



ANTALYA ALANYA
OTOYOLU

ANTALYA-ALANYA MOTORWAY PROJECT

BIODIVERSITY ACTION PLAN

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LIST OF ABBREVIATIONS

AFAD	Disaster and Emergency Management Presidency
AoI	Area of Influence
AZE	Alliance for Zero Extinction
CEKUL	Foundation for the Protection and Promotion of the Environment and Cultural Heritage
CIMER	Presidency's Communication Center
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DSI	General Directorate of State Hydraulic Works
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EFPIs	Equator Principles Financial Institutions
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMEP	European Monitoring and Evaluation Programme
ENCON	ENCON Environmental Consultancy Co.
ESF	Environmental and Social Framework
ESHS	Environmental, Social Health, and Safety
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMR	Environmental and Social Monitoring Report
ESMS	Environmental and Social Management System
EU	European Union
EUAS	General Directorate of Electricity Generation Corporation
GBV	Gender-Based Violence
GHG	Green House Gas
GIIP	Good international Industry Practice
GIS	Geographical Information System
GP	Good Practices
GRM	Grievance Redress Mechanism
IAPCR	Industrial Air Pollution Control Regulation
IBA	Important Bird Area
IFC	International Finance Corporation
ILO	International Labor Organization
IPA	Important Plant Area
IPCC	Intergovernmental Panel on Climate Change
ISKUR	General Directorate of Turkish Employment Agency
IUCN	International Union for Conservation of Nature

KBA	Key Biodiversity Areas
KGM	General Directorate of Highways
LACRP	Land Acquisition, Compensation, and Resettlement Plan
LARPF	Land Acquisition and Resettlement Policy Framework
LRP	Livelihood Restoration Plan
MoAF	Ministry of Agriculture and Forestry
MoEUCC	Ministry of Environment, Urbanization and Climate Change
MoLSS	Ministry of Labor and Social Security
MTA	General Directorate of Mineral Research and Exploration
NGOs	Non-Governmental Organizations
O&M	Operations and Maintenance
OHS	Occupational Health and Safety
OP	Operational Policies
PAP	Project Affected Person
PIF	Project Introduction File
PIU	Project Implementation Unit
PM₁₀	Particulate matters with aerodynamic diameter smaller than 10µm
PM_{2.5}	Particles with aerodynamic diameter smaller than 2.5µm
PMU	Project Management Unit
PS	Performance Standard
RP	Resettlement Plan
RAP	Resettlement Action Plan
SAoI	Social Area of Influence
SCM	Stakeholder Consultation Meeting
SEA/SH	Sexual Exploitation and Abuse / Sexual Harassment
SEP	Stakeholder Engagement Plan
SEPA	Special Environmental Protection Areas
TEIAS	General Directorate of Electricity Transmission Company
The Project	Antalya-Alanya Motorway Project
TURKSTAT	Turkish Statistical Institute, TÜİK
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US EPA	United States Environmental Protection Agency
WB	World Bank
WBG	World Bank Group

EXECUTIVE SUMMARY

This Biodiversity Action Plan (BAP) has been prepared to support Antalya-Alanya Motorway Project (referred to as "the Project") and offers a detailed framework to mitigate potential ecological impacts associated with the highway's construction and operation. The BAP aims to ensure the Project's compliance with the international biodiversity standards, especially IFC Performance Standard 6 (PS6).

The BAP employs an adaptive management strategy, incorporating long-term monitoring to evaluate the effectiveness of mitigation measures and address any unforeseen challenges. Monitoring programs will assess habitat quality, species populations, and ecosystem changes during both the construction and post-construction phases, with annual reports detailing progress and outcomes. Stakeholder engagement is a key component of the BAP, with planned collaboration with local communities, conservation NGOs, and academic institutions. These partnerships are designed to raise awareness, strengthen conservation efforts, and ensure the long-term sustainability of the measures implemented.

The project area encompasses a variety of sensitive and diverse habitats, including rocky cliffs, Mediterranean scrublands, wetlands, and agricultural landscapes. These habitats host a wide range of flora and fauna, including endemic, migratory, and threatened species. Notably, this includes flora species like *Pyrus serikensis* and fauna species *Lyciasalamandra atifi*, which are endemic to the region, along with various bat species, birds and freshwater fishes. The BAP provides detailed action plans aimed at minimizing potential impacts on these species and habitats, with an emphasis on reducing disturbances, preserving connectivity, and improving habitat conditions. Pre-construction surveys have established the baseline ecological data, highlighting important habitats and species distributions. Mitigation strategies involve avoiding critical habitats and implementing construction activity restrictions during sensitive periods, such as animal hibernation, breeding, or migration. Prior to construction, an expert (Ecological Clerk of Work) will evaluate whether any sensitive situations are present in the construction area. Based on these findings, decisions will be made regarding the necessity of imposing restrictions. Habitat restoration initiatives will focus on replanting native vegetation, stabilizing soil, and rehabilitating impacted areas to restore ecological integrity.

By balancing developmental goals with ecological considerations, the Antalya-Alanya Motorway Project reaffirms its commitment to biodiversity conservation. This BAP not only ensures adherence to environmental standards but also serves as a model for integrating conservation into infrastructure development projects in ecologically sensitive areas.

I. INTRODUCTION

I.1. Purpose of the BAP

The Biodiversity Action Plan prepared based on the analysis of the outcomes from the Project's Critical Habitat Assessment (CHA) and. It consolidates the biodiversity and ecosystem service mitigation measures for specific biodiversity features identified in the CHA for the Project.

Based on the findings of the ESIA and CHA, Critical Habitats have been identified. The residual impacts during the construction phase are considered negligible or minor once the mitigation hierarchy is fully implemented. However, significant residual impacts during the operational phase persist, particularly concerning air pollution's effects on habitats and flora, following a precautionary approach. The primary goal of this BAP is to provide detailed justification for the on-site restoration activities (included within the mitigation hierarchy) aimed at achieving non-significant residual impacts on CH, as well as to propose additional or complementary measures designed to achieve a net gain for certain CH features.

The main objectives of the BAP are as follows:

- Identification of biodiversity values
- Development of mitigation measures
- Establishment of a monitoring framework
- Impact net loss calculations
- Stakeholder engagement

Biodiversity Action Plans (BAPs) are dynamic documents that should include agreed timelines for regular reviews and updates, reflecting new information, project progress, and evolving conservation contexts. If project mitigation measures are included in the ESIA or Biodiversity Management Plan (BMP), these should be referenced within the BAP. Unlike the BMP, which is primarily an operational document for site managers and contractors, the BAP typically covers actions for off-site areas, such as offsets and additional activities, and engages external partners, including implementing organizations, reviewers, or advisors. The BAP may also be supplemented by other documents, like an Offset Management Plan or Biodiversity Monitoring and Evaluation Plan (BMEP), which will be referenced once developed. Depending on the project's scale and nature, an initial BAP may outline a strategy and timeline for identifying actions aimed at achieving a net biodiversity gain.

Limitations

During the Lender's review of the CHA/ESIA and the current BAP, further revisions were made to the BAP based on the findings from these documents regarding Critical Habitat triggers and the additional mitigation measures outlined.

I.2. Scope of the BAP

The BAP aims to identify opportunities for no net loss or net gain through the following studies:

- **Confirmation of the insignificance of residual impacts on Critical Habitat features:** Based on the updated ESIA report, avoidance, minimization, mitigation, and restoration measures have been identified for these features to ensure residual impacts are non-significant. To support the understanding and detail of the mitigation hierarchy, particularly regarding on-site replanting of CH species to achieve no net loss, habitat mapping was conducted. This map, created using satellite/aerial imagery, identifies the habitats within the expropriation corridor. The results of the mapping will help estimate the amount of habitats that need to be restored.

- **Identification of Biodiversity Offsets: Proposed compensation/offsets include:**
 - i. Restoration/recovery offsets outside the project's expropriation corridor (not applicable here as all restoration can take place within the corridor).
 - ii. Offsets through habitat restoration/recreation within the road RoW as compensation for permanent habitat losses, to meet NNL (for PBFs) and NG objectives (for CH).
 - iii. Identification of Complementary Measures: Also referred to as Additional Conservation Actions (ACA), these are not primarily focused on achieving NNL or NG objectives but may contribute to NG, even though they are difficult to quantify or measure in practice.

I.3. Associated Documents

The Biodiversity Action Plan (BAP) for the project is closely connected to several key documents that serve as both the foundation for its development and the means to ensure its successful implementation. These documents work together to manage biodiversity conservation, environmental protection, and social impact mitigation throughout the project's lifecycle. Below is a summary of these important documents:

- Environmental and Social Impact Assessment (ESIA) Report
- Critical Habitat Assessment (CHA)
- Relevant Baseline Studies

II. RELEVANT STANDARTS AND GUIDELINES

This chapter describes the institutional framework in Türkiye and identifies the national environmental legislation, international agreements and protocols and international environmental and social standards including European Bank for Reconstruction and Development (EBRD) Environmental and Social Policy and Performance Requirements (PRs) and International Finance Corporation's (IFC) Policy and related Performance Standards (PSs) on Environmental and Social Sustainability that would be applicable to the Project.

The ecology assessment has considered relevant Turkish (national) legislation, applicable standards and guidelines for international finance, and international agreements to which Türkiye is a signatory.

Internationally accepted criteria are considered while choosing sampling points in the study area together with the species characteristic and habitat needs. This were done by overlaying the Project Area with the distribution of species of conservation concern; with sites identified as globally important for migratory species (e.g. IBAs, RAMSAR sites), national parks, protected areas, and key biodiversity areas.

II.1. International Agreements

In evaluating the threat/protection status of species; CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), Bern Convention, and IUCN (International Union for Conservation of Nature) Red List Database were used. Additionally, hunting status of all fauna elements was determined according to 2024-2025 Decision of the Central Hunting Commission (CHC) of Türkiye.

Species covered in CITES are given under three different appendices according to their conservation status. Appendix I cover the species, which are under the threat of extinction. Trade in the specimens of these species is not allowed except extraordinary circumstances. Appendix II includes species, which are not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival. Appendix III includes species, for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country.

Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention) provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Türkiye became a contracting party in 1994.

BERN Convention aims at conserving and promoting biodiversity, developing national policies for the conservation of wild flora and fauna and their natural habitats, protection of the wild flora and fauna from the planned development and pollution, developing trainings for protection practices, promoting and coordinating the research made regarding this subject. It has been signed by 26 member states of the European Council (as well as Türkiye) with the aim of conserving the wildlife in Europe. Species that are protected under the Bern Convention are classified according to the following categories:

- Appendix I: Strictly protected flora species
- Appendix II: Strictly protected fauna species
- Appendix III: Protected fauna species

All the nations, which are party to the BERN Convention, have signed the Convention on Biological Diversity as well. These parties are responsible from ensuring sustainable use of resources in line with their national development trends and conserving threatened species.

To determine the threatening status of species IUCN classifications are also used, which are used in Turkish classification as well. IUCN Red List is published to highlight those species that are facing a risk of extinction. A species may be listed in IUCN Red List after studies on its population decrease. Thus, since IUCN List is based on research (annual updates are being made for species lists of countries), many countries attach more importance to species taking place in IUCN list than species taking place in Bern List.

As an environmental treaty of the United Nations, CMS provides a global platform for conserving and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range.

As the only global convention specializing in the conservation of migratory species, their habitats, and migration routes, CMS complements and co-operates with a number of other international organizations, NGOs, and partners in the media as well as in the corporate sector.

Migratory species threatened with extinction are listed in Appendix I of the Convention. CMS Parties strive to strictly protect these animals, conserve or restore the places where they live, mitigate obstacles to migration, and control other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species.

Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional agreements.

II.2. Turkish Legal Requirements

It is the responsibility of the Ministry of Agriculture and Forestry (MoAF), together with the MoEUCC and their affiliated organizations to formulate policies concerning the conservation of biodiversity in Türkiye designate and manage protected areas, to develop and implement plans and programmes, to carry out activities in this scope and to provide coordination among all relevant institutions.

The affiliated organizations of the MoAF are the Special Environmental Protection Agency, the General Directorate of Forestry, the General Directorate of the State Meteorological Service, and the General Directorate of State Hydraulic Works. The provincial organization of the MoAF consists of the Provincial Directorates of Agriculture and Forestry, as well as the regional directorates of the affiliated organizations.

The MoAF's unit with primary authority and responsibility for the conservation and sustainable use of biological diversity is the General Directorate of Nature Conservation and National Parks, which is also the CBD focal point. The General Directorate of Nature Conservation and National Parks is the principal unit responsible for the management of protected areas designated under the National Parks Law, for the conservation of wildlife and for the regulation and supervision of terrestrial hunting.

The Central Hunting Commission (CHC) is established under the Terrestrial Hunting Law and includes members from MoAF and General Directorate of Nature Conservation and National Parks, Directorate of Hunting and Wildlife, universities, Ministry of Food, Agriculture and Livestock, non-governmental organizations, hunting associations and Gendarmerie General Command. CHC prepares a resolution every year and this resolution is published in the official gazette. The recent resolution covers the hunting season for 2024-2025. These resolutions define hunting periods, limits (in terms of number of individuals that can be hunted and dates for hunting), areas where hunting is banned, as well as the species that can and cannot be hunted. Thus, CHC resolutions provide some measure of

regulation over the exploitation of wildlife within Türkiye. In this regard, according to 2024 and 2025 Resolutions of the CHC appendixes are as follows:

- Appendix I; Includes game animals which are protected by the CHC
- Appendix II; Includes game animals which are allowed to be hunted in seasons predefined by CHC

The legislation listed in Chapter II, provide some areas protection status based on the presence of significant biological diversity, local endemics of importance, and threatened species. These designations include Natural Protected Sites, National Parks, Nature Protection Areas, Wildlife Protection and Development Sites and Specially Protected Areas.

Activities in such designated areas are also covered various regulations, but these areas are not specifically provided a protection status. In Türkiye, there is no conservation status for habitats as defined by a specific vegetation as there is provided in European Union (EU) countries where the EU Habitats Directive applies. In Türkiye, there is no specific habitat compensation requirement. There is only a policy regarding forested areas, which aims to replant at least as much of the forest area that is lost due to development activities.

II.3. Standards and Guidelines for International Requirements

The Project is committed to implementing the IFC Performance Standards (PS) in order to manage social and environmental risks and impacts. IFC PS6 covers areas of biodiversity conservation, ecosystem services and sustainable management of living resources, which are all fundamental to achieve sustainable development. The objectives of PS6 are outlined as follows:

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services; and
- To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities.

The requirements of PS6 are applied to projects: (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g. agriculture, animal husbandry, fisheries and forestry) based on the risks and impacts identification process.

Ecosystem Services Review

Ecosystem Services Review (ESR) was prepared in relation to the IFC Biodiversity Conservation and Sustainable Management of Living Natural Resources Guidance Note 6 requirements to determine ecosystem services to The Project.

The overall aim of the ecosystem service concept is to bring a holistic approach to environmental decision-making by valuing the environment in terms of the benefits people obtain from ecosystems. It is practical and pragmatic, focusing on goals that provide greatest environmental benefit at least cost to society and the natural environment with the aim of avoiding taking decisions with unintended secondary consequences that may be costly, increase risk or be detrimental to ecosystems and human well-being. The evaluation of the effects, both desirable and undesirable, of approaches to landscape management on the delivery of ecosystem services allow for a broader assessment of the true costs and benefits of actions and policies.

In addition, when the projects may affect ecosystem services of relevance to local people, Affected Communities attached to biodiversity and ecosystem services will participate in the determination of priority ecosystem services in accordance with the stakeholder engagement process

which is one of the key means to understanding impacts on biodiversity and identifying appropriate responses to such impacts as defined in IFC Performance Standard.

II.4. Critical Habitat Assessment Process

Critical habitats are areas with high biological diversity value. Their identification is based on the following key criteria:

- i) Habitats supporting Critically Endangered and/or Endangered species.
- ii) Habitats of significance for endemic and/or range-restricted species.
- iii) Habitats that support globally important populations of migratory species and/or are crucial for migratory corridors.
- iv) Highly threatened and/or unique ecosystems.
- v) Areas associated with key evolutionary processes.

These criteria are essential for determining critical habitats and ensuring their protection and conservation within the scope of ecosystem assessments and environmental management planning.

The criteria for critical habitats are defined according to IFC PS6, 2012, as follows:

- Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species
- Criterion 2: Endemic and/or restricted-range species
- Criterion 3: Migratory and/or congregation species
- Criterion 4: Highly threatened and/or unique ecosystems
- Criterion 5: Key evolutionary processes

Projects located in areas with high biological diversity value, recognized at the national and/or international level, may require a critical habitat assessment. These areas include:

- IUCN Protected Area Categories: Ia (Strict Nature Reserves), Ib (Wilderness Areas), and II (National Parks).
- Key Biodiversity Areas (KBA) and Important Bird and Biodiversity Areas (IBA).

A critical habitat assessment is essential for ensuring that project activities do not negatively impact these ecologically significant areas, and that conservation measures are integrated into project planning and implementation.

II.5. Mitigation Hierarchy

According to IFC PS6, the project is required to fully implement the mitigation hierarchy (Figure II.1). To apply this hierarchy in line with Performance Standard 6, an evaluation of the project's Area of Influence within the existing landscape -along with any related facilities- can help guide the identification, screening, and design of alternatives as part of the avoidance process. Mitigation measures should be developed or reviewed by qualified biodiversity and engineering experts to ensure their optimization in accordance with the hierarchy.

In cases where significant residual impacts on biodiversity remain, and only after the previous steps of the mitigation hierarchy have been thoroughly assessed and, where feasible, applied, the client may consider using biodiversity offsets as compensation.

Avoidance	Actions taken to prevent the irreversible loss of biodiversity or essential ecosystem services. This may involve alternatives such as site selection, design modifications, and scheduling changes.
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Minimization	Efforts to reduce or limit the duration, intensity, and/or extent of impacts that cannot be avoided. Alternatives include physical controls, operational adjustments, and abatement measures.
Restoration	When biodiversity or ecosystem services have been impacted, remediation involves efforts such as rehabilitation and restoration. Alternatives may include re-establishing habitats, restoring biodiversity values, and revitalizing ecosystem services.
Offset	Measures taken to compensate for any residual impacts that cannot be avoided, minimized, or remedied on-site. This can include restoration offsets and averted loss offsets.

Figure II.1 Mitigation Hierarchy

II.6. No Net Loss and Loss-Gain Assessment

Biodiversity Net Gain (BNG) is a metric used to assess the impact of a development project on biodiversity. The goal is to ensure that, as a result of the development process, biodiversity achieves a net positive outcome compared to its initial state. If biodiversity is lost, it is considered a net loss.

The principle of biodiversity balance is based on achieving no net loss of biodiversity. This means that the biodiversity gains from conservation efforts must offset the biodiversity losses caused by a specific project. In this approach:

- No Net Loss occurs when the biodiversity gains from conservation activities are equal to the biodiversity losses caused by the project, ensuring no overall decline in species, population sizes, or habitat conditions.
- Net Loss refers to a situation where biodiversity and its components are in a worse state than before the project.
- Net Gain occurs when the biodiversity benefits surpass the biodiversity losses, leading to an overall improvement in biodiversity.

This BNG framework is crucial for sustainable development and ecological compensation strategies, ensuring that biodiversity conservation are integrated into project planning and implementation.

III. PROJECT DESCRIPTION

Antalya-Alanya Motorway Project (the Project) is one of the two sub-projects that constitute the Afyonkarahisar-Alanya Motorway Project and is designed to connect Serikli and Alanya districts through Manavgat district of Antalya province (Figure III.1). The Project will enhance the existing transportation network services with surrounding provinces (Burdur, Muğla, Konya, Isparta, Karaman and Mersin). Various environmental, social, and technical studies have been conducted along the initial route of the Project tendered by the KGM.

According to the current design (as of July, 2024), total length of the Motorway, which will be a dual carriageway of mostly 3 and partially 2 lanes (3x2 and 2x2) in each direction, is 117.8 kilometers including the main carriageway and the access roads.

Table III.1 provides the approximate distances of the Motorway according to the current design.

Table III.1. Information of the Motorway

Start Location	End Location	Main Road (Motorway)	Access Roads	Total
Km 52+000	Km 136+000	84+000	33+800	117+800



Figure III.1. The Route of the Antalya-Alanya Motorway Project

IV. BAP IMPLEMENTATION PROCESS

IV.1. Roles and Responsibilities

This section outlines the capacity for implementing the Biodiversity Action Plan (BAP) and the corresponding measures to be undertaken. To ensure the effective execution of the action plans, the Project Owner will designate qualified personnel who will be responsible for addressing and managing biodiversity-related matters.

Project Management and Supervision Consultant

The Project Management and Supervision Consultant (PMSC) is responsible for overseeing the comprehensive implementation of the Biodiversity Action Plan (BAP), ensuring that biodiversity conservation measures are fully integrated into the project throughout all phases. The key responsibilities of the PMSC include:

- Monitoring the implementation progress of the BAP, ensuring that all mitigation measures are executed correctly and in a timely manner.
- Providing technical guidance to the Engineering, Procurement, and Construction (EPC) contractor to support compliance with environmental requirements.
- Reviewing and approving reports submitted by the EPC contractor and the Ecological Clerk of Works (ECoW).
- Engaging with regulatory authorities and relevant stakeholders to ensure adherence to both national and international environmental regulations.

Engineering, Procurement, and Construction Contractor

The Engineering, Procurement, and Construction (EPC) Contractor is responsible for carrying out construction activities and implementing the mitigation and enhancement measures outlined in the Biodiversity Action Plan (BAP). The roles and responsibilities of the EPC Contractor include:

- Implementing the BAP on-site, ensuring that biodiversity protection and mitigation measures are effectively applied throughout the construction phase.
- Conducting and managing ecological surveys and monitoring activities to evaluate the effectiveness of mitigation measures.
- Applying best construction practices identified during pre-construction ecological assessments to minimize impacts on biodiversity—for example, restricting construction activities during sensitive periods such as breeding seasons.
- Maintaining close communication with the Project Management and Supervision Consultant (PMSC) to ensure accurate reporting and tracking of all biodiversity management activities.

Ecological Clerk of Works

The Ecological Clerk of Works (ECoW) plays a critical role in ensuring that biodiversity management practices are effectively implemented during the construction phase. Serving as an on-site ecological advisor, the ECoW bridges the gap between ecological requirements and construction activities. Key responsibilities include:

- *Supervision of Daily Operations:* Overseeing construction activities to ensure that the provisions of the BAP are correctly applied, with particular focus on wildlife protection and habitat restoration measures.
- *Regular Site Inspections:* Conducting frequent inspections to verify that mitigation measures—such as erosion control systems and wildlife corridors—are properly installed and maintained.

- *Monitoring Support:* Assisting in biodiversity monitoring efforts, including species surveys and habitat restoration assessments, to evaluate the success of mitigation strategies.
- *Reporting and Recommendations:* Preparing detailed progress reports and providing informed recommendations to the Project Management and Supervision Consultant (PMSC) for any necessary adjustments to the BAP based on on-site observations.

Environmental Specialists

Environmental specialists, whether affiliated with the Project Management and Supervision Consultant (PMSC) or the Engineering, Procurement, and Construction (EPC) Contractor, will provide technical expertise in biodiversity conservation and environmental protection. Their key responsibilities include:

- Conducting environmental impact assessments on habitats and species through field surveys and consultation with local ecological experts.
- Developing and refining biodiversity management action plans, including species-specific mitigation measures, habitat restoration strategies, and pollution control protocols.
- Supporting biodiversity monitoring activities by ensuring that scientific data is accurately collected, analyzed, and applied to improve mitigation strategies.

Regulatory Authorities and Local Authorities

Governmental bodies will play a critical role in supervising and enforcing the implementation of the BAP, including:

- **Ministry of Environment, Urbanization, and Climate Change (MoEUCC):** Responsible for monitoring project compliance with national environmental legislation, the MoEUCC will provide overarching regulatory oversight and guidance throughout the project lifecycle.
- **Local Government and Environmental Agencies:** Regional authorities will ensure the project aligns with local environmental regulations and may offer additional recommendations for biodiversity protection, leveraging site-specific knowledge and expertise.

Stakeholders and Community Representatives

Stakeholders—including local communities, conservation organizations, and non-governmental organizations (NGOs)—will actively contribute to the success of the BAP. Their involvement includes:

- Participating in consultation processes during key phases of the project to ensure that local concerns, knowledge, and suggestions are integrated into planning and implementation.
- Engaging in biodiversity conservation programs, such as native vegetation planting and wildlife monitoring initiatives.
- Providing feedback on the effectiveness of mitigation measures and overall implementation of the BAP, supporting adaptive management by contributing local perspectives and observations.

IV.2. Monitoring and Reporting

A comprehensive Biodiversity Monitoring and Evaluation Programme (BMEP) was developed to evaluate the effectiveness of the mitigation and enhancement measures implemented throughout the Project. The BMP focused on monitoring the condition and ecological health of affected habitats, assessing the success of restoration activities, and tracking the impacts on species populations.

The results of biodiversity monitoring activities and the progress of mitigation measures will be communicated to stakeholders on a regular basis, ensuring transparency and enabling ongoing feedback and adaptive management

IV.3. Mitigation Measures

One of the objectives of the BAP was the formulation of specific actions to be implemented for biodiversity conservation, following the identification of priority habitats and species. Each action plan developed in this chapter outlined a set of measures specifying what needed to be done and within what time frame.

The BAP actions were designed to be adaptive and open-ended, allowing for updates and improvements based on ongoing research and the evolving nature of the Project. The mitigation hierarchy was strictly followed, ensuring that all necessary avoidance, minimization, and mitigation measures were implemented. Where required, additional offsets beyond those defined in this document were also considered throughout the life cycle of the Project.

V. FINDINGS OF BIODIVERSITY BASELINE

V.1. Protected Areas

Internationally recognized areas are situated in the vicinity of the Project Area, which spans the provinces of Antalya and Mersin. These include Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs), both of which are identified as critical for supporting biodiversity. A total of 16 internationally recognized areas have been identified; however, no RAMSAR sites are located within or near the Project Area. Studies have shown that parts of the Antalya Plains (designated as both a KBA and IBA) and Kızılot (KBA) fall within the boundaries of the Project Area.

V.2. Habitats

As part of the ESIA, the extent of both natural and modified habitats was evaluated. The Critical Habitat Assessment utilized the relevant Ecologically Appropriate Area for Analysis (EAAA) for the various habitats and species considered.

- C2 - Surface running waters
- J1 - Buildings of cities, towns and villages
- G1.1 - Riparian and gallery woodland, with dominant *Alnus*, *Betula*, *Populus* or *Salix*
- T3 - Coniferous forest
- T1.4 - Mediterranean and Macaronesian riparian forest
- S7.211 - Aegean *Sarcopoterium phrygana*
- S6 - Garrigue
- S5 - Maquis, arborescent matorral and thermo-Mediterranean scrub
- V1 - Arable land and market gardens

The results indicated that habitats within the expropriation corridor and its surrounding area (400 m buffer zone) were primarily classified as modified habitats.

V.3. Flora and Fauna Species

Flora

As a result of the field study, a total of 221 plant species belonging to 60 families were identified within the project area. Among these, seven species (*Eryngium kotschyi*, *Phlomis leucophracta*, *Phlomis lycia*, *Phlomis monocephala*, *Phlomis nissolii*, *Pyrus serikensis*, and *Sideritis congesta*) are endemic to Türkiye. Only one species, *Pyrus serikensis* (Endangered - EN), is classified as threatened according to IUCN criteria. No other plant species in the area are considered threatened.

Amphibians

As a result of literature and field studies, five amphibian species have been recorded. One of which, *Lyciasalamandra atifi* (Endangered - EN), is classified as threatened. The primary reason for *Lyciasalamandra atifi* being classified as EN by the IUCN is its specific habitat, climatic, and hydrological requirements. Despite this, monitoring studies conducted during the spring, the optimal season for observing the species, did not detect its presence in the area.

Reptiles

A total of 25 species belonging to 14 families from the Testudines and Squamata orders were identified in the project area and ecological impact areas. Of these, only *Testudo graeca* (Vulnerable - VU) is classified as threatened according to IUCN criteria. However, this species has a wide distribution across Türkiye in various habitats, and its population within the project area does not meet critical habitat assessment criteria. Among the reptiles, there are four endemic lizard species (*Ablepharus anatolicus*, *Anatololacerta ibrahimi*, *Lacerta pamphylica*, and *Blanus aporus*). Among these endemic species,

Lacerta pamphylica has a relatively narrower and more localized distribution. The project area lies within the distribution range of *Lacerta pamphylica*.

Birds

Based on observations in the project area and literature studies, it was determined that a total of 124 bird species belonging to 33 families from nine orders live in the project area and ecological impact areas. Among them, *Neophron percnopterus* (Endangered - EN) and *Streptopelia turtur* (Vulnerable - VU) are listed as threatened.

Mammals

According to the studies carried out in the project area and ecological impact areas, it was determined that there was a possibility of a total of 46 mammal species belonging to 17 families from five orders. Bats represent the largest group among both small and large mammal species in the area. Two bat species, *Rhinolophus mehelyi* and *Myotis capaccinii* (both Vulnerable - VU), are classified as threatened. However, bat monitoring did not detect either species within the project area.

Fishes

In the field studies conducted for the project, 29 fish species from seven families were identified. Among these, five species are classified as threatened (Critically Endangered - CR, Endangered - EN, and Vulnerable - VU). These include one CR species (*Anguilla anguilla*), two VU species (*Cyprinus carpio* and *Capoeta antalyensis*), and two EN species (*Alburnus baliki* and *Pseudophoxinus fahrettini*). Since the rivers in the project area discharge into the sea, the catadromous species *Anguilla anguilla* (European eel) inhabits these waters.

VI. PRIORITY BIODIVERSITY AND CRITICAL HABITAT FEATURES

VI.1. Selection Criteria for Priority Habitats and Species

Based on the evaluations conducted during the Ecological Assessment and monitoring studies carried out within the scope of the Project, as well as the analyses undertaken as part of the Biodiversity Action Plan (BAP), habitats and species of high priority and conservation significance were identified in this section.

To achieve the targeted outcomes, one of the key objectives of the BAP was to focus on species and habitats requiring specialized management strategies and mitigation measures. Earlier sections of this report outlined various national and international criteria used to assess the conservation status and threat levels of habitats and species. Accordingly, all biodiversity assessments were carried out in alignment with one or more of these criteria, as applicable to their respective contexts.

VI.2. Critical Habitat Features

Based on the findings of the Critical Habitat Assessment carried out for the Project, the following features have been identified as meeting the criteria to be classified as Critical Habitat.

- *Pyrus serikensis* is in “Endangered – EN” category according to IUCN and found primarily within the maquis ecosystem surrounding the project area, with known populations located near the Serik district, thus meeting critical habitat assessment criteria. Consequently, maquis areas along the project route have been designated as critical habitats.
- Amphibian species *Lyciasalamandra atifi* is in “Endangered – EN” category according to IUCN and meeting critical habitat assessment criteria. However, this species typically inhabits higher elevations and was not observed in the project area
- Considering the overall distribution ranges of all endemic reptile species, there is no critical habitat within the project area as defined by critical habitat assessment criteria.
- No bird species meets critical habitat assessment criteria based on their population status. Considering the population densities of migratory bird species present in the area, it has been determined that their populations are not at a level that meets critical habitat assessment criteria. Consequently, no critical habitat has been designated for birds within the project area.
- Since the global population densities of the bat species are unknown and no significant populations were observed in the area, they do not meet critical habitat assessment criteria.
- Since no freshwater fish species meet the critical habitat assessment criteria, no critical habitat has been designated.

Table VI.1. Critical Habitat Assessment Results

Criteria	Species / habitat triggered
Criterion 1: Critically endangered and/or endangered species	• Maquis, arboreal matorral, and thermo-mediterranean scrub (EUNIS code S5)
	• <i>Pyrus serikensis</i>
Criterion 2: Endemic and/or restricted-range species	• <i>Lyciasalamandra atifi</i>

VI.3. Priority Habitats and Species of Conservation Importance

As a result of the comprehensive assessments conducted during the biodiversity studies, the selection criteria for priority habitats and species to be addressed in the biodiversity conservation action plans -developed as part of this document- were defined as follows.

Habitat types and species identified as having high priority and conservation importance listed in Table VI.2. The conservation of these species required specific actions to be implemented within the scope of the Project.

Table VI.2. Priority habitats and species of conservation importance

Biodiversity Component		Status
Habitats	Maquis, arboreal matorral, and thermo-mediterranean scrub (EUNIS code S5)	Natural habitat that do meet the Critical Habitat Criteria.
Species	<i>Pyrus serikensis</i>	Regional endemic
	<i>Lyciasalamandra atifi</i>	EN category in the IUCN Red List
	<i>Lacerta pamphylica</i>	Local endemic
	<i>Testudo graeca</i>	VU category in the IUCN Red List
	<i>Neophron percnopterus</i>	EN category in the IUCN Red List
	<i>Streptopelia turtur</i>	VU category in the IUCN Red List
	<i>Myotis capaccinii</i>	VU category in the IUCN Red List
	<i>Rhinolophus mehelyi</i>	VU category in the IUCN Red List
	<i>Alburnus baliki</i>	Endemic and EN category in the IUCN Red List
	<i>Capoeta antalyensis</i>	Regional Endemic and VU category in the IUCN Red List
	<i>Oxynoemacheilus eregliensis</i>	VU category in the IUCN Red List
	<i>Pseudophoxinus fahrettini</i>	Regional Endemic and EN category in the IUCN Red List

VII. IMPACT ASSESSMENT ON ECOLOGY

The construction and operation of the Motorway Project will involve a wide range of activities that have the potential to affect the ecology. Impacts of project activities can be further divided into the target group of terrestrial and aquatic biological elements. Important impacts of motorway construction and operation activities on the biological environment are mainly habitat fragmentation. Habitat fragmentation can be described as splitting natural habitats and ecosystems into smaller, more isolated patches. The process of fragmentation is connected to many different factors, of which the direct loss and isolation of natural habitat are the most important.

VII.1. Potential Impacts on Critical Habitats

Habitat Loss

The project area is primarily characterized by maquis vegetation and agricultural lands, interspersed with isolated patches of degraded forest habitat. The construction of the highway is not expected to have a significant impact on biodiversity within agricultural zones. However, certain sections of maquis vegetation may undergo changes in their natural structure, and the use of natural forest areas for soil deposition could have adverse effects on local biodiversity. To mitigate these potential impacts, post-construction rehabilitation efforts should be undertaken to restore the natural features of affected habitats. With the implementation of appropriate conservation measures, the project is not expected to result in permanent habitat loss for plant species.

Habitat Fragmentation

One of the key ecological concerns in highway development is habitat fragmentation. Ensuring connectivity between both sides of the road is essential to support wildlife movement and maintain genetic diversity. While ecological overpasses are commonly used to address this issue, the specific characteristics of the project area reduce the necessity for additional structures. Due to the region's topography and the presence of rivers, the highway design includes nine viaducts, several bridges, and at-grade crossings, which are anticipated to provide sufficient connectivity for fauna. Moreover, the highway follows a low-elevation route (10–160 m) parallel to the Mediterranean coast, where no north-south migratory species have been recorded. The southern side of the highway also lacks continuous habitats, further diminishing the risk of significant habitat fragmentation. As a result, the construction of additional ecological overpasses is not deemed necessary.

Water Pollution

Disturbance to the vegetation cover and natural environment of the region will lead to the degradation or destruction of habitats. Highway construction activities are expected to impact river ecosystems through excavation, blasting, the installation of artificial structures, channel straightening, and alterations to floodplain dynamics. In particular, construction and excavation in coastal sections of waterways can negatively affect aquatic organisms, water-dependent habitats, and associated fauna species. Pollution and increased turbidity during construction are likely to occur. Without appropriate mitigation measures, such contamination could lead to a gradual decline or loss of basin ecosystems and the degradation of natural biosynthetic reservoirs.

Noise and Dust Pollution

Construction activities will generate dust, noise, and vibrations, which may temporarily disturb native mammalian species. However, these impacts are not expected to have long-term effects on the local fauna. Following the completion of construction, the composition and presence of fauna species in the area are anticipated to gradually return to their original state over time.

VIII. BIODIVERSITY NET LOSS AND LOSS-GAIN CALCULATION

Biodiversity Net Gain (BNG) is a metric used to assess the impact of a development project on biodiversity. The goal is to ensure that, as a result of the development process, biodiversity achieves a net positive outcome compared to its initial state. If biodiversity is lost, it is considered a net loss.

The principle of biodiversity balance is based on achieving no net loss of biodiversity. This means that the biodiversity gains from conservation efforts must offset the biodiversity losses caused by a specific project.

VIII.1. Net Loss and Loss-Gain of Biodiversity by Habitats

Along the highway corridor, the main road will span 84 km with a width of 39.5 m, while the 33.8 km of connection roads will have a width of 29 m. These sections will be covered with asphalt and concrete, and the primary biodiversity loss will result from this land conversion.

A buffer zone averaging 77.5 m in width and 120.9 km in length will be rehabilitated or left for natural vegetation regeneration on both sides of the road. This buffer zone will provide opportunities for biodiversity enhancement, helping to offset net loss. Since approximately 60% of the highway route passes through low-biodiversity agricultural areas, the buffer zones in these sections are expected to contribute to an increase in biodiversity value.

In the net gain/loss calculation, each habitat has been evaluated individually.

VIII.2. Calculation of Biodiversity Net Loss and Net-Gain

Along the project route, a 400-meter-wide and approximately 117.8-kilometer-long corridor will be established, including construction sites, quarries, concrete plants, asphalt plants, and other facilities. The habitats within these areas and their respective coverage are provided in Table VIII.1.

Table VIII.1. Habitat Types, Covered Areas and Habitat Assessment Scores in the Project Area

Habitat Types	Habitat Area (ha)	Habitat Assessment Score		
		Distinctiveness	Condition	Strategic Importance
V1 - Arable Land and Market Gardens	4,045	2	1	1
S5 - Maquis, Arboreal Matorral, and Thermo-Mediterranean Scrub	347	6	2	1
C2 - Surface Flowing Waters	37	6	2	1
J1 - Urban, Town, and Village Buildings	520	6	2	1
G11 - Riparian and Gallery Forests Dominated by Alnus, Betula, Populus, or Salix Genera	37	6	2	1
T14 - Mediterranean and Macaronesian Riparian Forest	94	6	3	1
S7211 - Aegean Sarcopoterium phrygana	171	6	3	1
S6 - Garrigue	447	6	3	1
T3 - Coniferous Forest	1,092	6	3	1

Based on the evaluation of all habitats within the project area, net biodiversity gain and loss calculations have been conducted. In this context, the initial biodiversity value and the post-development biodiversity value, reflecting the impact of the project on habitats, have been calculated. The net gain/loss ratio and percentage were determined as follows:

Initial (Baseline) Biodiversity Value = 5.7

Post-Development Biodiversity Value = 4.7

Net Biodiversity Change = -1.0

Net Biodiversity Gain Percentage = -17%

The results indicate that the construction of the highway will have negative impacts on biodiversity, leading to a net loss. Therefore, to mitigate this net loss, the biodiversity impact mitigation hierarchy must be applied, following the principles of avoidance, minimization, restoration, and offsetting to manage the project's potential impacts on biodiversity.

The first three steps of the impact mitigation hierarchy -Project Design, Environmental and Social Impact Assessment (ESIA), and Biodiversity Action Planning (BAP) - was incorporated into the project planning process. Additionally, offset measures were identified for each habitat type affected by net loss to compensate for the negative impacts on biodiversity.

IX. HABITATS AND SPECIES ACTION PLANS

IX.1. Action Plan for Critical Habitats

The maquis habitat, a defining component of the Mediterranean ecosystem, occupies approximately 5% of the proposed highway route. These habitats are particularly susceptible to anthropogenic pressures due to their limited extent and fragmented distribution. Within these areas, seven endemic plant species have been identified, and the vegetation supports a diverse native fauna. A portion of the maquis habitat will be affected by road construction, soil deposition, and the establishment of worksite areas. To minimize ecological impacts, it is essential to prevent further disturbance and degradation in the remaining sections. Restoration efforts should be undertaken in areas where habitat has been degraded, aiming to reestablish original ecological conditions.

As an offset strategy, it is recommended to carry out planting activities consisting of native species in the region in order to compensate the loss of habitats that have previously been destroyed due to fires in the region and will be degraded due to the construction of the Motorway.

Given the presence of the critically important species *Pyrus serikensis* within these habitats, all related activities under this action plan must be aligned and coordinated with relevant conservation and management plans.

Objectives of the Action Plan

- To minimize the loss and degradation of maquis habitats resulting from project activities.
- To ensure the provision of suitable living conditions and maintain habitat connectivity for endemic and other ecologically critical plant species.
- To implement effective post-construction habitat restoration measures and support the long-term sustainability of ecosystem services.

Habitat Protection

- Prior to the commencement of construction, areas with dense maquis habitats will be mapped in detail.
- Construction activities will be scheduled to avoid critical periods such as flowering, breeding, and hibernation seasons of key species.
- Unnecessary land use will be avoided, and the extent of disturbed areas will be minimized accordingly.

Reducing Habitat Fragmentation

- Corridors will be established to connect fragmented maquis habitats and facilitate wildlife movement.
- Infrastructure will be adapted to include features such as underpasses and culverts to ensure the safe passage of animals.

Restoration Activities

- Topsoil removed during construction will be carefully stored to preserve seed banks and later reused in the restoration of disturbed areas.
- Rocks and stones displaced during construction will be repurposed to restore habitats. In some cases, they will be arranged to create microhabitats for local fauna.
- Invasive species will be systematically removed, and native species will be reintroduced to rehabilitate the ecosystem.

Preservation of Ecosystem Services

- Sedimentation barriers and proper drainage systems will be installed in construction zones to mitigate erosion.
- Restoration activities will aim to enhance the capacity of these habitats to sequester carbon and regulate water resources.

Offsetting

- Plantation activities consisting of native species of the region will be carried out in areas to be determined.

Monitoring and Evaluation

- Continuous monitoring will be conducted on maquis habitats, endemic plant species, and indicator species such as *Pyrus serikensis*.
- Annual monitoring reports will be prepared and shared with relevant stakeholders, and necessary revisions to the action plan will be made based on findings.
- Local communities will be actively involved in habitat restoration and monitoring efforts.

Stakeholder Engagement and Awareness

- Construction personnel will receive training focused on habitat conservation and the significance of key species.
- Community outreach sessions will be held to provide information and ensure transparency regarding the project's environmental impact and mitigation strategies.

IX.2. Action Plan for *Pyrus serikensis*

Among the plant taxa identified in and around the Project area, *Pyrus serikensis* falls under the EN (Endangered) category. *Pyrus serikensis* is found within the maquis ecosystem in and around the project area, with determined populations located near the Serik district. Therefore, it meets critical habitat criterion (Criterion-1) for Critical Habitat Assessment.

Given the critical population of *Pyrus serikensis* and the impracticality of translocation, it is recommended that this species be propagated through planting as part of an offset strategy.

Objectives of the Action Plan

- To preserve seed banks and promote natural regeneration through effective topsoil management practices.
- To restore maquis and rocky habitats and ensuring the protection and continuity of the natural environments supporting endemic plant species.

Habitat Identification and Protection

- Conservation measures targeting maquis habitats will be implemented to indirectly safeguard endemic plant species.
- Restoring disturbed areas with native species following the completion of construction activities.

Topsoil Management

- Topsoil containing native seeds and beneficial microorganisms will be carefully excavated and stored during construction works.
- This preserved topsoil will be reapplied during the restoration phase to facilitate natural seed dispersal and support the regeneration of endemic plant species.

Restoration Activities

- Restoration efforts will be made of this species within their original habitat.

Offsetting

- Plantation of the *Pyrus serikensis* will be carried out in suitable areas to be determined.

Monitoring and Reporting

- Regular monitoring will be conducted to evaluate the population health and trends of *Pyrus serikensis* as well as the overall quality of their habitats.
- Monitoring outcomes will be compiled into annual reports and disseminated to relevant stakeholders. The restoration plan will be revised as needed based on monitoring findings.

Stakeholder Engagement and Awareness

- Restoration activities will be supported through collaboration with local communities and subject-matter experts.
- Raising initiatives will be undertaken to inform stakeholders about the ecological importance of conserving *Pyrus serikensis*.

IX.3. Action Plan for Endemic Plants

Endemic plant species identified along the Motorway route are naturally distributed within maquis habitat. These species will benefit from the comprehensive habitat conservation and restoration measures outlined in this plan. Indirect protection will be achieved through actions such as the careful management of topsoil and the replanting of native species during post-construction restoration activities, thereby supporting the long-term sustainability of endemic plant populations.

Seven endemic plant species (*Eryngium kotschyi*, *Phlomis leucophracta*, *Phlomis lycia*, *Phlomis monocephala*, *Phlomis nissolii*, *Pyrus serikensis*, and *Sideritis congesta*) were determined during the ecological baseline studies for the Project. These findings were based on both field surveys and a thorough review of relevant literature. It is recommended to implement this action plan for endemic plant species other than *Pyrus serikensis*.

Objectives of the Action Plan

- To preserve seed banks and promote natural regeneration through effective topsoil management practices.
- To restore maquis and rocky habitats and ensuring the protection and continuity of the natural environments supporting endemic plant species.

Habitat Identification and Protection

- Conservation measures targeting maquis habitats will be implemented to indirectly safeguard endemic plant species.
- Restoring disturbed areas with native species following the completion of construction activities.

Topsoil Management

- Topsoil containing native seeds and beneficial microorganisms will be carefully excavated and stored during construction works.
- This preserved topsoil will be reapplied during the restoration phase to facilitate natural seed dispersal and support the regeneration of endemic plant species.

Restoration Activities

- Restoration efforts will prioritize the re-establishment of endemic plant species within their original habitats.

Monitoring and Reporting

- Regular monitoring will be conducted to evaluate the health and population trends of endemic plants as well as the overall quality of their habitats.
- Monitoring outcomes will be compiled into annual reports and disseminated to relevant stakeholders. The restoration plan will be revised as needed based on monitoring findings.

Stakeholder Engagement and Awareness

- Restoration activities will be supported through collaboration with local communities and subject-matter experts.
- Raising initiatives will be undertaken to inform stakeholders about the ecological importance of conserving endemic plant species.

IX.4. Action Plan for *Lyciasalamandra atifi*

Lyciasalamandra atifi, an endemic terrestrial salamander species which is endangered according to IUCN, occurs in fragmented populations along the Taurus Mountains, between Alanya and Serik, at elevations ranging from 190 to 1,400 meters. While the species was not observed during field surveys conducted within the Project Area, the presence of potentially suitable habitats suggests occurrence of the species in the vicinity of the Project Area is possible.

Pre-construction surveys are expected to confirm the presence of the species and this Action Plan will be implemented accordingly based on the findings.

Objectives of the Action Plan

- To reduce direct impacts on wildlife populations and their habitats.
- To prevent disturbances during active periods.
- To rehabilitate degraded habitats and implement post-construction monitoring of population dynamics.

Habitat Identification and Pre-Construction Surveys

- Comprehensive surveys will be conducted within maquis habitats to identify active populations and critical habitat areas.

Construction Phase Measures

- A qualified fauna expert will be engaged to supervise construction activities and implement immediate mitigation strategies as required.
- Dust suppression techniques will be applied along access routes, and noise barriers will be installed to minimize environmental stress.
- In situations where avoidance is not feasible, individuals will be safely translocated to ecologically similar habitats, ensuring minimal stress and a high likelihood of survival.

Habitat Connectivity and Protection

- Existing native vegetation essential for shelter, nesting, and foraging will be conserved.

Post-Construction Activities

- Areas affected by construction will be rehabilitated using native plant species, and rocky habitat features will be reconstructed to support recolonization.
- Annual monitoring program will be implemented over a three-year period to assess population trends and habitat recovery.

Stakeholder Engagement and Awareness

- Targeted training will be provided to construction personnel on the ecological requirements and conservation strategies.
- Outreach campaigns will be carried out to raise awareness among local communities regarding the species ecological role and the importance of its conservation.

IX.5. Action Plan for *Reptiles*

Field studies conducted within the Project Area and its ecological impact zone, supplemented by interviews with local residents and a review of existing literature, have identified a total of 25 reptile species potentially occurring in the area. Of these, four species are endemic, while the remaining 21 are widely distributed and generally considered to be tolerant of a range of environmental conditions.

Among the 25 reptile species with potential distribution within the Project Area and its vicinity, *Testudo graeca* has been classified as Vulnerable (VU) according to the IUCN Red List. It is recommended that monitoring for *Testudo graeca* be conducted during the first year of the operational phase. Based on the data obtained, a decision should then be made regarding the necessity of continuing the monitoring activities in subsequent years

Objectives of the Action Plan

- To reduce direct impacts on wildlife populations and their habitats.
- To prevent disturbances during torpor periods and improve connectivity between habitats.
- To rehabilitate degraded habitats and implement post-construction monitoring of population dynamics.

Habitat Identification and Pre-Construction Surveys

- Comprehensive surveys will be conducted within maquis habitats to identify active populations and critical habitat areas.

Construction Phase Measures

- Construction activities in key habitats will be limited during the winter months (November–February) to avoid disturbance during the species hibernation period.
- A qualified fauna expert will be appointed to oversee construction operations and implement immediate mitigation measures as necessary.
- Dust suppression techniques will be applied along access routes, and noise barriers will be installed to minimize environmental stress.
- Where avoidance is not feasible, individuals will be safely translocated to ecologically similar habitats prior to the onset of winter, ensuring minimal stress and maximizing survival potential.

Habitat Connectivity and Protection

- Underpasses or culverts will be installed in fragmented landscapes to facilitate safe movement and maintain ecological connectivity.
- Existing rocky outcrops and native vegetation, which are essential for shelter, nesting, and foraging, will be preserved and protected throughout the project duration.

Post-Construction Activities

- Construction-affected areas will be rehabilitated using native plant species, and rocky habitat features will be reconstructed to promote recolonization by the species.
- Annual monitoring program will be implemented over a three-year period to assess population dynamics and evaluate the success of habitat restoration efforts.

Stakeholder Engagement and Awareness

- Targeted training sessions will be provided to construction personnel, focusing on the ecological needs and conservation strategies.

IX.6. Action Plan for *Neophron percnopterus*

Neophron percnopterus (Egyptian vulture) is classified as Endangered (EN) by the IUCN and is a migratory scavenger that depends on rocky cliffs and valleys for nesting, and open landscapes for foraging.

This Action Plan aims to address potential impacts on the species by outlining strategies to avoid, minimize, and mitigate disturbances to its critical habitats. It is essential to assess the population status of these species in the Project Area, along with factors such as habitat use, feeding, and other bioecological characteristics to evaluate the species population status.

Objectives of the Action Plan

- To prevent disturbance to nesting sites during the breeding season.
- To maintain habitat connectivity and preserve key foraging areas.
- To monitor potential impacts and ensure effective habitat restoration following construction activities.

Pre-Construction Phase Measures

- Pre-construction surveys will be conducted in rocky cliff areas during late March and April to identify potential nesting sites before construction begins.
- During the nesting surveys, the presence of other raptor species will be monitored. If active nests are identified, additional protective measures will be incorporated into the construction schedule, such as avoiding activities near these nests during their breeding season.
- Nesting areas identified during surveys will be marked and protected to avoid disturbance.

Construction Phase Measures

- Construction activities, including blasting and the use of heavy equipment, will be restricted near identified nesting sites during the breeding season (March–August).

Habitat Protection and Restoration

- Sediment barriers will be used, and soil will be stabilized to prevent the degradation of foraging areas.
- Waste management practices will be implemented to prevent accidental poisoning from construction debris or spills.
- Disturbed rocky cliff habitats will be rehabilitated following construction to ensure they remain suitable for nesting.

Monitoring and Evaluation

- Ongoing monitoring of potential nesting sites and foraging habitats will be conducted throughout the construction period.
- Post-construction monitoring will be carried out for at least three years to assess nesting success and habitat recovery.

Stakeholder Engagement and Awareness

- The stakeholder will collaborate with ornithologists and conservation organizations to ensure access to technical expertise.
- Local communities and construction teams will be informed about the species and the importance of preserving their habitats to reduce human disturbance.

IX.7. Action Plan for *Streptopelia turtur*

Streptopelia turtur (Eurasian Turtle Dove), listed as Vulnerable (VU) on the IUCN Red List, is a migratory bird species recorded in Türkiye during the spring and summer months. It typically inhabits forest edges, Mediterranean maquis, and agricultural landscapes characterized by scattered trees and shrubs. The species is experiencing population declines primarily due to habitat loss, agricultural intensification, and hunting pressures, particularly along its migratory routes.

This Action Plan outlines specific measures aimed at ensuring the protection of the species and minimizing disturbances during construction activities, with particular attention to maquis habitats.

Objectives of the Action Plan

- To prevent disturbance to nesting sites during the breeding season.
- To align construction activities with the species breeding and migration patterns.
- To monitor potential impacts and ensure effective habitat restoration following construction activities.

Pre-Construction Phase Measures

- Pre-construction surveys will be conducted in nesting habitats during late March and April to identify potential nesting sites before construction begins.
- Nesting areas identified during surveys will be marked and protected to avoid disturbance.

Construction Phase Measures

- Construction activities, including blasting and the use of heavy equipment, will be restricted near identified nesting sites during the breeding season (March–August).

Habitat Protection and Restoration

- Sediment barriers will be used, and soil will be stabilized to prevent the degradation of foraging areas.
- Waste management practices will be implemented to prevent accidental poisoning from construction debris or spills.
- Disturbed rocky cliff habitats will be rehabilitated following construction to ensure they remain suitable for nesting.

Monitoring and Evaluation

- Ongoing monitoring of potential nesting sites and foraging habitats will be conducted throughout the construction period.
- Post-construction monitoring will be carried out for at least three years to assess nesting success and habitat recovery.

Stakeholder Engagement and Awareness

- The stakeholder will collaborate with ornithologists and conservation organizations to ensure access to technical expertise.
- Local communities and construction teams will be informed about the species and the importance of preserving their habitats to reduce human disturbance.

IX.8. Action Plan for Bats

The threatened bat species *Myotis capaccinii* and *Rhinolophus mehelyi* are distributed within the Area of Influence. The Motorway Project encompasses areas containing rocky habitats, caves, and other natural features that may provide potential habitats for bats. Given that the rocky areas designated for quarrying within the project site offer suitable roosting habitats for bats, it is essential to monitor these species prior to the commencement of stone crushing activities.

Pre-construction surveys are expected to yield more definitive data regarding the presence of the species, and any necessary mitigation measures will be revised accordingly based on the findings.

Objectives of the Action Plan

- Ensure the protection of critical bat habitats, including roosting, breeding, and hibernation sites.
- Inform and guide construction activities in consideration of bat presence and activity patterns.
- Preserve habitat connectivity and uphold overall ecological integrity within the project area.
- Support long-term bat conservation efforts through post-construction habitat restoration and ongoing monitoring initiatives.

Pre-Construction Activities

- Comprehensive surveys will be conducted to assess bat presence in caves, rocky habitats, and other potential roosting areas prior to the initiation of construction.
- Critical roosting, breeding, and hibernation sites will be identified and mapped.
- Construction activities will be suspended in confirmed hibernation areas between December and March.
- Construction will be restricted in identified breeding sites from March to August to avoid disturbance during sensitive life stages.

Construction Phase Measures

- Construction schedules will be aligned to avoid sensitive periods identified through pre-construction surveys, particularly during hibernation and breeding seasons.
- No construction will be undertaken within critical bat habitats during these periods.

Lighting Control

- Low-intensity, non-UV lighting will be used to minimize disruption to bat behavior.
- All lighting will be directed away from bat flight paths and roosting sites to maintain natural activity patterns.

Noise and Vibration Management

- Noise barriers will be installed to reduce acoustic disturbances near key bat habitats.
- The operation of heavy machinery will be limited to designated hours to control vibration and noise levels.

Habitat Protection and Restoration

- All identified caves and rocky habitats will be clearly marked and protected throughout the construction phase.
- Measures will be taken to maintain the physical integrity of these areas during all construction activities.

Habitat Restoration

- Following the completion of construction, disturbed habitats will be restored using native vegetation and structural features that support bat roosting.
- Caves and rocky areas will be rehabilitated to ensure their continued suitability as bat habitats.

Monitoring and Reporting

- A regular monitoring program will be implemented to assess both habitat conditions and bat populations before, during, and after construction.
- Post-construction monitoring will continue for a minimum of five years to evaluate long-term impacts.
- Monitoring results will be communicated to project stakeholders and management authorities.
- Collected data will be utilized to inform and enhance future conservation measures and project planning.

Stakeholder Engagement and Awareness

- Construction personnel will receive comprehensive training on bat conservation, including the identification of sensitive habitats and the application of appropriate mitigation strategies.
- Targeted outreach initiatives will be carried out to raise awareness within local communities about the ecological importance of bats and the necessity of protecting their habitats.

IX.9. Action Plan for Fishes

A total of 29 fish species are likely to inhabit the streams along the motorway route, with 11 of these species being endemic. While some of the endemic species are widely distributed, monitoring activities are recommended for those with a more restricted distribution.

The measures outlined in this Action Plan must be implemented to ensure the protection of fish populations and the integrity of their aquatic environment.

Objectives of the Action Plan

- To reduce direct impacts on aquatic populations and their habitats.
- To prevent disturbances during spawning periods.
- To implement post-construction monitoring of population.

Habitat Identification and Pre-Construction Surveys

- Comprehensive surveys will be carried out within aquatic environments to identify active populations.

Construction Phase Measures

- Construction activities will be restricted during the spawning period (April-May) to prevent disturbance.
- During the construction, no interventions should be carried out within the riverbeds to prevent disruption of the aquatic ecosystem and no activities should be carried out that could hinder fish migration.
- If construction activity must be undertaken during this period, it should only proceed following a thorough assessment to determine the presence of spawning activity in the area.
- A qualified hydrobiologist will be engaged to oversee construction activities and to implement immediate mitigation measures as necessary.

Habitat Connectivity and Protection

- Wastewater management practices will be implemented to prevent pollution of surface running waters from construction debris or spills.
- Existing aquatic habitats and riparian vegetation, which are essential for spawning and feeding, will be conserved and protected throughout the project.

Post-Construction Activities

- Post-construction monitoring will continue to evaluate long-term impacts and ensure the health of fish population.

Stakeholder Engagement and Awareness

- Targeted training sessions will be provided to construction personnel on the ecological requirements and conservation strategies for freshwater fishes.
- Outreach campaigns will be conducted to raise awareness within local communities about the ecological role of the species and the importance of its protection.

IX.10. Summary of Action Plans

The summary of action plans in Table IX.1 outlines the biodiversity conservation and monitoring strategies developed for the Antalya–Alanya Motorway Project. It presents a detailed summary of action plans targeting key habitats, endemic species, and critical fauna. These plans define clear objectives, mitigation measures, monitoring approaches, and designated responsibilities to facilitate effective implementation.

Table IX.1 Summary of Action Plans

Biodiversity Component	Approach	Objectives	Location	Potential Impacts	Mitigation Measures	Responsibility
Maquis, Arboreal Matorral, and Thermo-mediterranean Scrub	Avoid, Reduce, Mitigate, Restore, Offset	Minimize habitat loss and degradation; restore habitats; ensure habitat continuity	Maquis habitats along the motorway	Fragmentation, noise, light pollution; habitat degradation during construction	<ul style="list-style-type: none"> Map critical maquis areas before construction Restrict construction during flowering, breeding, and hibernation periods Limit unnecessary land use Reuse stored topsoil and rocks for restoration Remove invasive species and reintroduce native vegetation Plant native species to compensate the loss of habitat 	EPC Contractor (AAOİAŞ); ECoW; Local Communities
<i>Pyrus serikensis</i>	Avoid, Mitigate, Restore, Offset	Protect endemic habitats; manage topsoil; restore ecosystems	Maquis habitats within the Area of Influence	Habitat loss, soil disturbance, plant destruction during construction	<ul style="list-style-type: none"> Conduct pre-construction surveys to identify critical habitats Remove and store topsoil with seeds for reuse Rehabilitate disturbed areas using local plant species Plant species in designated areas to compensate population degradation 	EPC Contractor (AAOİAŞ); ECoW
Endemic Plants <i>Eryngium kotschy</i> <i>Phlomis leucophracta</i> <i>Phlomis lycia</i> <i>Phlomis monocephala</i> <i>Phlomis nissolii</i> <i>Sideritis congesta</i>	Avoid, Mitigate, Restore	Protect habitats; manage topsoil; restore ecosystems	Maquis and shrub habitats within the Area of Influence	Habitat loss, soil disturbance, plant destruction during construction	<ul style="list-style-type: none"> Conduct pre-construction surveys to identify critical habitats Remove and store topsoil with seeds for reuse Rehabilitate disturbed areas using local plant species 	EPC Contractor (AAOİAŞ); ECoW
<i>Lyciasalamandra atifi</i>	Avoid, Reduce, Mitigate	Protect habitats; avoid disturbances during hibernation	Maquis and shrub habitats near the Project Area	Habitat loss; noise, dust	<ul style="list-style-type: none"> Conduct habitat surveys pre-construction to locate active populations Implement dust and noise controls 	EPC Contractor (AAOİAŞ); ECoW
Reptiles	Avoid, Reduce, Mitigate	Protect habitats; avoid disturbances during hibernation	Maquis and rocky habitats within the Area of Influence	Habitat loss; noise, dust; disturbance during hibernation	<ul style="list-style-type: none"> Conduct habitat surveys pre-construction to locate active populations Restrict construction in hibernation period (November-February) Implement dust and noise controls Create wildlife corridors in fragmented areas 	EPC Contractor (AAOİAŞ); ECoW
<i>Neophron percnopterus</i>	Avoid, Minimize, Mitigate	Protect nesting habitats; maintain foraging areas; monitor impacts	Rocky cliffs and valleys near the Project Area	Nesting site disturbance; foraging habitat fragmentation; noise impacts	<ul style="list-style-type: none"> Conduct nesting surveys during pre-construction Avoid noisy activities near nesting areas during breeding season (April-July) Use erosion control measures to protect foraging habitats Rehabilitate disturbed rocky areas post-construction 	EPC Contractor (AAOİAŞ); ECoW
<i>Streptopelia turtur</i>	Avoid, Reduce, Mitigate, Restore	Protect nesting habitats; align activities with breeding seasons; restore areas	Maquis, forest edges, and agricultural areas within the Project Area	Habitat disturbance, noise pollution, nesting site destruction	<ul style="list-style-type: none"> Conduct pre-construction surveys in nesting habitats Avoid noisy activities near nesting areas during breeding season (April-July) Reintroduce native vegetation to restore habitats Implement sedimentation barriers to prevent soil erosion 	EPC Contractor (AAOİAŞ); ECoW
Bats	Avoid, Reduce, Mitigate, Restore	Prevent habitat loss; ensure species conservation; restore habitats	Rocky areas, caves and quarries within the Area of Influence	Habitat loss; light and noise pollution; roosting site disturbance	<ul style="list-style-type: none"> Conduct surveys to identify roosting and hibernation sites Avoid activities near roosting areas during hibernation period (November-February) Use low-intensity, non-UV lighting Restore disturbed habitats post-construction Protect roosting structures 	EPC Contractor (AAOİAŞ); ECoW
Fishes	Avoid, Reduce, Mitigate	Protect habitats; align activities with breeding seasons	Surface running waters within the Area of Influence	Habitat loss; water pollution	<ul style="list-style-type: none"> Conduct habitat surveys pre-construction to locate active populations Restrict construction of bridges and viaducts in spawning period (April-May) Avoid disruption of the riverbed Implement dust and noise controls Implement measures for surface water pollution 	EPC Contractor (AAOİAŞ); ECoW

X. BIODIVERSITY MONITORING AND EVALUATION PROGRAMME (BMEP)

The primary objective of the Biodiversity Monitoring and Evaluation Programme (BMEP) is to assess the status of biodiversity components and evaluate the integration of Biodiversity Action Plan (BAP) measures into project activities and their interaction with human-induced impacts. Ongoing monitoring of BAP implementation is essential to ensure the effectiveness of defined actions and the achievement of conservation goals. Monitoring should be conducted throughout both the construction and post-construction phases to track biodiversity trends and enable timely mitigation in response to unforeseen impacts. During project construction and operation, monitoring will ensure compliance with all relevant legislation, contract requirements, and effective implementation of BAP actions.

Serving as a practical reference for project stakeholders, the monitoring plan in Table X.1 summarized essential actions and supports strategic planning, execution, and adaptive management across all phases of the project.

Table X.1 Biodiversity Monitoring and Evaluation Summary

Habitat / Species	Monitoring Parameter/ Performance Indicator	Monitoring Location	Monitoring Action	Time Period	Monitoring Frequency
Maquis, Arboreal Matorral, and Thermo-mediterranean Scrub	Evaluate the status of natural habitat areas that may harbor critical habitat trigger species	Maquis habitats along the motorway	Regular habitat monitoring, including flora and fauna surveys should be conducted.	Between February and May	Regular habitat monitoring, including flora and fauna surveys; prepare annual reports
<i>Pyrus serikensis</i>	Evaluate the status of the population and its habitat; Presence and abundance of species	Maquis habitats within the Area of Influence	Monitoring the species population status within the Aol	Between April and September	Regular monitoring of plant populations and habitat recovery annually
Endemic Plants <i>Eryngium kotschy</i> <i>Phlomis leucophracta</i> <i>Phlomis lycia</i> <i>Phlomis monocephala</i> <i>Phlomis nissolii</i> <i>Sideritis congesta</i>	Evaluate the species population status; Presence and abundance of endemic species	Maquis and shrub habitats within the Area of Influence	Monitoring the species population status within the Aol	Between April and September	Regular monitoring of plant populations and habitat recovery annually
<i>Lyciasalamandra atfi</i>	Evaluate the status of the population and its habitat; Presence and species	Maquis and shrub habitats near the Project Area	Monitoring the species presence within the Aol	Between February and June	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Lacerta pamphylica</i>	Evaluate the species population status	Maquis and rocky habitats within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Testudo graeca</i>	Evaluate the species population status	Maquis and rocky habitats within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Neophron percnopterus</i>	Evaluate the status of the species; Presence of species	Rocky cliffs and valleys near the Project Area	Monitoring species presence and habitat use (transition, feeding, accommodation) within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Streptopelia turtur</i>	Evaluate the status of the species; Presence of species	Maquis, forest edges, and agricultural areas within the Project Area	Monitoring species presence and habitat use (transition, feeding, accommodation, reproduction, wintering) within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Myotis capaccinii</i>	Evaluate the status of the species; Presence of species	Rocky areas, caves and quarries within the Area of Influence	Monitoring species presence and habitat use (migration, foraging, roosting) within the Aol	Between March and October	Habitat condition and species population monitoring for 5 years post-construction
<i>Rhinolophus mehelyi</i>	Evaluate the status of the species; Presence of species	Rocky areas, caves and quarries within the Area of Influence	Monitoring species presence and habitat use (migration, foraging, roosting) within the Aol	Between March and October	Habitat condition and species population monitoring for 5 years post-construction
<i>Alburnus baliki</i>	Evaluate the species population status	Surface running waters within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Capoeta antalyensis</i>	Evaluate the species population status	Surface running waters within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Oxynoemacheilus eregliensis</i>	Evaluate the species population status	Surface running waters within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years
<i>Pseudophoxinus fahrettini</i>	Evaluate the species population status	Surface running waters within the Area of Influence	Monitoring the species population status within the Aol	Between March and September	Habitat and species monitoring during construction; post-construction monitoring for 3 years

