings will be monitored at least twice a year for the next 3 years to verify whether the installed channels/culverts (or additional measures that will be judge necessary) are used by fishes in different water flow conditions.	IFC PS6	Twice a year for the first 3 years of operation.	Correct functioning of the installed fish passages. Register of fish observations.	E&S Manager Biodiversity specialist(s)	Not started
BIO35	**Hydrology/erosion management** ■ The presence of signs of erosion or stagnant water accumulation, waste or hazardous substances spill will be monitored on the railway and highway route in correspondence of natural habitats and river crossings and in the associated facilities rehabilitating areas.	IFC PS6	Twice a year for the first 3 years of operation	No sign of stagnant water, erosion and spills around the operation site	E&S Manager All employees and contractors	Not started
BIO36	**Invasive species** ■ The presence and spreading of invasive flora species on the railway and highway route in correspondence of natural habitats and river crossings will be monitored by an expert botanist.	IFC PS6	Twice a year during the vegetative season (from March to October) for the first three years after restoration	No spreading of invasive species	E&S Manager	Not started

Item	Monitoring Actions	Source doc.	Timeline and frequency	KPI	Resp.	Status
	■ If necessary, extirpation campaign through chemical (e.g. herbicide application) or mechanical (e.g. hand-weeding, cutting, pulling) removal, involving direct elimination of each individual both in form of seed and vegetative propagules, will be put in place in order to avoid the spreading of the invasive species. ■ The ideal time to remove and dispose of invasive plants is before they flower and produce seeds. This helps minimize seed dispersal. ■ The removed plant material will be disposed of properly. Plant material will be put in closed thick, durable, black or clear plastic bags place in a sunny location for several days or weeks (depending on the temperature) to kill and decompose the plants. After this process the material can be composted on site or send to the local land field.					
BIO37	**Rehabilitation/Restoration:** ■ The rehabilitation of temporary facilitates such as mobilization and storage areas for excess excavated material, and the restoration of river crossings will be monitored in order to ensure the correct re-vegetation of the area and intervene in a timely manner in case of signs of vegetation stress or erosion.	IFC PS6	Twice a year during the vegetative season (from March to October) for the first three years after rehabilitation/ restoration.	Restored areas with vegetation cover and composition similar to undisturbed areas	E&S Manager Biodiversity specialist(s)	Not started

9.0 AUDIT AND REVIEW

The correct implementation of this Management Plan is verified through internal inspections and audits to be carried out according to the requirements included in section “Internal audit” of the “ESMS Manual” and in the “Audit and Non-Conformities Procedure”.

The schedule, the frequency, the scope and objectives of the audit as well as the responsible internal auditors are indicated in the Audit Program that is developed and updated by Doğuş-EZE.

Internal auditing shall address:

- the correct implementation of this Management Plan;
- the correct development and implementation of Contractor’s Plan;
- the correct and timely implementation of an auditing and review system by the Contractor;
- each of the points indicated in the tables in section 7.0 (mitigation measures/actions) and 8.0 (monitoring activities) of this plan;
- the establishment of a stakeholder engagement process related to the aspects addressed by this Management Plan.

Evidences and results of the inspection and audit activities are included in the audit reports and in the “Non-Conformity and Preventive/Corrective actions” records.

Doğuş-EZEreviews results of inspections and audits and the progress of the Preventive/Corrective actions and, if necessary, takes additional appropriate actions according to the indications included in section 7 “Management Review” of the ESMS Manual.

Additional details related to both construction and the operation phase of the Project are expected to come in due course; it is therefore recommended that this plan is subject to a systematic review process during the construction phase and then before the starting of operation (3-4 months before) in order to encompass and consider any information relevant to the BIO matters.

During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances, operational needs or monitoring results. Revision of this Management Plan will be the responsibility of the E&S Manager, who is in charge of this Plan.

10.0 REPORTING

This section provides instructions and requirements for the reporting related to mitigation measures/actions, to monitoring activities and to internal auditing.

10.1 Reporting of the monitoring activities

Evidences and results of the monitoring activities (detailed in section 8.0) must be described in detail in appropriate monitoring reports. These monitoring reports must include the following minimum information/data (where relevant):

- analytical certificates from the laboratory/ies;
- localization of the monitoring activities (geographical coordinates in WGS84 system and elevation);
- map of the surveyed area;
- timing of the data collection (start date and end date);
- description of the applied methodology;
- KPI (Key performance indicator): regulatory limit value or qualitative acceptance criteria to comply with;
- the responsibility for implementing the specific monitoring activities (including reference to this Management Plan and reference to the appointment of third parties eventually contracted to perform part of the activity, e.g. external laboratories and consultants);
- conclusions on compliance vs. KPI, and eventual observations;
- implications and recommendations in respect to adaptive management;
- quality control procedures applied to ensure consistency and reliability of the analyses or results.

10.2 Reporting of the auditing activities

The correct implementation of this Management Plan must be verified through internal audits to be carried out according to the requirements included in the “ESMS Manual”, the internal auditing procedure and section 6.0 “Audit and review” of this Management Plan.

Evidences of the implementation of the mitigation measures/actions (detailed in section 7.0), of the timely deployment of monitoring activities (detailed in section 8.0) and of related results are described in the audit reports. These audit reports must include the following minimum information/data:

- list of the items audited (detailed in sections 7.0 and 8.0);
- information whether the items have been implemented within the indicated timeline and frequency;
- achievement (or not) of the KPIs;
- description of non-compliances eventually identified.

Signature Page

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