Istanbul New Airport ESIA

Environmental Baseline and Impact Assessment

Ecology

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Contents

7.8 Ecology 1

7.8.1 Introduction 1
7.8.2 Policy, Regulatory and Administrative Framework 1
7.8.3 Assessment Methodology 12
7.8.4 Baseline Information, Background and Sources of Information 37
7.8.5 Potential Impacts 107
7.8.6 Mitigation and Residual Impacts 137
7.8.7 Summary of Residual Impacts 151
7.8.8 Conclusions 165

Annex 7.8.A: Plant Species Recorded In the Project Area

Annex 7.8.B: Insect Species Recorded In the Project Area

Annex 7.8.C: Marine Fish Species

Annex 7.8.D: Migratory Bird Survey Results (Spring 2014): Excluding Large Soaring Bird Species

Annex 7.8.E: Migratory Bird Survey Results (Autumn 2014): Excluding Large Soaring Bird Species

Annex 7.8.F: Breeding Bird Survey Results

Annex 7.8.G: Critical Habitat Assessment

Annex 7.8.H: Ecosystem Services Review

Annex 7.8.I: Photographs

List of Tables

Table 7.8.1 Laws and Regulations on Conservation of Habitats and Species 4

Table 7.8.2 Central Hunting Commission Resolution Appendices 5

Table 7.8.3 Turkish Nature Area Conservation Categories 6

Table 7.8.4 International Union for Conservation of Nature Categories of Extinction Risk 14

Table 7.8.5 National Threat Categories for Bird Species 15

Table 7.8.6 The Dates on which the Study of Sampling Points Throughout Flora Survey 18

Table 7.8.7 Matrix for Evaluating Overall Impact Significance 35

Table 7.8.8 Ecological Sensitivity Criteria 35

Table 7.8.9 Bird Species Identified in the Environmental Impact Assessment 39

Table 7.8.10 Endemic and Threatened Species Present within Terkos Basin KBA 42

Table 7.8.11 Populations of IBA Trigger Species for Terkos Basin Important Bird Area 43

Table 7.8.12 Globally and Nationally Threatened Conservation Categories And Seasonal Status of Waterbird Species Recorded at Lake Terkos in 2014 45

Table 7.8.13 Comparison of Wintering Bird Survey Results: Lake Terkos and Project Area 47

Table 7.8.14 Endemic and Threatened Species Present within Agacli Sand Dunes Key Biodiversity Area 48

Table 7.8.15 Endemic and Threatened Species Present within the Bosphorus Region Key Biodiversity Area 50

Table 7.8.16 Populations of Important Bird Area Trigger Species for the Bosphorus Region Important Bird Area 52

Table 7.8.17 Endemic and Threatened Species Present within West Istanbul Pasture Key Biodiversity Area 53

Table 7.8.18 Endemic and Threatened Species Present within Kucukcekmece Basin 54

Table 7.8.19 Populations of Important Bird Area Trigger Species for Kucukcekmece Basin Important Bird Area 55

Table 7.8.20 Habitat Types within the Project Area 58

Table 7.8.21 List of the Algae Identified in Lake Kulakcayiri 59

Table 7.8.22 Identified Marine Biotopes in the Black Sea 65

Table 7.8.23 Threatened and Endemic Plant Species within the Project Area 69

Table 7.8.24 List of the Benthic Organisms of Marine Identified within the Project Area and its Surroundings 73

Table 7.8.25 List of the Zooplankton of Marine Identified within the Project Area and its Surroundings 74

Table 7.8.26 List of the Freshwater Fish Species Identified within the Project Area and its Surroundings 75

Table 7.8.27 List of the Amphibia and Reptilia Species Identified within the Project Area 79

Table 7.8.28 Numbers of Large Soaring Migratory Birds Species Recorded in Spring 2014 86

Table 7.8.29 Numbers of Large Soaring Migratory Birds Species Recorded in Autumn 2014 94

Table 7.8.30 Numbers of Wintering Waterbirds Recorded in Project Area 98

Table 7.8.31 List of the Mammalia Species Identified in the Project Area 101

Table 7.8.32 List of Mammalia Species Identified in Each Habitat Type 105

Table 7.8.33 Project Activities and Likely Pathways of Potential Impact 107

Table 7.8.34 Critical Habitat Determination Summary 108

Table 7.8.35 Sensitivity Appraisal of Internationally Recognised Areas 110

Table 7.8.36 Habitat Sensitivity Appraisal 110

Table 7.8.37 Plant Species Sensitivity Appraisal 112

Table 7.8.38 Terrestrial Invertebrate Species Sensitivity Appraisal 112

Table 7.8.39 Marine Invertebrate Species Sensitivity Appraisal 113

Table 7.8.40 Freshwater Fish Species Sensitivity Appraisal 113

Table 7.8.41 Marine Fish Species Sensitivity Appraisal 113

Table 7.8.42 Herptile Species Sensitivity Appraisal 114

Table 7.8.43 Bird Species Sensitivity Appraisal 115

Table 7.8.44 Terrestrial Mammal Species Sensitivity Appraisal 116

Table 7.8.45 Marine Mammal Species Sensitivity Appraisal 116

Table 7.8.46 Significance of Construction Impacts to Internationally Recognised Areas Prior to Mitigation 119

Table 7.8.47 Significance of Construction Impacts to Habitats Prior to Mitigation 121

Table 7.8.48 Significance of Construction Impacts to Threatened and Red List Plant Species Prior to Mitigation 123

Table 7.8.49 Significance of Construction Impacts to Invertebrates Prior to Mitigation 124

Table 7.8.50 Significance of Construction Impacts to Freshwater Fish Prior to Mitigation 125

Table 7.8.51 Significance of Construction Impacts to Marine Fish Prior to Mitigation 126

Table 7.8.52 Significance of Construction Impacts to Herptiles Prior to Mitigation 126

Table 7.8.53 Significance of Construction Impacts to Birds Prior to Mitigation 128

Table 7.8.54 Significance of Construction Impacts to Terrestrial Mammals Prior to Mitigation 129

Table 7.8.55 Significance of Construction Impacts to Marine Mammals Prior to Mitigation 130

Table 7.8.56 Significance of Operational Impacts to Internationally Recognised Areas Prior to Mitigation 132

Table 7.8.57 Significance of Operational Impacts to Bird Species Prior to Mitigation 135

Table 7.8.58 Significance of Operational Impacts to Marine Mammals Prior to Mitigation 136

Table 7.8.59 Review of Possible Measures to Reduce Birdstrike 148

Table 7.8.60 Summary of Residual Impacts 152

List of Figures

Figure 7.8.1 Project Area and Sampling Points for Marine Ecology Studies 17

Figure 7.8.2 Sampling Points for Terrestrial Flora Surveys 20

Figure 7.8.3 Project Area and Aquatic Sampling Point Locations 22

Figure 7.8.4 Waterbodies Surveyed for Amphibians 24

Figure 7.8.5 Bird Observation Points for Wintering Bird Survey 26

Figure 7.8.6 Bird Observation Points for Breeding Bird Survey 28

Figure 7.8.7 Bat Survey Locations in the Project Area 30

Figure 7.8.8 Sherman Live Trap, Cage Trap and Nest Tube Locations in the Project Area 32

Figure 7.8.9 Photo Trap Locations in the Project Area 34

Figure 7.8.10 Designated Sites in the Vicinity of the Project Area 41

Figure 7.8.11 Agacli Sand Dunes – Area of High Botanical Interest 49

Figure 7.8.12 Protected Areas In the Vicinity of the Project Area 56

Figure 7.8.13 Habitat Map of the Project Area 68

Figure 7.8.14 Location of Endemic and Rarely Distributed/Threatened Plant Species within the Project Area 71

Figure 7.8.15 Locations of Reptilia Species (*Testudo graeca* and *Emys orbicularis*) Encountered within the Project Area 82

Figure 7.8.16 Daily Numbers of All Large Soaring Migratory Birds (Spring 2014) 88

Figure 7.8.17 Numbers of All Large Soaring Migratory Bird Species by Observation Points (Spring 2014) 88

Figure 7.8.18 Numbers of All Large Soaring Migratory Bird Species According to Major Flight Directions (Spring 2014) 89

Figure 7.8.19 Diurnal Patterns and Numbers Of All Large Soaring Migratory Birds According to Time Intervals (Spring 2014) 89

Figure 7.8.20 Numbers of All Large Soaring Migratory Birds According to Approximate Flight Altitudes (Spring 2014) 90

Figure 7.8.21 Stopover Sites (Red: Openland; Yellow: Forestry Areas) Used by White Storks 91

Figure 7.8.22 Daily Numbers of Yelkouan Shearwaters (Spring 2014) 93

Figure 7.8.23 Daily Numbers of Large Soaring Migratory Bird Species for Autumn, 2014 95

Figure 7.8.24 Numbers of All Large Soaring Migratory Bird Species by Observation Points (Autumn 2014) 96

Figure 7.8.25 Flight Direction of All Large Soaring Migratory Birds (Autumn 2014) 96

Figure 7.8.26 Diurnal Patterns and Numbers of All Large Soaring Migratory Birds according to Time Intervals (Autumn 2014) 97

Figure 7.8.27 Flight Height of All Large Soaring Migratory Birds (Autumn 2014) 97

Figure 7.8.28 Species Richness of Breeding Bird Species According to Habitat Type 100

Figure 7.8.29 Location of *Spalax leucodon* within the Project Area 104

Figure 7.8.30 Directions of Vegetation Clearance Works 145

7.8 Ecology

7.8.1 Introduction

This chapter provides a description of the ecological characteristics of the INA Project Area and identifies the potential impacts on the biological environment arising from the Project activities. The assessment follows the recommendations and requirements of the IFC Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Management of Living Natural Resources (Ref. 7.8.1).

This chapter is set out according to the following structure:

- Section 7.8.2 Policy, Regulatory and Administrative Framework: provides an overview of the legal and policy framework for the protection and conservation of nature in Turkey and related national and international requirements.
- Section 7.8.3 Assessment Methodology: gives a summary of the baseline assessment methodologies and the assessment criteria specifically relating to ecology. This builds on the overarching ESIA assessment methodology provided in **ESIA Chapter 6 Impact Assessment Methodology**. A summary of the methodology of the ecology assessment is provided within the main text of this Chapter. This section also describes the spatial scope for the assessment.
- Section 7.8.4 Baseline Information, Background and Sources of Information: describes the background information and findings in the Turkish EIA Report (Ref. 7.8.2), which was prepared by AK-TEL Muhendislik and received a positive decision in May 2013 from the Turkish Ministry of Environment and Urbanization (MoEU). This section then provides a description of the ecological baseline, which is based on the findings from the desk study and field surveys conducted in 2014 to inform this ESIA.
- Section 7.8.5 Potential Impacts: describes potential impacts (e.g. habitat loss, fragmentation, disturbance, etc.) of the Project during the construction and the operational phase.
- Section 7.8.6 Mitigation: sets out mitigation measures that has been agreed as project commitments to be implemented by the INA Project. According to IFC PS6, mitigation measures should be designed to follow the 'mitigation hierarchy', where impacts are progressively avoided, minimised, restored or offset. Due to the nature of the Project, its large land-take and minimal location alternatives, the Project is heavily reliant on offsetting to achieve no net loss of biodiversity (or a net gain in respect of critical habitat).
- Section 7.8.7 Residual Impacts: summarises the likely residual impacts that will remain following the implementation of the agreed mitigation measures.

7.8.2 Policy, Regulatory and Administrative Framework

The ecology assessment has considered relevant Turkish (national) legislation, applicable standards and guidelines for international finance, and international agreements to which Turkey is a signatory. Applicable policy and legislation relevant to the ESIA are presented in **Chapter 2 Policy, Legislative and Regulatory Framework**, with those of particular relevance to ecology summarised below.

7.8.2.1 International Agreements

Turkey is a signatory to a number of conventions relevant to the ecology assessment. These are listed below:

- United Nations (UN) Convention on Biological Diversity (CBD) (Ref. 7.8.3). The convention has three main objectives: 1. the conservation of biological diversity; 2. the sustainable use of the components of biological diversity; and 3. the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. Turkey became a party to the convention in 1997.
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention) (Ref. 7.8.4). Turkey became a contracting party in 1994. The Ramsar convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Ref. 7.8.5). CITES aim is to ensure that international trade in specimens of wild animals and plants does not threaten their species' survival. The principles of CITES are based on sustainability of the trade in order to safeguard ecological resources (e.g. live animals and plants, as well as the vast array of wildlife products derived from them, including food products, exotic leather goods etc.). Turkey became a contracting party in 1996.
- Convention for the Protection of World Cultural and Natural Heritage (Ref. 7.8.6). The Convention sets out the duties of States in identifying potential World Heritage Sites and their role in protecting and preserving them. Turkey ratified the convention in 1983.
- Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention) (Ref. 7.8.7). The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III. To this end, the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species. Turkey ratified the convention in 1984.
- The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) (Ref. 7.8.8). This convention includes seven protocols including the Protocol on Special Protected Areas and Biological diversity in the Mediterranean. Turkey ratified the convention in 1988.
- Convention for the Protection of the Black Sea Against Pollution (Bucharest Convention) (Ref. 7.8.9). Many of the objectives of the Bucharest Convention relate to marine pollution; however it also has a specific objective to protect the biodiversity and the marine living resources, as set out within the Protocol for the Protection of Biological and Landscape Diversity in the Black Sea. Turkey ratified the convention in 1994.

Convention on Biological Diversity

Amongst the conventions listed above, the UN CBD sets the stage for this chapter, in terms of not only providing a globally recognisable definition of biological diversity, but also defining clear strategies on conservation of biodiversity that are addressed within the scope of the INA Project. Turkey ratified the Convention in 1996, and since then has prepared four National Reports on Biological Diversity, the latest of which is dated 2007.

In 2010, the Conference of Parties (COP) of the Convention adopted a revised and updated Strategic Plan for Biodiversity, which also included the Aichi Biodiversity Targets for the period of 2011-2020. The targets provide a framework for action by all stakeholders to save biodiversity and enhance its benefits for people (Ref. 7.8.3):

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use;
- Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services; and
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

7.8.2.2 Turkish Legal Requirements

Institutional Framework

It is the responsibility of the Ministry of Forestry and Water Affairs (MFWA), together with the MoEU and their affiliated organisations to formulate policies concerning the conservation of biodiversity in Turkey, 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 organisations of the MFWA 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 organisation of the MFWA consists of the Provincial Directorates of Forestry and Water Affairs, as well as the regional directorates of the affiliated organisations.

The MFWA'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 Ministry of Food, Agriculture and Livestock is another important institution with authority and responsibility in the conservation and sustainable use of biological diversity. Those duties and responsibilities of the Ministry of Food, Agriculture and Livestock, which concern biological diversity, are performed by its central and provincial organisations through the General Directorate of Agricultural Research, the General Directorate of Protection and Control and the General Directorate of Agricultural Production and Development, which are amongst its main service units.

National Laws and Regulations

The laws and regulations for the conservation of habitats and species in Turkey are presented in Table 7.8.1. Of those listed, the most relevant to the assessment is the Environment Law (dated 9 August 1983, numbered 2872). The Environment Law provides protection of the

environment in accordance with the principles of sustainable environment and sustainable development; determines and provides for the basic principles related to protecting and improving the environment; and preventing pollution. The Environment Law was amended in 2006. The Amendment to Environment Law states the importance of protecting biological diversity in Article 6 and introduces penal sanctions against damage to the environment, including the destruction of biological diversity, when detected through inspection and audits. The regulations issued on the basis of the Environment Law specify rules on the prevention of pollution and on environmental impact assessment.

Table 7.8.1 Laws and Regulations on Conservation of Habitats and Species

Turkish Law / Regulation	Official Gazette	
	Date	Number
Environment Law	11.08.1983	2872
Amendment to Environment Law	26.04.2006	5491
Law on National Parks	09.08.1983	2873
Law for the Protection of Cultural and Natural Assets	23.07.1983	2863
Bosphorus Law	22.11.1983	18229
Decree-Law Establishing the Special Environmental Protection Agency	19.10.1989	383
Terrestrial Hunting Law	01.07.2003	4915
Law on Fisheries	04.04.1971	1380
Forestry Law	31.08.1956	6831
Law for the Protection of Animals	24.06.2004	5199
Specially Protected Areas Law	12.11.1989	20341
Water Products Law and Regulations	04.04.1971	13799
Environmental Impact Assessment Regulation	03.10.2013	28784
Regulation for the Protection of Wetlands	17.05.2005	25818
Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora	27.12.2001	24623
Regulation on the Collection, Production and Exportation of Natural Flower Bulbs	19.07.2012	28358
Regulation on Fisheries	10.03.1995	22223
Regulation on Protection of Wildlife and Wildlife Development Areas	08.11.2004	25637
The Regulation on the Principles and Procedures Concerning the Protection of the Game and Wild Animals Together with their Habitats and Struggle with the Pests	24.10.2005	25976
Annual Central Hunting Commission Decisions	20.05.2014	13

The Central Hunting Commission (CHC) is established under the Terrestrial Hunting Law and includes members from MFWA and General Directorate of Nature Conservation and National Parks, Directorate of Hunting and Wildlife, universities, Ministry of Food, Agriculture and Livestock, non-governmental organisations, hunting associations and Gendarmerie General Command. CHC prepares a resolution every year and this resolution is published in the official gazette. The recent resolution (dated 20.05.2014) covers the hunting season for 2014 and 2015. 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 Turkey. In this regard, according to 2014 and 2015 Resolutions of the CHC, fauna species are evaluated as given in Table 7.8.2.

Table 7.8.2 Central Hunting Commission Resolution Appendices

Appendix	Central Hunting Commission Resolutions
I	Includes game animals which are protected by the CHC
II	Includes game animals which are allowed to be hunted in seasons predefined by CHC
III	Areas where hunting is banned in 2014-2015 hunting period (including wildlife conservation and development areas)
IV	The sites where hunting is banned according to specific legislation in accordance with Article 12 of the Law No: 4915 (including nature conservation areas, national parks, nature parks, special protection areas)

The legislation listed in Table 7.8.1, 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. A full list of Turkish nature conservation categories and the relevant regulations are presented in Table 7.8.3.

Activities in such designated areas are also covered various regulations, but these areas are not specifically provided a protection status. In Turkey, 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 Turkey, 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.

Table 7.8.3 Turkish Nature Area Conservation Categories

Designation	Definition/Protection Target	Level of Protection and Management	Regulatory Base
First Degree Natural Protected Site[1]	A site specified for preservation for public benefit due to public interest, rarity, specific characteristics, aesthetic value and scientific value.	Managed with development plans for protection. No activity that will effect/damage vegetation, topography and landscape is permitted.	Conservation of Cultural and Natural Assets Law (No: 2863); July 21, 1983 Principal Resolutions of the High Committee of Protection of Cultural and Natural Assets; November 5, 1999 (Decision No: 659)
Second Degree Natural Protected Site[1]	A site with some degree of protection status, which may be used for development, subject to sufficient, controls being in place to protect the site.	Managed with development plans for protection. No construction activities except touristic facilities with touristic investment or operation licences and ancillary facilities, or , public benefit projects.	Conservation of Cultural and Natural Assets Law (No: 2863); July 21, 1983 Principal Resolutions of the High Committee of Protection of Cultural and Natural Assets; November 5, 1999 (Decision No: 659)
Third Degree Natural Protected Site[1]	A site of lower protection status, which may, under certain circumstances, be used for development.	Managed with development plans for protection. Can be used for development considering the potential and use of the region.	Conservation of Cultural and Natural Assets Law (No: 2863); July 21, 1983 Principal Resolutions of the High Committee of Protection of Cultural and Natural Assets; November 5, 1999 (Decision No: 659)
National Park	Natural areas with protection, recreation and touristic sites having national and international rare natural and cultural resource values regarding scientific and aesthetic view.	Managed with management plans or long term development plans. Plans, projects and investments of governmental agencies and organisations are allowed (with the permission of MFWA). Construction of touristic facilities are allowed for public use at the national and natural parks outside the touristic region, area and centres (with the permission of MFWA)	National Parks Law (No: 2873); August 09, 1983

Designation	Definition/Protection Target	Level of Protection and Management	Regulatory Base
Natural Park	Natural sites appropriate for public recreation with vegetation and wildlife characteristics.	Managed with management plans or Long term development plans. Plans, projects and investments of governmental agencies and organisations are allowed (with the permission of MFWA). Construction of touristic facilities are allowed for public use at the national and natural parks outside the touristic region, area and centres (with the permission of MFWA).	National Parks Law (No: 2873); August 09, 1983
Nature Protection Area	Rare, under threatened ecosystems and species and natural sites containing special assets that should be necessarily protected (used for scientific and educational purposes).	Used for only scientific and educational purposes. These studies may include the scientific investigations to obtain detailed information about the protected site or to define the mitigation measures for the protection of these sites.	National Parks Law (No: 2873); August 09, 1983
Natural Asset/Monument	Natural sites protected within the scope of national parks principles, with natural characteristics and scientific values.	Plans, projects and investments of governmental agencies and organisations are allowed (with the permission of MFWA). Construction of touristic facilities are allowed for public use at the national and natural parks outside the touristic region, area and centres (with the permission of MFWA).	National Parks Law (No: 2873); August 09, 1983

Designation	Definition/Protection Target	Level of Protection and Management	Regulatory Base
Wildlife Protection and Development Site	A site specified for preservation and continuity together with flora and fauna due to wildlife characteristics.	Managed with management plans. No activities except the ones stated in the management plans. Projects with public benefit are allowed. Facilities, which have adverse effects on these sites, although not located within the boundaries of the protected site, are not allowed. No discharge without treatment is allowed. No solid waste disposal/storage facilities are allowed at the protection sites.	Terrestrial Hunting Law (No: 4915); July 01, 2003 Regulation on Wildlife Protection and Development Areas (No: 25637); November 8, 2004
Special Protected Area	Ecologically important sites sensitive to environmental pollution and disturbance with historical and natural assets.	Managed with management plans. All facilities to be constructed within the boundaries of this site are dependent on the permission and monitoring of the General Directorate of Natural Assets Conservation. Allowable facilities are determined according to the issues stated in the Decree on the Establishment of the Authority for the Protection of Special Areas and Regulation on the Principles and Methods of Identification, Registration and Approval of Protected Areas.	Decree with Force of Law on the Establishment of the Authority for the Protection of Special Areas (No: 383); October 19, 1989 Regulation on the Principles and Methods of Identification, Registration and Approval of Protected Areas, Official Gazette date: July 19, 2012, No: 28358
Protection Forest	Important forest or shrub lands selected for preventing natural disasters, preventing erosion to protect water resources, supporting national defence and urban environments.	Managed with forestry management plans. All facilities to be constructed within the boundaries of this site are dependent on the permission and monitoring of the General Directorate of Forestry.	Forestry Law No: 6831, Official Gazette date: September 08, 1956, No: 9402

Designation	Definition/Protection Target	Level of Protection and Management	Regulatory Base
Wetland	Important biodiversity sites with water resources.	Managed with wetland management plans. There are different zones of protection and facilities allowed in each zone have been determined by the Regulation on the Protection of Wetlands and managed by the General Directorate of Nature Protection and Natural Parks.	Regulation on the Protection of Wetlands, Official Gazette date: May 17, 2005, No: 25818
Ramsar Site	Ramsar sites are wetlands of international importance, recognised globally due to the Ramsar Convention, which is an international treaty for the conservation and wise use of wetlands. The main objective is to develop and maintain an international network of wetlands which are important for the conservation of global biological diversity and for sustaining human life through the maintenance of their ecosystem components, processes and benefits / services.	Each Ramsar Sites have wetland management plan. There are different zones of protection and facilities allowed in each zone have been determined by the Regulation on the Protection of Wetlands and managed by the General Directorate of Nature Protection and Natural Parks.	Ramsar Convention, ratified by Turkey in 1994. Regulation on the Protection of Wetlands, Official Gazette date: May 17, 2005, No: 25818
Biosphere Reserve	Biosphere reserves are sites established by countries and recognised under UNESCO's Man and the Biosphere Programme to promote sustainable development based on local community efforts and sound science.	A biosphere reserve occurs from three protection zones: core area, buffer zone and transition area. Only core area has to be officially protected. Managed by the General Directorate of Nature Protection and Natural Parks.	Established by countries and recognised under UNESCO's Man and the Biosphere Programme

Designation	Definition/Protection Target	Level of Protection and Management	Regulatory Base
[1]A natural site is defined as the 'over-ground, underground or submarine assets that belong to geological eras, prehistoric and historic eras and that should be protected because of their rareness or specifications and preciousness'. There are a total of 1,273 Natural Protected Sites in Turkey including first, second and third degree sites.			

There are also laws and regulations that are in effect to protect other environmental components, as well as to minimise pollution, promote sustainable development and management of natural resources. Legislation relating to air quality, environmental management and permitting, health and safety, management of chemicals and other dangerous substances, noise, soil quality, water quality and waste management, also provide management of issues that might have secondary impacts on biodiversity components. Environmental laws and regulations that do not primarily relate to ecology are referenced in the relevant chapters of the ESIA.

National Environmental Plans and Programmes

In addition to the international conventions and national laws mentioned in the previous sections, Turkey has developed a number of national environmental strategies:

- National Environmental Action Plan (NEAP) (1998): attests to the recognition being given to the need to address the issues of environmental pollution and degradation. Environmental concerns have not been adequately incorporated into all economic and social decisions or in legislative/organisational arrangements. Thus, a different approach was developed to prevent pollution and solve environmental problems (Ref. 7.8.10);
- National Plan for In-Situ Conservation of Plant Genetic Diversity (1998): aimed to conserve the genetic diversity of wild relatives of cultivated plants and forest tree species with global importance. This national plan was developed due to the lack of an efficient programme or strategy to conserve the plant genetic resources in-situ. This in-situ conservation project supported first time by the Global Environment Facility (GEF) of the World Bank and was initiated in 1993 by the Ministries of Agriculture and Rural Affairs (MARA), Forestry (MOF), and Environment (MOE) in Turkey (Ref. 7.8.11);
- National Wetland Strategy (2003): was prepared with the participation of delegates from all relevant governmental institutions, non-government organisations, and stakeholders based on the Ramsar 2003-2008 Strategic Plan. This plan aimed to encourage the conservation of biodiversity in wetlands and to develop research and monitoring programmes through sustainable management, restoration and rehabilitation (Ref. 7.8.12);
- Turkish National Forestry Programme (2004): was prepared to protect the areas, integrity, biological diversity and natural structures of forests, as well as provide protection against harmful biotic and abiotic agents, improvement of existing forests, rehabilitation of degraded forests and expansion of forest areas (Ref. 7.8.13);
- National Environmental Strategy (2006): includes Turkey's environmental management of physical, humanitarian and economic features of the country. This plan mainly focuses on the programme of supportive actions for developing more efficient environmental management; actions for developing information; and investment for critical issues (Ref. 7.8.14); and

- National Biological Diversity Strategy and Action Plan (2007): aimed at identifying and assessing Turkey's biological diversity, to determine a generally agreed strategy for conservation and to propose the actions required for achieving the goals of biological diversity conservation in Turkey (Ref. 7.8.15).

7.8.2.3 Standards and Guidelines for International Financing

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 integrate 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.

Within modified, natural and critical habitat, the following requirements are applicable, *inter alia*:

Modified Habitats

"The client should minimise impacts on such biodiversity and implement mitigation measures as appropriate".

Natural Habitats

"The client will not significantly convert or degrade natural habitats, unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the project on modified habitat;*
- *Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation; and*
- *Any conversion or degradation is mitigated according to the mitigation hierarchy.*

In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- *Avoiding impacts on biodiversity through the identification and protection of set-asides;*
- *Implementing measures to minimise habitat fragmentation, such as biological corridors;*
- *Restoring habitats during operations and/or after operations; and*
- *Implementing biodiversity offsets."*

Critical Habitats

"In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- *No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;*
- *The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;*
- *The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and*
- *A robust, appropriately designed, and long-term biodiversity monitoring and evaluation programme is integrated into the client's management programme.*

In such cases where a client is able to meet the requirements defined in paragraph 17 [of PS6]*, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated."*

7.8.3 Assessment Methodology

7.8.3.1 Scope

The objective of the ecological baseline studies is to describe the biological environment within the Area of Influence as defined in **Chapter 3 Proposed Project and Project Description**. The biological environment includes designated sites (both protected by Turkish Law as well unprotected sites that are Internationally Recognised Areas[1]) habitats (including terrestrial, freshwater and marine), and their component species. The ecological baseline has been characterised through a combination of secondary data and field surveys. The field surveys conducted in 2014 have included:

- Marine: marine surveys were completed to provide a general description of the marine habitats adjacent to the Project Area. The surveys included sampling of plankton, benthic organisms and marine fish;
- Habitats: habitats were initially mapped using satellite imagery and classified according to European Nature Information System (EUNIS) level 3 habitat classification system. The classification was then checked through field surveys and refined by experts;
- Flora: the main objective of the flora baseline studies was to confirm the broad habitat type at each sample location, assess habitat quality, provide a comprehensive plant species list for each habitat type and locate any endemic, restricted-range, or threatened flora species in the Project Area;

[1] IFC PS6 exclusively defines Internationally Recognised Areas as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention).

Terrestrial invertebrates: invertebrates were surveyed within the Project Area using a combination of direct search and sweep netting;

- Freshwater Fish: surveys were completed within a range of inland aquatic ecosystems including lakes, ponds, ephemeral pools and streams. The main focus of the surveys was to describe the freshwater fish communities present, particularly in relation to two endemic fish species that were identified as potentially present during the secondary data review. The surveys were designed to confirm whether either of two Turkish endemic species, *Alburnus istanbulensis* or Marmara chub *Squalius cii*, occur on-site or in water bodies that might be affected from the Project (i.e. the area of influence);
- Herptiles: amphibian and reptiles within the Project Area were sampled using a combination of sweep netting of water bodies, direct search and survey of refuges;
- Birds: three separate methodologies were employed to survey wintering, breeding and migrating birds. The wintering bird surveys covered the Project Area, the adjacent sea area and Lake Terkos; and
- Mammals: a combination of survey techniques were used to target different species groups, including live traps for small mammals, night time ultrasonic detector surveys for bats and camera traps for large and medium sized mammals.

7.8.3.2 Method - Secondary Data Review

A detailed review of secondary data was completed to obtain readily available information on ecological receptors in the Area of Influence. The aim of the secondary data review was to collect existing baseline information on ecological receptors potentially present in the Area of Influence (including designated sites, habitats and species). This was then used to inform the scope and design of the detailed methodologies for the field survey work. The secondary data review also provided contextual information about the status of ecological receptors (e.g. local, regional and global distribution, population size and level of extinction risk) and ecological information about the receptors (e.g. habitat requirements and behaviour of species) to assist with the valuation and assessment of potential impacts.

The secondary data review included an extensive review of published scientific literature, websites and other sources. References for published information quoted within the chapter are provided within the relevant sections. For designated sites, the key references are as follows:

- Key Biodiversity Areas (KBA) of Turkey (Ref. 7.8.19): Turkey's KBAs have been identified on a national scale by Doga Dernegi (the Nature Society of Turkey) in collaboration with the Turkish Ministry of Environment and Forestry;
- Important Bird Areas in Turkey (Ref. 7.8.20);
- Ramsar Sites of Turkey (Ref. 7.8.21): published by Doga Dernegi and provides details of 13 Ramsar Sites in Turkey; and
- The Ramsar Convention on Wetland website (Ref. 7.8.22): provides summary of all 14 Ramsar sites in Turkey.

Turkish nature conservation categories (Natural Protected Sites, National Parks, Nature Protection Areas, Wildlife Protection and Development Sites, etc.) and the relevant underpinning regulations are detailed in section 7.8.2.2 of this chapter.

In order to identify the potential presence of plant and animal species of conservation importance within the Area of Influence, international and national assessments of extinction risk were reviewed. These included:

- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (RL) (Ref. 7.8.23);
- The Red Book of Butterflies in Turkey (RBBT) (Ref. 7.8.24); and
- Red Data Book of Turkish Plants (RDBTP) (Ref. 7.8.25).

The classification system used by the IUCN RL, RBBT and RDBTP for representing the extinction risk of species is presented in Table 7.8.4. Species classified as VU or above on the IUCN Red List, are referred to collectively as 'threatened' species.

Table 7.8.4 International Union for Conservation of Nature Categories of Extinction Risk

Category	Definition
Extinct in the Wild (EXW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.
Critically Endangered (CR):	Species facing an extremely high risk of extinction in the wild.
Endangered (EN):	Facing a very high risk of extinction in the wild.
Vulnerable (VU)	Facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Data Deficient (DD)	Inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.
Least Concern (LC)	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

Source: Ref. 7.8.26

In addition to the publications mentioned above, the Red Data Book of Birds of Turkey (Ref. 7.8.27) has been reviewed. However, this publication used an assessment methodology specific to German-speaking countries, which is based largely on population size rather than IUCN categories and criteria. Therefore, the resulting classification categories are not directly comparable with those of the IUCN and cannot be used to inform the determination of critical habitat as defined by IFC PS6. Despite this, the categorisation (as shown in Table 7.8.5) provides an overall impression of the abundance of bird species in Turkey, and therefore these have been presented where relevant.

Table 7.8.5 National Threat Categories for Bird Species

Category A		
A.1.2	(CR)	Critically endangered and breeding species in Turkey
A.2	(EN)	Endangered and breeding species in Turkey
A.3	(VU)	Vulnerable and breeding species in Turkey
A.3.1	(D)	Declining, vulnerable and breeding species in Turkey
A.4	(NT)	Near Threatened, breeding species not facing risk now, but are likely to qualify for threatened category in the near future in Turkey
A.5	(LC)	Least Concern, breeding species that are widespread in Turkey
A.6	(DD)	Data Deficient, breeding species on which there is deficient information in Turkey
A.7	(NE)	Not evaluated, breeding species which have not been evaluated in Turkey
Category B		
B.1.2	(CR)	Critically endangered and non-breeding species in Turkey
B.2	(EN)	Endangered and non-breeding species in Turkey
B.3	(VU)	Vulnerable and non-breeding species in Turkey
B.3.1	(D)	Declining, vulnerable and non-breeding species in Turkey
B.4	(NT)	Near Threatened, non-breeding species not facing risk now, but are likely to qualify for threatened category in the near future in Turkey
B.5	(LC)	Least Concern, non-breeding species that are widespread in Turkey
B.6	(DD)	Data Deficient, non-breeding species on which there is deficient information in Turkey
B.7	(NE)	Not Evaluated, non-breeding species which have not been evaluated in Turkey

7.8.3.3 Method – Field Surveys

The following section summarises the ecology survey methodologies employed to describe the ecological baseline of the Project Area.

Marine

Marine field surveys were completed in the sea area adjacent to the Project Area. The plankton and benthic surveys were completed on 11 February 2014 and 14 May 2014, whilst the marine fish surveys were completed on 21 May 2014. In addition, shoreline habitats were surveyed on 3 July 2014. The marine sampling locations were identified based on the previous knowledge regarding the area, expert opinion and information gathered during the secondary data review. The five sampling points are shown in Figure 7.8.1. The following survey methodology was employed at each of the sample points:

Plankton

Phytoplanktonic organisms were sampled using a 20 cm diameter plankton net, with a mesh size of 44 µm. The zooplanktonic samples were collected using a 20 cm diameter plankton

net, with a 55 µm mesh size. Both phytoplankton and zooplankton were collected in the reservoir at the bottom of the 1 m long nets and then transferred to plastic containers. Each 100 ml sample was fixed with 10 ml of 37% formaldehyde solution. The samples were analysed under microscopes in a laboratory, with record photographs taken of the common species.

Benthic Organisms

An Ekman grab sampler (0.185 m^2) was used to sample benthic organisms. Ekman grabs are useful for sampling benthic communities inhabiting soft bottomed aquatic environments. After collecting, sediment was washed under water with using different mesh size sieves (0.5 mm, 2 mm, 4 mm and 8 mm) in order to divide the benthic organisms into size groups. Following collection, 10 ml of 70% volume of alcohol was added to each 100 ml of sample for fixation. Benthic organisms were examined under binocular microscopes in the laboratory for identification to species or genus level.

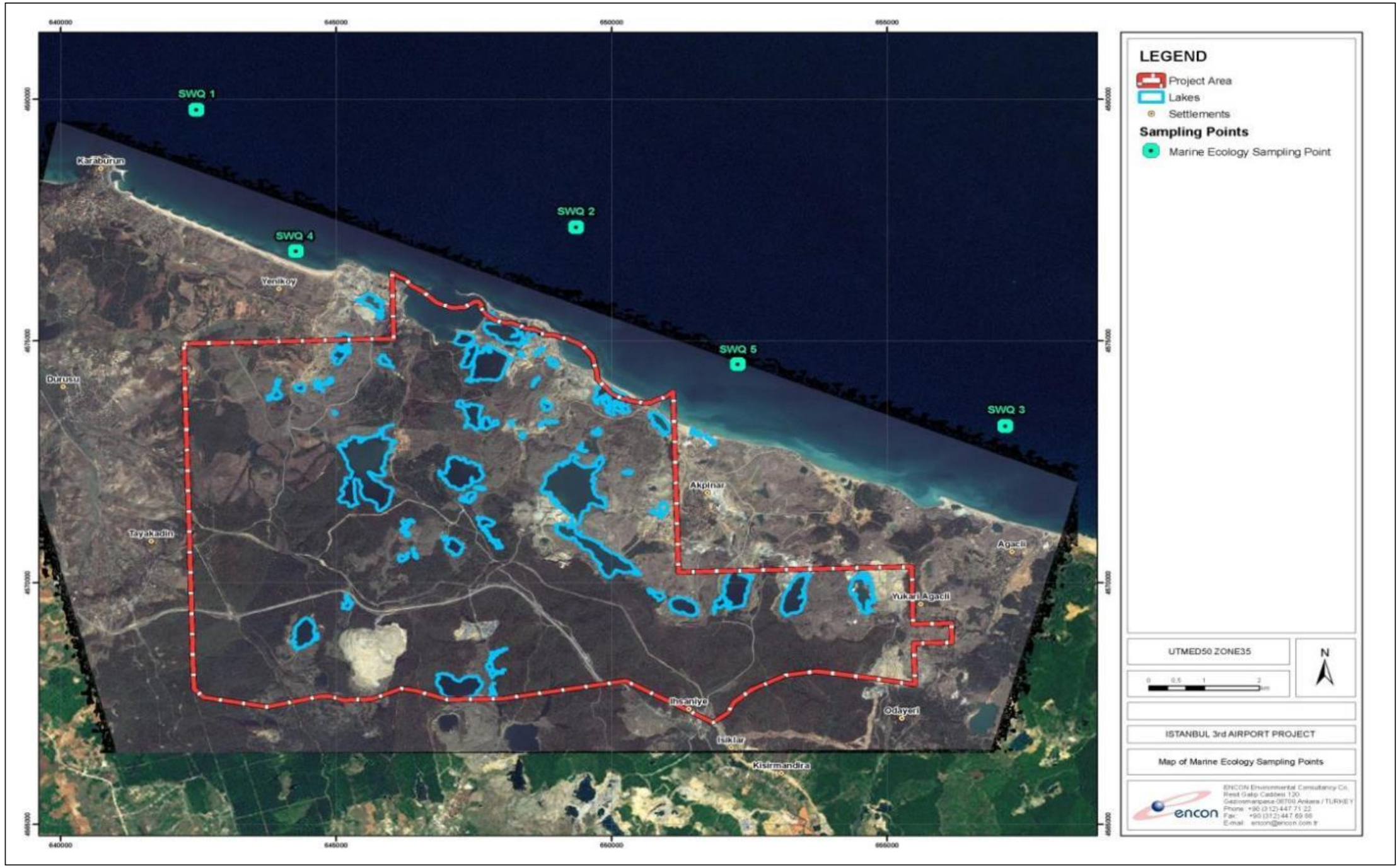
Marine Fish

Marine fish were sampled using a trammel net, similar to that used by local commercial fishermen. Trammel nets comprise three layers of netting, a slack central layer with a small mesh (32 mm) is sandwiched between two taut outer layers with a much larger mesh (90 mm). The net is kept vertical by floats on the head rope and weights on the bottom rope. Trammel nets are effective at catching pelagic fish species that feed within the water column as opposed to the sea floor. Additional information on marine fish composition in the area was obtained from interviews with local fisherman and published literature, which also provided information on demersal species (fish species that live and feed on the sea bed).

Coastal Habitats

The coastal marine ecosystems were characterised by a walkover survey along the shore, which identified the relevant marine biotypes present.

Figure 7.8.1 Project Area and Sampling Points for Marine Ecology Studies



Terrestrial Habitats

The preliminary habitat distribution in the Project Area was determined based on EUNIS Level 3 habitat type classification. EUNIS habitat type classification is a comprehensive pan-European system that facilitates the harmonised description and collection of data across Europe, including Turkey, through the use of habitat identification criteria. Prior to the field surveys, a variety of habitat types were determined by analysing appropriate satellite imagery available from Google™ Earth). A series of 26 survey locations were pre-selected as providing representative samples of each habitat type (see Figure 7.8.2). The GPS co-ordinates of the sample locations were then used in the field to conduct surveys to ground-truth the habitat classifications. Where necessary, based on professional judgement, sample locations were altered in the field to provide the most representative samples. An additional six sample locations were added during the field surveys where endemic and rarely distributed species of flora and fauna were found. Two "reference" samples were taken outside the Project Area in areas suspected as being particularly important for habitats and flora (see Figure 7.8.2). Following the field surveys, the EUNIS habitat types were cross-referenced with the nomenclature of CORINE Land Cover types according to Moss and Davies (2002) (Ref. 7.8.28) and EU Habitats Directive Annex I habitat descriptions.

Terrestrial Flora

The terrestrial flora studies were carried out during five comprehensive field visits between March and June 2014 (Table 7.8.6).

The objectives of flora baseline studies were to confirm the broad habitat type at each sample location, assess habitat quality, provide a comprehensive plant species list for each habitat type and locate any endemic, restricted-range, or threatened flora species in the Project Area. On the discovery of endemic, restricted-range or threatened species, GPS coordinates of the populations were taken along with notes on the ecological condition of the site.

In order to support the identification of some of the species, photographs were taken with particular regards to diagnostic features (e.g. flowers, leaves etc.). Photographs of each sample location were also taken. Plant material of some species was collected and prepared for herbarium as a record and for comparison with reference identification material.

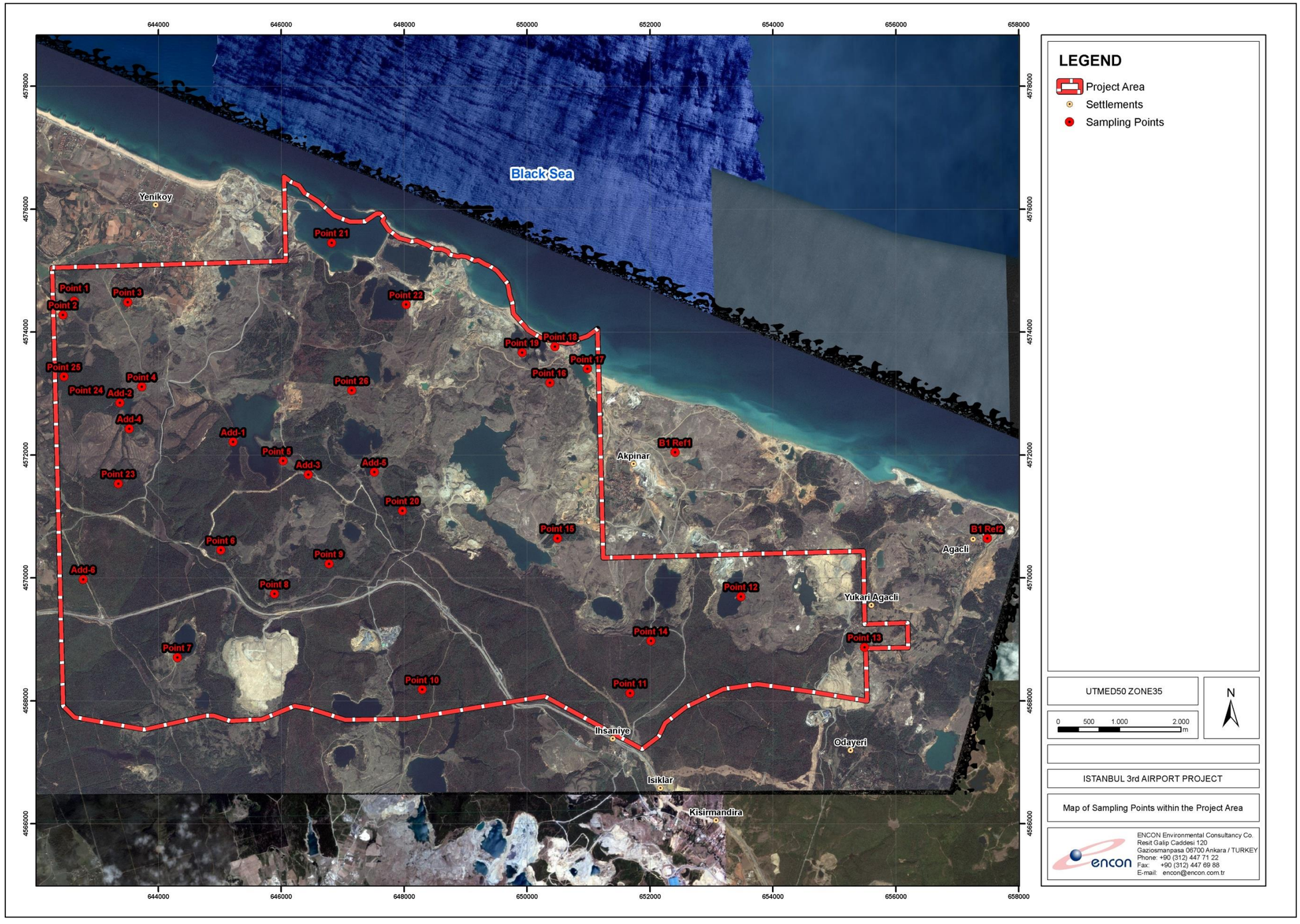
The information gathered during the surveys was recorded on field observation forms.

Table 7.8.6 The Dates on which the Study of Sampling Points Throughout Flora Survey

Date	Location
13.3.2014	• Points 7, 25, 6, 4, 26 and 10
14.3. 2014	• Points 11, 16, 17, 18, 19, 21, 22 and 23
17.4.2014	• Points 9, 6, 5, 23 and 8
18.4.2014	• Points 23, 4, 9, 19, 16 and 11 • Additional point 1
19.4.2014	• Points 24 and 15 • Additional points 2 and 3 • Reference points 1 and 2
15.5.2014	• Points 11, 14, 23, 3, 2, 1 and 12

Date	Location
	• Additional point 2
16.5.2014	• Points 18, 7, 26 and 13 • Additional points 3, 5 and 6 • Reference 1, 2
17.5.2014	• Points 23 and 24 • Additional points 2 and 4
25.6.2014	• Points 11, 16 and 18 • Reference point 2
26.6.2014	• Points 7, 23 and 24 • Additional points 3, 2, 4 and 6

Figure 7.8.2 Sampling Points for Terrestrial Flora Surveys



Invertebrates

Two main methods were employed to survey invertebrates:

- direct search of micro-habitats (e.g. in/under logs and rocks, tree barks/surface and beneath, scats, on top of flowers, and soil); and
- sweep netting.

Both survey methods were employed at each of the sample point locations shown in Figure 7.8.2, in May and June 2014.

Freshwater Fish

Freshwater fish studies were carried out in May and July 2014. The freshwater fish surveys covered a range of inland aquatic ecosystems including lakes, ponds, ephemeral pools and streams. The main focus of the surveys were to describe the freshwater fish communities present, particularly in relation to two endemic fish species that were identified as potentially present during the secondary data review. The surveys were designed to confirm whether either *Alburnus istanbulensis* or Mamara chub *Squalius cii*, occur on-site or in water bodies that might be affected from the Project (i.e. the Area of Influence). Additional survey locations were selected in surrounding water bodies to allow for the potentially affected populations to be assessed in a wider context.

Figure 7.8.3 shows the water bodies sampled during the survey. Ayazma, Balikli, Pirinc, Ayvali Streams were surveyed on 20 May 2014, and Yenikoy stream was surveyed 21 May 2014. Tayakadin, Boyali Streams and Lake Kulakcayiri were surveyed on 2 July 2014 and Sogut Stream was surveyed on 3 July 2014.

Figure 7.8.3 Project Area and Aquatic Sampling Point Locations

The fish surveys were completed using a combination of electrofishing and cast-net sampling methods for streams, and trammel net sampling methods for Lake Kulakcayiri.

Electrofishing was completed according to following procedure:

- Using hand held electrofishing devices, surveyors moved through the water body wearing waders.
- Sampling was done moving upstream so that stunned fish were swept towards the surveyors by the current.
- The net electrofishing equipment was kept in the water and the electric current was applied for 2-3 second periods, and any stunned fish were immediately collected with hand nets.
- This procedure continued until a length of about 50 m was covered.

Cast-net sampling technique was completed according to the following procedure:

- The nets were cast by hand by surveyors wearing waders.
- Sampling was done moving upstream within a 50 m long area for each sampling location.
- Cast net was thrown 5 times within the 50 m long survey area.

Trammel fishing technique was completed according to the following procedure:

- A trammel is a fishing net with three layers of netting that is used to entangle fish. A slack central layer with a small mesh (32 mm) is sandwiched between two taut outer layers with a much larger mesh (90 mm). The net is kept vertical by the floats on the head rope and weights on the bottom rope.
- The net was installed into the lake at night and collected the following morning to allow any captured fish to be removed.

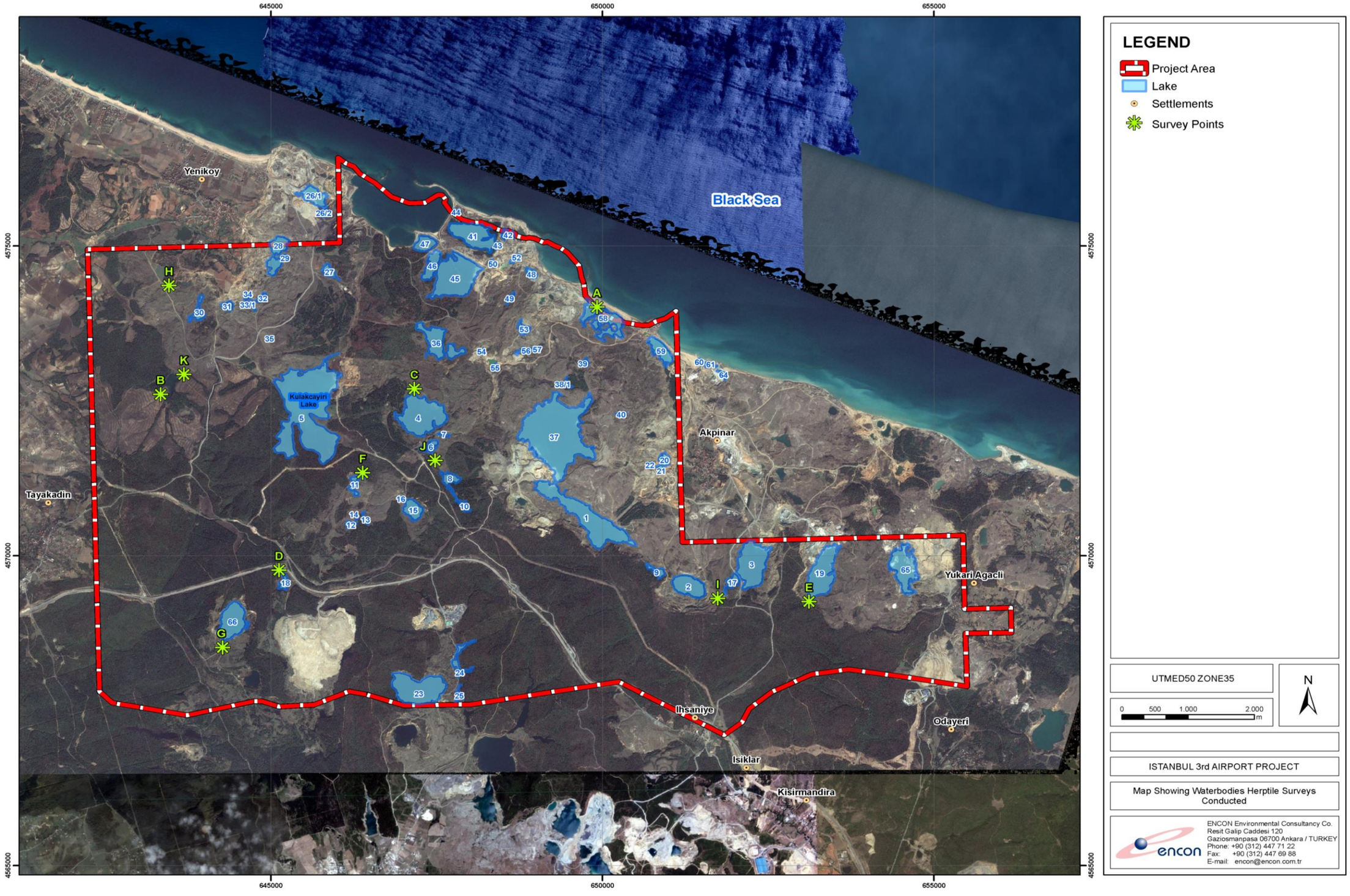
In all cases following collection, fish samples were fixed with formalin and brought to the laboratory in order to confirm their taxonomic status.

Herptiles

A range of techniques were employed to survey amphibians and reptiles. Amphibians were primarily surveyed using sweep netting of water bodies during the breeding season (March, April and May 2014). Sweep netting was completed in Lake Kulakcayiri, as well as a representative sample of the other water bodies, including a range of sizes and structures. Additional records of amphibians were made during targeted searches around the edge of water bodies, as well as refuge searches. Figure 7.8.4 shows the locations of the water bodies sampled during the survey.

Reptiles were surveyed using a combination of refuge searches and patch sampling completed at the 26 locations shown in Figure 7.8.1, which were selected to provide representative samples of the habitats present on-site. Four survey visits to each location were made between March and June 2014. All reptile species observed were recorded by GPS location, along with the number of animals present and any information on their age and sex.

Figure 7.8.4 Waterbodies Surveyed for Amphibians



Birds

Three separate methodologies were completed for migrating (spring and autumn), wintering and breeding birds.

Wintering Bird Surveys

Wintering birds surveys were conducted in January and February 2014. During each month, the survey was completed over a two day period. The surveys covered three main areas: the lakes within Project Area; offshore sea areas adjacent to the Project Area; and Lake Terkos (Figure 7.8.5).

The surveys employed a point count methodology with 23 observation points located within the Project Area, adjacent to all of the lakes and larger ponds. A total of 13 bird observation points were selected adjacent to Lake Terkos. The observation points were selected to provide sufficient views of the water bodies to enable a comprehensive count of the birds present.

At each observation point all waterbirds observed were recorded including grebes, cormorants, swans, geese, ducks, waders, herons and gulls. The records taken included species, number of individuals, locations, habitats and behaviour

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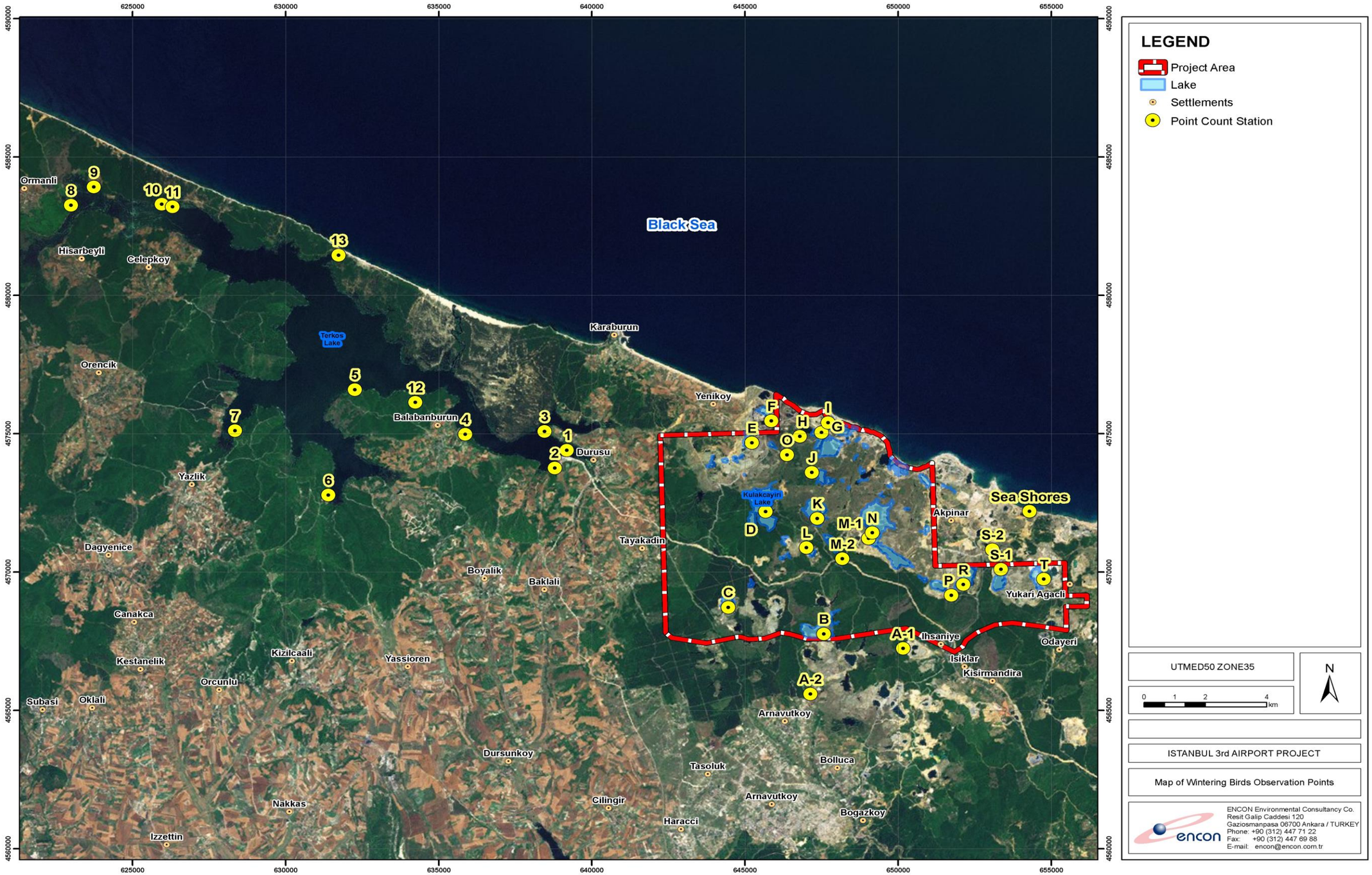
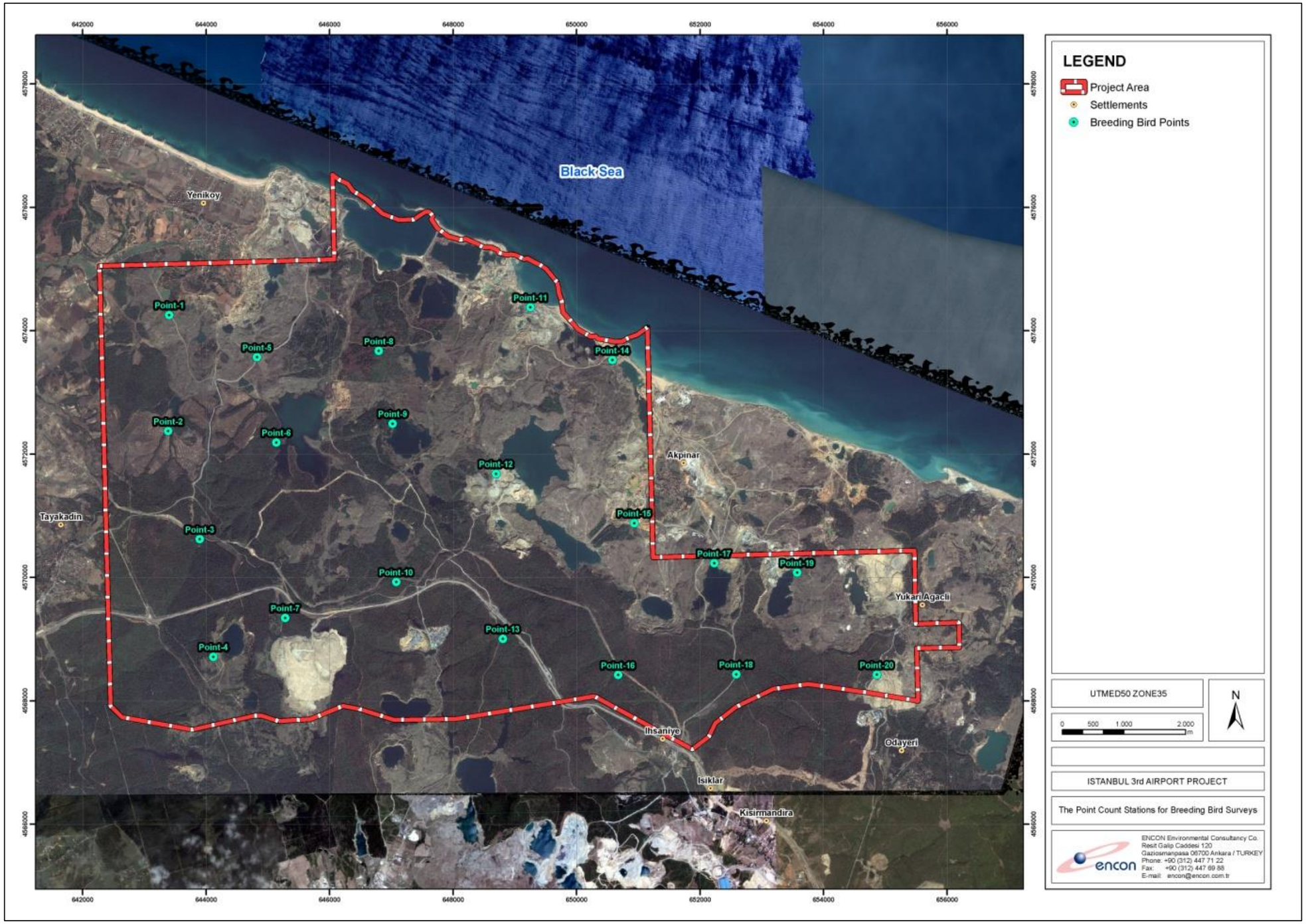
Figure 7.8.5 Bird Observation Points for Wintering Bird Survey



Breeding Birds

In order to carry out the breeding bird survey, both point count and transect methods were used. The line transect method consists of selecting a route in an area, along which visual and audial observations are conducted. Point counts were made at 20 points (Figure 7.8.6), which were chosen according to habitat type (habitat types were determined at a broader level than the classification of EUNIS). At each point count location, the observer waited for a minute for the birds to recover from being disturbed by the approach of the observer. Following the first minute, birds seen or heard were recorded for a five minute period. The location where the bird first detected provided the data on its location. This provided estimations on the distance of the birds to the observer. During the field observations, birds were identified to species level and notes were made of any observed breeding behaviour. Depending on the behaviours observed, each species was classified according to three categories: possibly breeding, probably breeding and confirmed breeding.

Figure 7.8.6 Bird Observation Points for Breeding Bird Survey



Migrating Bird Survey

Spring bird surveys were completed over 75 days, from 18 March 2014 to 31 May 2014. The surveys were carried out simultaneously by four experienced local ornithologists, located at four observation points. The four observation points were selected to form a line perpendicular to the main axis of migratory trajectory. Each observation point was located approximately 3 km from each other, giving a survey radius of approximately 1.5 km. This conforms to the Scottish Natural Heritage (SNH) guidance for vantage point surveys that recommends maximum survey radius of 2 km (Ref. 7.8.29). During the surveys, records were made of the numbers of each species observed (all bird species), approximate flight altitudes, flight directions, as well as weather conditions. The four observers kept in close contact with each other using mobile phones to cross-reference observations to ensure that birds flying close to the boundaries between observation areas were not double counted. The observations were recorded on standard proforma that were subsequently transcribed into an electronic format for analysis.

Autumn migrating bird surveys were completed over 61 days between 1 August 2014 and 30 September 2014. The methodology for the autumn survey was identical to that of the spring except that that the four observation points were moved to the west. The observation points were moved westwards to maximise the observation of birds originating from the west and north-west.

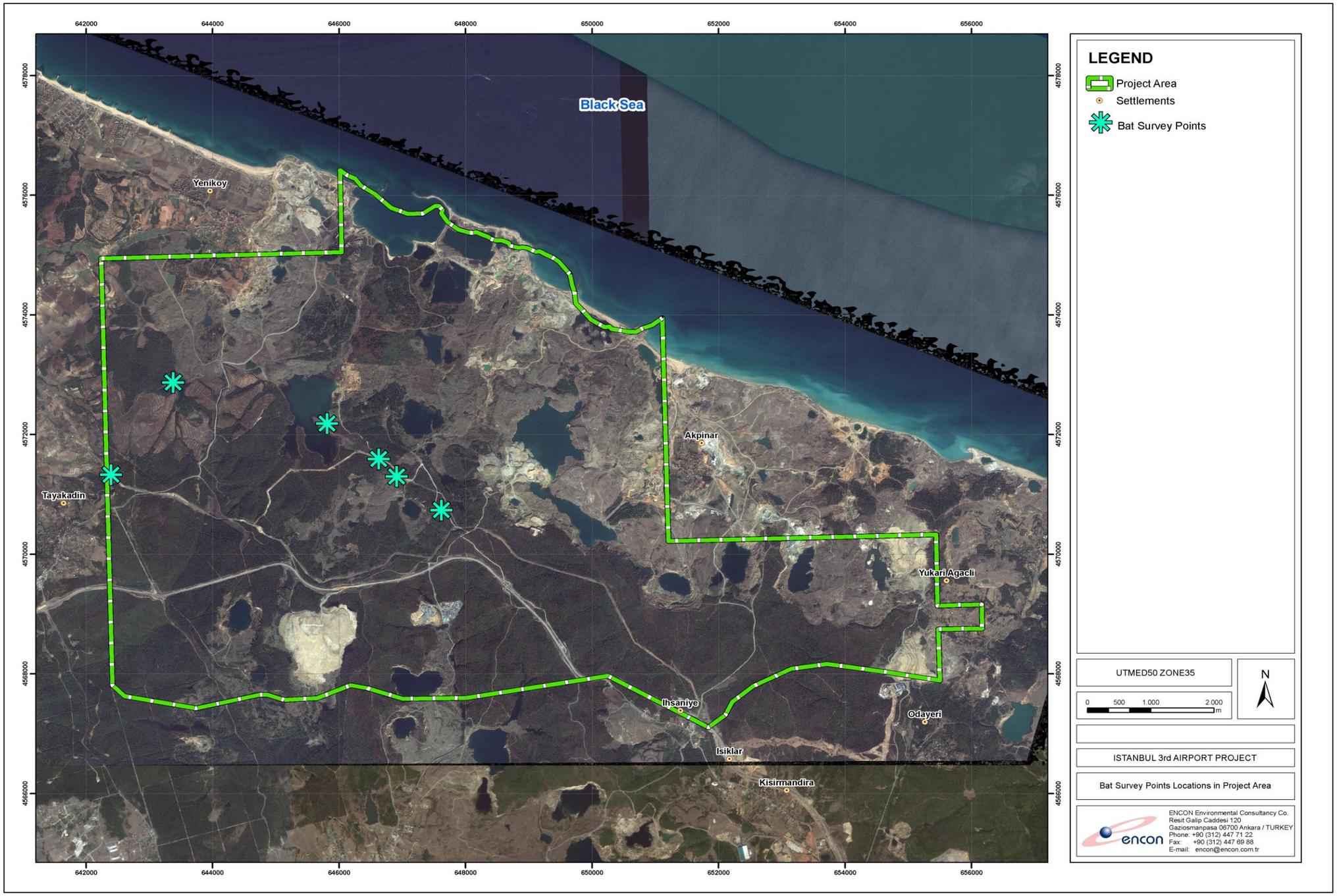
Mammals

In order to identify the diversity of the mammals in the Project Area, various methods were used for different species groups. These methods are given below.

Bats

Bat surveys were completed within the Project Area using direct observations and an ultrasonic bat detector. During the surveys, a Batbox Duet was used in conjunction with a recording device to capture bat calls, which were subsequently analysed with Raven 1.4 programme (Ref. 7.8.30) to identify the species present. Bat surveys were completed at sites selected across the Project Area, as shown in Figure 7.8.7. A range of suitable bat foraging habitats were surveyed (e.g. in woodland, adjacent to watercourses and on the edge of clearings). Bat Surveys were completed on 17 April, 15 May , 25 June, 26 June 2014, between 8.30-12.00 pm.

Figure 7.8.7 Bat Survey Locations in the Project Area



Small Mammals

Small mammal surveys were completed using a combination of:

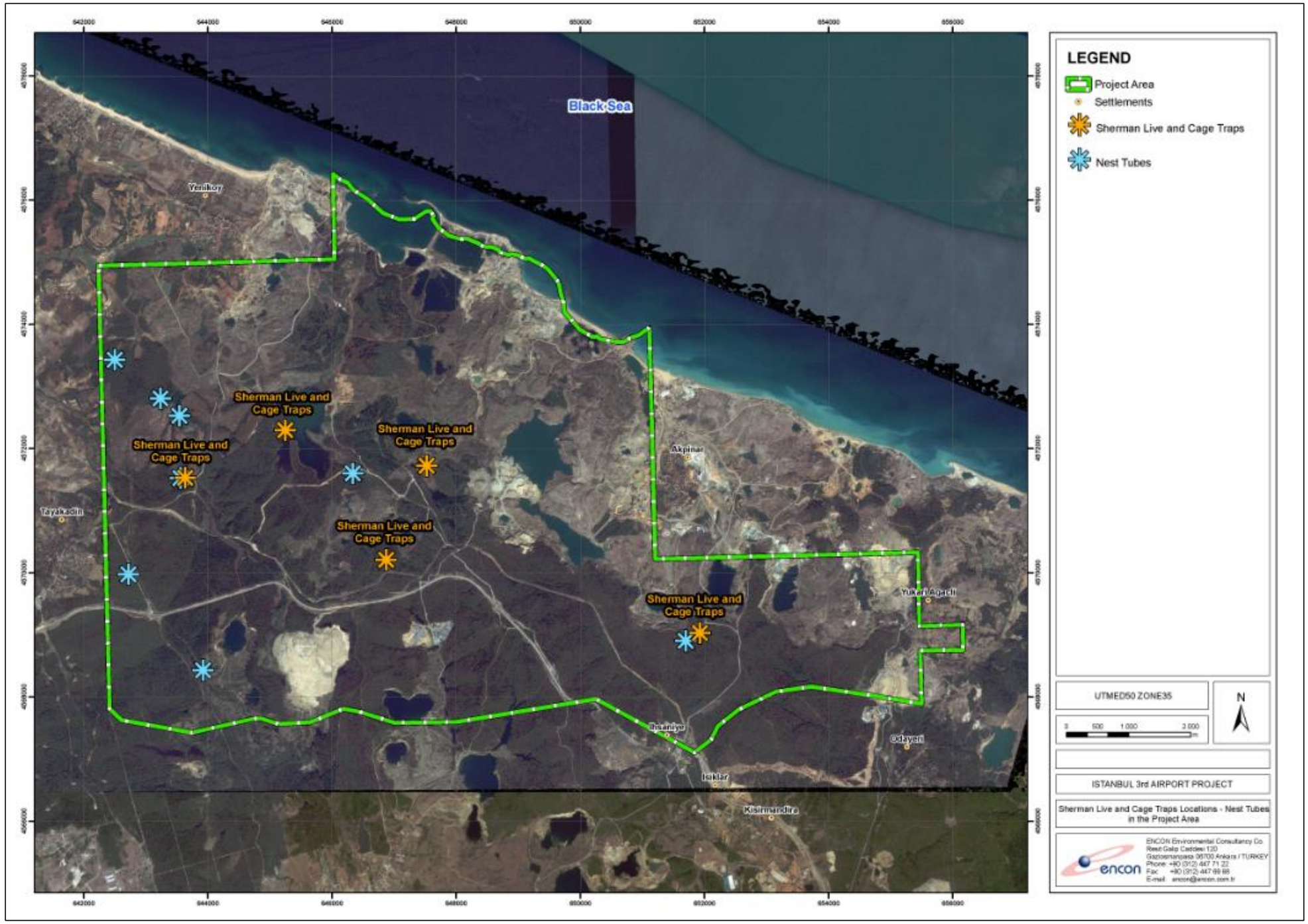
- observation of live animals;
- live traps, including both Sherman and larger cage traps; and
- nest tubes

Live traps were baited with apples and peanut butter and left out overnight. A total of 50 Sherman traps and 20 larger cage traps were used for each survey location. A total of 5 sample locations and surroundings were surveyed using live traps on the following dates: 17-18 April 2014 and 25-26 June 2014. The locations are shown in Figure 7.8.8.

A nest tube survey methodology, adapted from that used by Ściński and Borowski (2006) (Ref. 7.8.31) was implemented with the specific aim of confirming the potential presence of forest dormouse *Dryomys nitedula*. A total of 50 tubes were placed at 8 different points (Figure 7.8.8) on 15 May 2014 and then checked on 25 June 2014. The nest tubes are made from plastic, with dimensions of 5 cm in diameter and 35 cm long. The tubes are sealed at one end. Each tube was attached into the canopy of suitable shrubs and trees.

A specific search for signs of European ground squirrel *Spermophilus citellus* was made in suitable open habitats within the Project Area.

Figure 7.8.8 Sherman Live Trap, Cage Trap and Nest Tube Locations in the Project Area



Large and Medium Sized Mammals

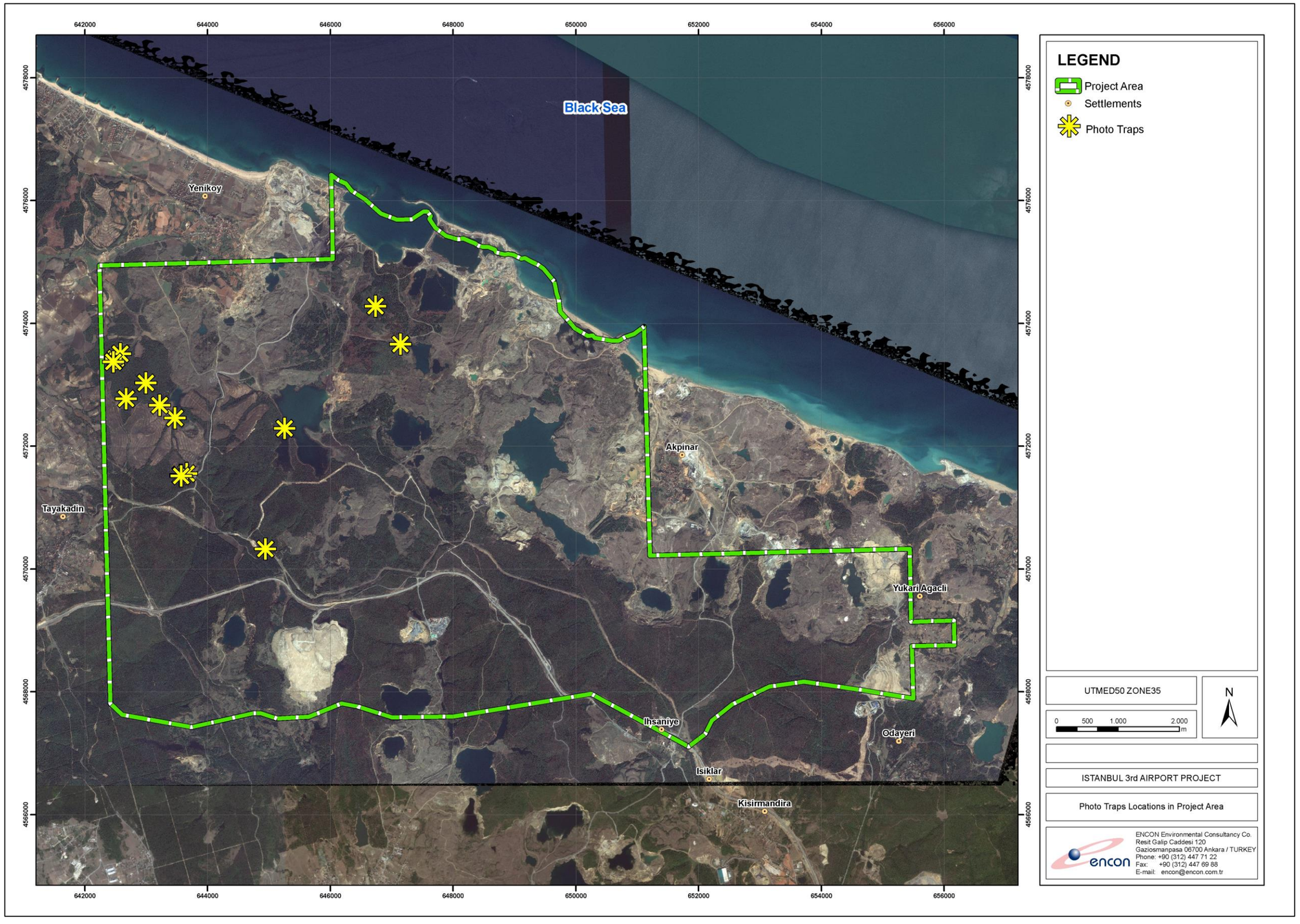
Large and medium sized mammals surveys were completed through a combination of the methods listed below:

- direct observations;
- identification of droppings, tracks and other signs; and
- camera traps.

A total of 12 locations were surveyed using camera traps between the months of March and June 2014.

Camera traps locations within the Project Area are shown in Figure 7.8.9.

Figure 7.8.9 Photo Trap Locations in the Project Area



7.8.3.4 Significance Criteria

Chapter 6 Impact Assessment Methodology describes the over-arching significance criteria used within the ESIA. Impacts are first identified and classified either as adverse (negative) or beneficial (positive). Then each impact is assessed either quantitatively or qualitatively. Quantitative methods predict measurable changes that occur as a result of the INA Project and rely on accurately measuring baseline conditions to make accurate predictions/estimations regarding the potential impacts. Within this ESIA, impact categorisation and significance have been evaluated with reference to definitive standards, published criteria and legislation, where available. Where it has not been possible to quantify impacts and effects, qualitative assessments have been carried out, based on expert knowledge, GIIP and professional judgement as explained in detail in **Chapter 6 Impact Assessment Methodology**.

The significance of a potential impact derives from a combination of the severity of the receptor and the likelihood that an impact will occur in accordance with the matrix shown in Table 7.8.7. The severity of the impact is based on a combination of the magnitude, reversibility and duration of the impact, along with the sensitivity of the receptor. Sensitivity is assessed according to a three point scale of Low, Medium and High. Table 7.8.8 details the criteria used to assign ecology receptors to the appropriate sensitivity level. Ecological receptors that are of less than Low sensitivity have not been taken forward within the impact assessment.

Table 7.8.7 Matrix for Evaluating Overall Impact Significance

Likelihood of Impact	**Severity of Impact**			
	Negligible	**Low**	**Moderate**	**High**
Probable	Negligible	Low	Moderate	High
Possible	Negligible	Negligible	Low	Moderate
Unlikely	Negligible	Negligible	Negligible	Low
Improbable	Negligible	Negligible	Negligible	Negligible

Table 7.8.8 Ecological Sensitivity Criteria

Sensitivity Level	**Receptor**	**Criteria**
Negligible	All	Receptors that do not meet the criteria listed for Low to High sensitivity.
Low	Designated Sites	N/A.
	Habitats	Natural habitats that do not meet the criteria for either medium or high sensitivity. Habitats that support species of Low sensitivity.
	Species	Locally important populations of Near Threatened (NT) or Vulnerable (VU) species, or locally important populations of species listed on Annexes to the Bern Convention.
Medium	Designated Sites	Nationally designated areas.

Sensitivity Level	Receptor	Criteria
	Habitats	Areas of habitat that represent >1% distribution within Turkey or are threatened at a national level. Habitats that support species of Medium sensitivity.
	Species	Nationally/regionally important concentrations of a Vulnerable (VU) species, or locally important concentrations of Critically Endangered (CR) and/or Endangered (EN) species. Locally important populations of endemic / range-restricted species. Populations of migratory species that represent >1 % of the national (Turkish) population.
High	Designated Sites	Internationally Recognised Areas (e.g. UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention)).
	Habitats	Habitats that trigger critical habitat under the following IFC PS6 Criteria: • Criterion 4: Highly threatened and/or unique; and/or ecosystems • Criterion 5: Key evolutionary processes Habitats that support species of High sensitivity
	Species	Species populations that trigger critical habitat under the following IFC PS6 Criteria: • Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species; • Criterion 2: Endemic and/or restricted-range species; and/or • Criterion 3: Migratory and/or congregatory species.

In addition to the criteria set out in Table 7.8.8, IFC PS6 sets out definitions for modified, natural and critical habitats as follows:

- Modified habitats: *'areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.'*
- Natural habitats: *'areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition'.*
- Critical habitat: *'areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly*

threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.'

Each of the habitats described in the baseline description section of this chapter are assessed as being either modified or natural habitat according to the IFC PS6 definitions. Annex 7.8.G provides a detailed assessment of critical habitat within the Project Area, and the findings are summarised in section 7.5.1 of this chapter. All critical habitats are assessed to be of high sensitivity according to the criteria detailed in Table 7.8.8.

IFC PS6 sets out a series of requirements in relation to modified, natural and critical habitat. Of particular relevance to the impact assessment are the requirements to achieve no net loss of biodiversity in areas of natural habitat and a net gain of biodiversity values for which the critical habitat was designated.

Within the scope of IFC PS6, it is important to evaluate ecosystem services that a particular site offers, which include "benefits that people, including businesses, derive from ecosystems". Accordingly, IFC defines four types of ecosystem services (IFC, 2012):

- Provisioning services, which are the products people obtain from ecosystems;
- Regulating services, which are the benefits people obtain from the regulation of ecosystem processes;
- Cultural services, which are the non-material benefits people obtain from ecosystems; and
- Supporting services, which are the natural processes that maintain the other services.

IFC requires that a project owner carries out a systematic review to identify priority ecosystem services, which are referred to as an Ecosystem Services Review (ESR). For the purposes of PS6 implementation and the ESR, ecosystem services are categorised as two types (Ref. 7.8.1):

- Type I: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities; and
- Type II: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and on which the project directly depends for it.

The ESR for the INA Project is provided in Annex 7.8.H.

7.8.4 Baseline Information, Background and Sources of Information

7.8.4.1 Sources of Information (EIA only)

The INA Project has previously been subject to the Turkish EIA process and the EIA Report was prepared by AK-TEL Muhendislik on behalf of the Ministry of Transport, Maritime Affairs and Communications, General Infrastructure Directorate. The EIA received a "Positive Decision for EIA" from the MoEU on 21 May, 2013 in accordance with Turkish legislation. In this section, findings from the Turkish EIA Report that are relevant to this chapter have been summarised.

The Turkish EIA was primarily based on desktop analysis. Only a very small amount baseline field studies were undertaken as part of the EIA process. Ecological components of the Project

Area were assessed in accordance with the requirements in line with the Turkish requirements. Given the very limited scope of the studies completed for the EIA, its findings provide little relevance for the purposes of this chapter. However, a brief summary of the findings of the EIA study is presented below.

Flora

Within the EIA, the floristic components of the Project Area were described through a combination of literature review and field surveys. The surveys for flora were limited to field visits completed in October, 2012, a sub-optimal time of year to record plant species. Of the flora listed within the EIA, 80% were identified through field observation, and the remainder from literature search. The literature review for the flora species included the Red Data Book for Turkish Plants (Ref. 7.8.25), TUBIVES (Turkish Plants Data Service) database (Ref. 7.8.32) and Flora of Turkey and the East Aegean Islands (Ref. 7.8.33). In evaluating the threat and protection status of species; CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and IUCN RL classifications were used. The literature review focussed on the endemic species that might be found in the Project Area. The EIA provides a total list of 79 flora species, of which 18 species are classified as endemic.

Fauna

The EIA states that the fauna on-site was described through the completion of a literature review.

Invertebrates

The EIA report does not mention invertebrates.

Amphibians

The EIA lists a total potential of eight amphibian species for the Project Area. None of these species have significant threatened status with regard to IUCN classification. All of these species are classified as IUCN Least Concern (LC).

Reptiles

The EIA reports a total of 18 reptile species for the Project Area and its vicinity. Among these 18 reptile species, ten are listed as IUCN LC. A single species spur-thighed tortoise *Testudo graeca ibera* is IUCN VU (Vulnerable), and two species (European pond turtle *Emys orbicularis* and four-lined snake *Elaphe quatuorlineata*) are listed as NT (Near Threatened) according to the IUCN RL. The other four species are not listed in the IUCN RL.

Mammals

The EIA provides a list of 14 mammal species, of which nine are listed as LC according to the IUCN RL. Two species (marbled polecat *Vormela peregusna* and long-fingered bat *Myotis capaccinii*) are in VU category and one species (Mediterranean Horseshoe Bat *Rhinolophus Euryale*) is IUCN NT.

Birds

Table 7.8.9 provides a list of bird species that might be found in the Project Area and vicinity according to the EIA report.

Table 7.8.9 Bird Species Identified in the Environmental Impact Assessment

Species Name	Common Name
Podiceps nigricollis	Black-necked grebe
Puffinus yelkouan	Yelkouan shearwater
Larus melanocephalus	Mediterranean gull
Hirundo daurica	Red-rumped swallow
Delichon urbica	Northern house martin
Pica pica	Eurasian magpie
Corvus monedula	Eurasian jackdaw
Sturnus vulgaris	European starling
Podiceps cristatus	Great crested grebe
Phalacrocorax carbo	Great cormorant
Ardea cinerea	Grey heron
Larus marinus	Great black-backed gull
Streptopelia decaocto	Eurasian collared dove
Apus apus	Common swift
Circus cyaneus	Northern harrier
Scolopax rusticola	Eurasian woodcock
Hieraaetus pennatus	Booted eagle
Circaetus gallicus	Short-toed snake eagle
Aquila clanga	Greater spotted eagle
Anas acuta	Northern pintail
Ciconia nigra	Black stork
Ciconia ciconia	White stork
Pelecanus onocrotalus	Great white pelican
Pelecanus crispus	Dalmatian pelican
Grus grus	Common crane
Fulica atra	Common coot

Marine Ecology

Marine ecology is not discussed in the EIA.

7.8.4.2 Findings

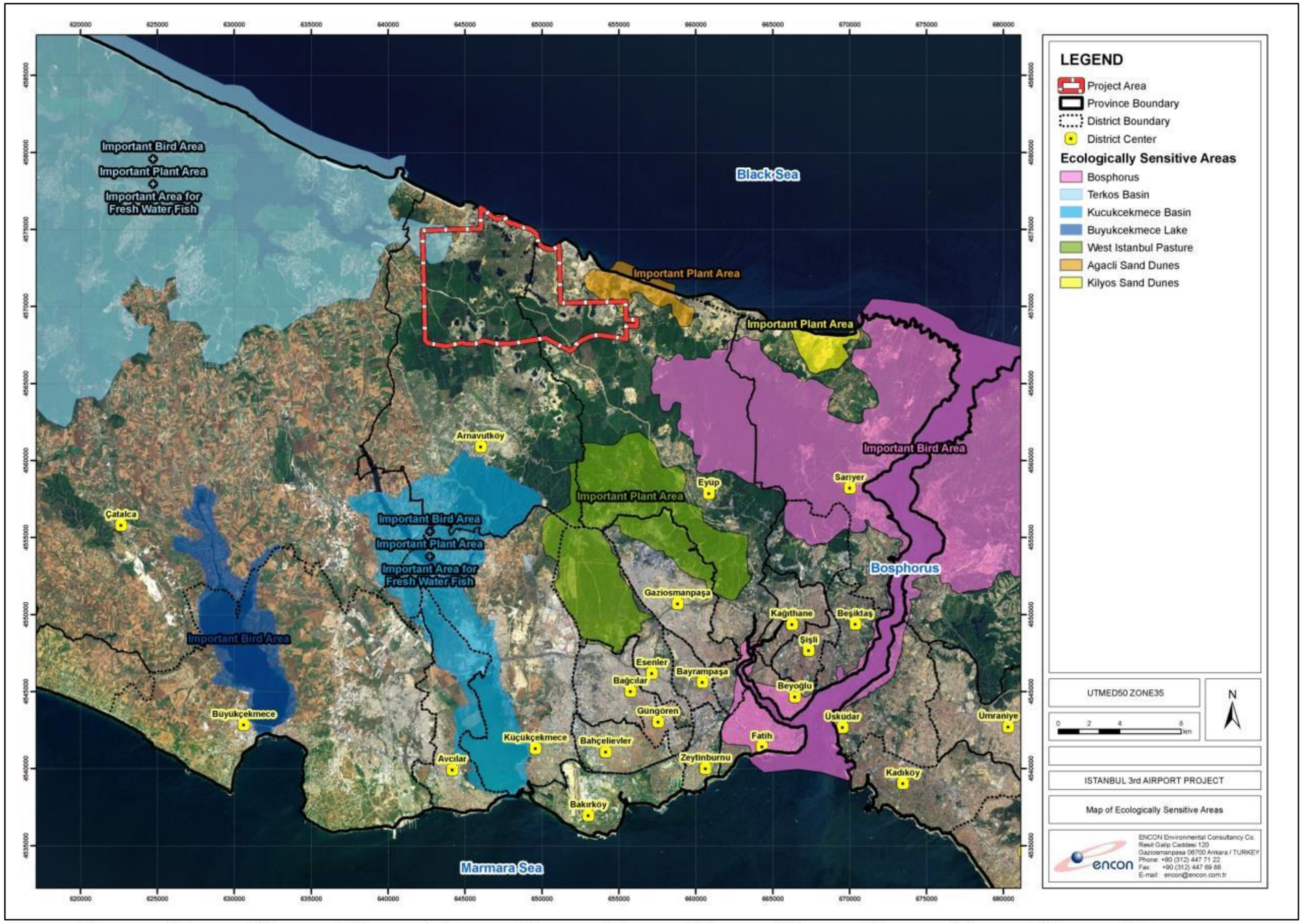
Internationally Recognised Areas

This section provides details on the qualifying features for each of the Internationally Recognised Areas located in the vicinity of the Project Area. These include Key Biodiversity

Areas (KBAs), Important Plant Areas (IPAs) and Important Bird Areas (IBAs). The Internationally Recognised Areas described in this section are shown in Figure 7.8.10.

The Project Area overlaps with two small portions of the Terkos Basin KBA, IPA and IBA, as well as the Agacli Sand Dunes KBA and IPA. The Project Area lies on the route of various migrating bird species that utilise a number of the surrounding IBAs. The closest point of the Bosphorus Region IBA is 2.3 km to the Project Area.

Figure 7.8.10 Designated Sites in the Vicinity of the Project Area



Terkos Basin KBA, IBA and IPA

Surface Area: 160,351 ha
Altitude: 0 m – 490 m
Longitude: 28.27°E
Province(s): Istanbul, Tekirdag, Kirklareli
Latitude: 41.38°N
District(s): Vize, Saray, Cerkezkoy, Silivri

The Terkos Basin has been designated as a KBA due to the presence of a range of endemic and threatened species. These include 17 plant taxa that meet the KBA criteria. Eleven of these plant taxa are endemic to Turkey and the majority are threatened. The Terkos Basin KBA includes the whole watershed of Lake Terkos. The terrestrial habitats mainly comprise farmland, forests and scrub. The Terkos Basin KBA extends into the Project Area. Endemic and threatened species that form part of the designation criteria of Terkos Basin KBA are presented in Table 7.8.10.

Table 7.8.10 Endemic and Threatened Species Present within Terkos Basin KBA

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP
Plants	*Asperula littoralis*	-	Yes	-	VU
	Centaurea hermanii	-	Yes	-	EN
	Centaurea inermis	-	No	-	VU
	Centaurea kilaea	-	Yes	-	EN
	Cirsium baytopae	-	No	-	VU
	Cirsium polycephalum	-	Yes	-	CR
	Crocus flavus ssp. dissectus	Dutch yellow crocus	Yes	-	VU
	Crocus pestalozzae	-	Yes	-	VU
	Erysimum sorgerae	-	Yes	-	-
	Isatis arenaria	-	Yes	-	EN
	Jurinea kilaea	-	No	-	VU
	Linum tauricum ssp. Bosphori	-	Yes	-	CR
	Ornithogalum euxinum	-	No	-	EN
	Peucedanum obtusifolium	-	No	-	VU
	Ranunculus thracicus	-	No	-	EN
	Silene sangaria	-	Yes	-	VU
	Verbascum degenii	-	Yes	-	CR
Birds	*Aquila clanga*	Greater spotted eagle	No	VU	-
	Aythya nyroca	Ferruginous duck	No	NT	-
	Branta ruficollis	Red-breasted goose	No	VU	-

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP
	Ficedula semitorquata	Semi-collared flycatcher	No	NT	-
Mammals	*Lutra lutra*	European otter	No	NT	-
	Miniopterus schreibersii	Schreibers' long-fingered bat	No	NT	-
	Myotis capaccinii	Long-fingered bat	No	VU	-
	Nannospalax leucodon	Lesser mole rat	No	DD	-
	Rhinolophus euryale	Mediterranean horseshoe bat	No	NT	-
	Rhinolophus ferrumequinum	Greater horseshoe bat	No	LC	-
	Spermophilus citellus	European ground squirrel	No	VU	-
	Spermophilus citellus thracius	-	No	VU	-
Reptiles	*Emys orbicularis*	European pond turtle	No	NT	-
	Testudo graeca	Spur-thighed tortoise	No	VU	-

Two of the plant species listed in Table 7.8.10, *Centaurea hermannii* and *Cirsium polycephalum* were recorded within the Project Area during 2014. Both *Emys orbicularis* and *Testudo graeca* were recorded to be widespread within the Project Area.

The qualifying bird populations for the Terkos Basin IBA are provided in Table 7.8.11 (Ref. 7.8.34). Wetlands International have published data from 15 winter surveys of Lake Terkos completed between 1967 and 2010 (Ref. 7.8.35). The highest previous recorded count of 10,985 waterbirds (all species combined) was made in 2006. A peak count of pygmy cormorant of 224 individuals was made in 2002. A single count of 6 red-breasted geese was made in 1997. The only record of ferruginous duck was made in 1995 when 5 individuals were counted, although this was during the winter and not the breeding season.

Table 7.8.11 Populations of IBA Trigger Species for Terkos Basin Important Bird Area

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria[1]	IUCN RL
Red-breasted goose *Branta ruficollis*	Winter	1995	90 individuals	Poor	A1, B2	EN
Ferruginous duck *Aythya nyroca*	Breeding	2000	20 breeding pairs	Poor	A1	NT

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria[1]	IUCN RL
Black stork *Ciconia nigra*	Breeding	-	5-10 breeding pairs	-	B2	LC
Pygmy cormorant *Phalacrocorax pygmeus*	Passage	2000	32 individuals	Poor	A1	LC
Pygmy cormorant *Phalacrocorax pygmeus*	Winter	2002	224 individuals	-	A1	LC
Whiskered tern *Chlidonias hybrida*	Breeding	2000	45 breeding pairs	-	B2	LC

Notes:

A1 – Species of global conservation concern. The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.

B2 - Species with an unfavourable conservation status in Europe. The site is one of the most important in the country for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate.

See Birdlife International website for full list of definitions of IBA criteria: (http://www.birdlife.org/datazone/info/ibacriteuro)

In order to confirm the species, importance and population densities of the wintering bird assemblage of Lake Terkos, field surveys were carried out in January 2014. The field surveys recorded a total of 23,791 individual waterbirds of 33 species (Table 7.8.12) The most common waterbird species recorded were *Fulica atra* (15,408 individuals), *Phalacrocorax carbo* (4,279 individuals) and *Anas platyrynchos* (1,378 individuals). The surveys recorded 48 individual pygmy cormorants. This is significantly fewer than the 224 individuals from the 2002 population estimate that forms part of the designation criteria of the IBA. Neither red-breasted goose nor ferruginous duck were recorded in January 2014. Whilst the 2014 winter bird survey results are inconclusive in terms of the qualifying criteria listed in Table 7.8.11 above, Lake Terkos was confirmed to support more than 20,000 waterbirds. Therefore, it meets the IBA criteria A4. Congregations: iii - The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds. In addition to waterbirds, a single greater spotted eagle was recorded during January 2014.

Table 7.8.12 Globally and Nationally Threatened Conservation Categories And Seasonal Status of Waterbird Species Recorded at Lake Terkos in 2014

Species	International Threatened Categories				National Threatened Categories				Total Individuals
	IUCN RL	BERN	BirdLife Int. (SPEC)	CITES	CHC	Turkish RDB	Turkish RDB (IUCN)	Status	
Tachybaptus ruficollis	LC	ANN-2	V	-	ANN-1	A.3.1	VU	RESIDENT	538
Podiceps cristatus	LC	ANN-3	V	-	ANN-1	A.5	LC	RESIDENT	809
Podiceps grisegena	LC	ANN-2	V	-	ANN-1	A.3	VU	RESIDENT	1
Podiceps nigricollis	LC	ANN-2	V	-	ANN-1	A.4	NT	RESIDENT	19
Phalacrocorax carbo	LC	ANN-3	V	-	ANN-2	A.3	VU	RESIDENT	4,279
Phalacrocorax pygmeus	LC	ANN-2	I	-	ANN-1	A.3.1	VU	RESIDENT	48
Pelecanus onocrotalus	LC	ANN-2	III	-	ANN-1	A.3	VU	RESIDENT	6
Egretta garzetta	LC	ANN-2	V	-	ANN-1	A.3.1	VU	RESIDENT	5
Casmerodius albus	LC	ANN-2	V	-	ANN-1	A.3	VU	RESIDENT	134
Ardea cinerea	LC	ANN-3	V	-	ANN-2	A.3.1	VU	RESIDENT	121
Cygnus olor	LC	ANN-3	V	-	ANN-1	A.3.1	VU	RESIDENT	15
Cygnus columbianus	LC	ANN-2	III	-	ANN-1	A.1.2	CR	RESIDENT	1
Cygnus cygnus	LC	ANN-2	V	-	ANN-1	A.3	VU	RESIDENT	5
Anas crecca	LC	ANN-3	V	-	ANN-3	A.5	LC	RESIDENT	15
Anas platyrynchos	LC	ANN-3	IV	-	ANN-3	A.5	LC	RESIDENT	1,378
Netta rufina	LC	ANN-3	IV	-	ANN-3	A.5	LC	RESIDENT	2

Species	International Threatened Categories				National Threatened Categories				Total Individuals
	IUCN RL	BERN	BirdLife Int. (SPEC)	CITES	CHC	Turkish RDB	Turkish RDB (IUCN)	Status	
Aythya fuligula	LC	ANN-3	III	-	ANN-3	A.5	LC	RESIDENT	34
Mergus serrator	LC	ANN-3	IV	-	ANN-1	B.2	EN	WINTER VISITOR	6
Circus aeroginosus	LC	ANN-3	IV	ANN-2	ANN-1	A.3	VU	RESIDENT	1
Fulica atra	LC	ANN-3	IV	-	ANN-3	A.5	LC	RESIDENT	15,408
Vanellus vanellus	LC	ANN-3	II	-	ANN-2	A.5	LC	RESIDENT	131
Calidris alpina	LC	ANN-2	III	-	ANN-1	B.5	LC	WINTER VISITOR	4
Gallinago gallinago	LC	ANN-3	III	-	ANN-3	B.3.1	VU	WINTER VISITOR	36
Numenius arquata	NT	ANN-3	II	-	ANN-2	B.3	VU	WINTER VISITOR	5
Tringa totanus	LC	ANN-3	II	-	ANN-2	A.4	NT	RESIDENT	1
Larus ichthyaetus	LC	ANN-3	-	-	ANN-2	B.3	VU	WINTER VISITOR	1
Larus minutus	LC	ANN-2	III	-	ANN-1	A.3.1	VU	RESIDENT	66
Larus ridibundus	LC	ANN-3	IV	-	ANN-2	A.5	LC	RESIDENT	528
Larus canus	LC	ANN-3	II	-	ANN-2	B.2	EN	WINTER VISITOR	18
Larus michahellis	LC	ANN-3	II	-	ANN-1	A.4	NT	RESIDENT	21
Sterna caspia	LC	ANN-2	III	-	ANN-1	A.2	EN	RESIDENT	7
Alchedo atthis	LC	ANN-2	III	-	ANN-1	A.2	EN	RESIDENT	4
Total									23,676

The watershed of Lake Terkos forms the boundary of the Terkos Basin IBA. However, when considering bird populations it is important to understand that they are mobile and not confined to specific areas. In the case of the Terkos Basin IBA, it is likely that the larger waterbodies within the Project Area provides supporting habitat to the wintering bird populations of Lake Terkos. The concept of supporting habitat is well developed under the legal application of the EU habitats Directive. Supporting habitat is situated outside a designated site, but provides significant support to the conservation status of its qualifying features. Examples include habitat buffers and linear routes, feeding, roosting or resting areas for species that are features of interest. The wintering bird surveys completed at Lake Terkos and within the Project Area show that the two areas have a very similar wintering bird assemblage (Table 7.8.13). Excluding yellow-legged gull, the two areas share the same five most numerous species. Wintering pygmy cormorants is one of the trigger species for the designation of the Terkos Basin IBA. The number of pygmy cormorants recorded within the Project Area represents 67% of the number recorded at Lake Terkos. It is highly likely that there is regular interchange of this species and others between the two localities and that they can be considered as a single wintering population. Therefore, the Project Area can be considered as supporting habitat to the IBA and has been included in the assessment of critical habitat (Annex 7.8.G).

Table 7.8.13 Comparison of Wintering Bird Survey Results: Lake Terkos and Project Area

	Project Area		Lake Terkos	
Rank	**Species**	**Number of Individuals (Percentage of IBA Population)**	**Species**	**Number**
1	*Fulica atra*	577 (4%)	*Fulica atra*	15,408
2	*Phalacrocorax carbo*	301 (7%)	*Phalacrocorax carbo*	4,279
3	*Podiceps cristatus*	106 (13%)	*Anas platyrynchos*	1,378
4	*Anas platyrynchos*	55 (4%)	*Podiceps cristatus*	809
5	*Tachybaptus ruficollis*	50 (9%)	*Tachybaptus ruficollis*	538
6	*Phalacrocorax pygmeus*	32 (67%)	*Larus ridibundus*	528
7	*Larus minitus*	22 (33%)	*Casmerodius albus*	134
8	*Aythya ferina*	19 (95%)	*Vanellus vanellus*	131
9	*Gallinula chloropus*	10 (-)	*Ardea cinerea*	121
10	*Netta rufina*	8 (400%)	*Larus minutus*	66
11	*Ardea cinerea*	5 (4%)	*Phalacrocorax pygmeus*	48

Agacli Sand Dunes KBA and IPA

Surface Area: 1,347 ha **Altitude:** 0 m – 100 m
Longitude: 27.86°E **Province(s):** Istanbul
Latitude: 41.28°N **District(s):** Eyup

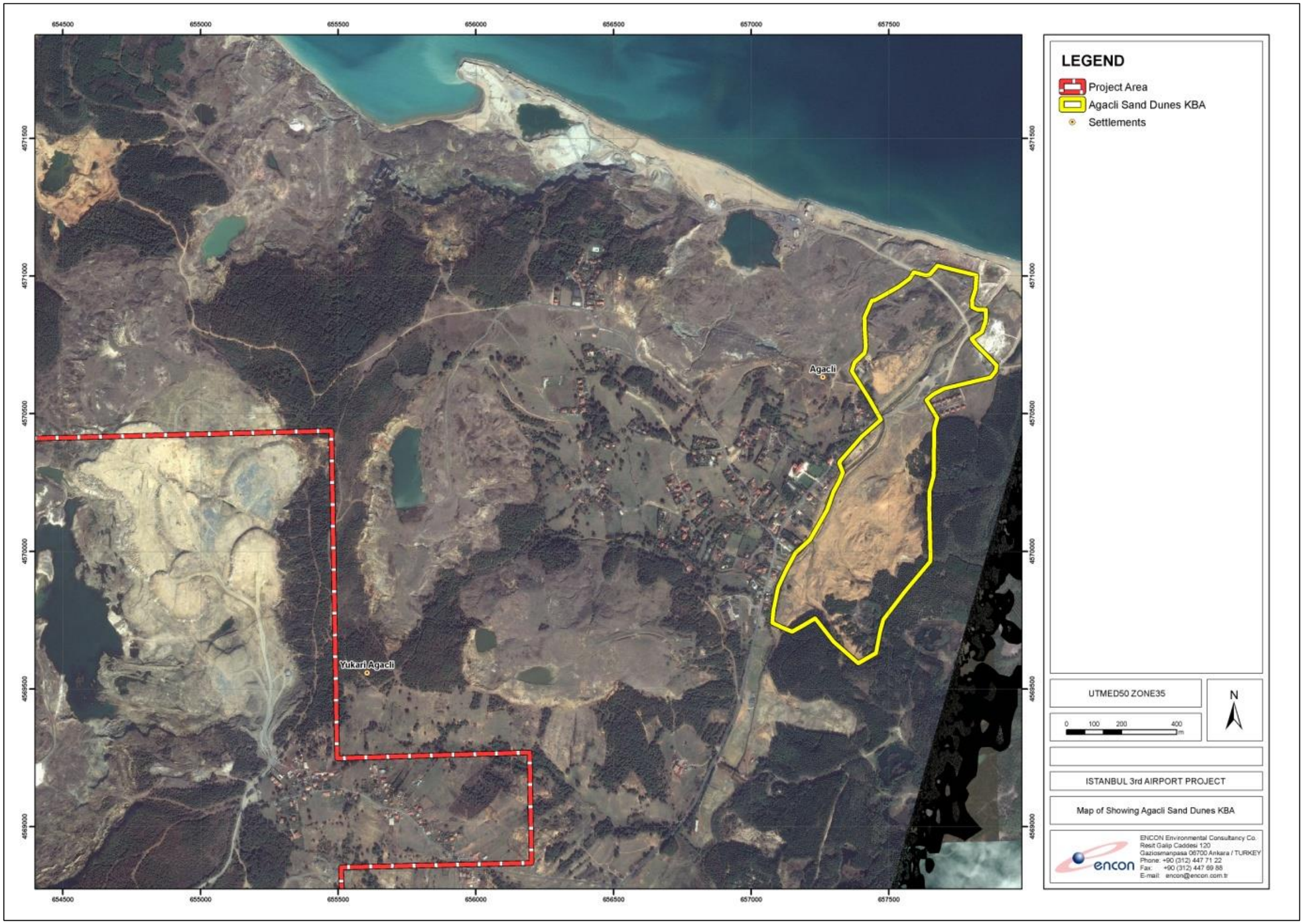
Agacli Sand Dunes KBA has been designated as a KBA and IPA due to the presence of a range of endemic and threatened plant species (Table 7.8.14).

Table 7.8.14 Endemic and Threatened Species Present within Agacli Sand Dunes Key Biodiversity Area

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP
Plants	*Asperula littoralis*	-	Yes	VU	VU
	Aurinia uechtritziana	-	No	VU	VU
	Centaurea kilaea	-	Yes	EN	EN
	Isatis arenaria	-	Yes	EN	EN
	Jurinea kilaea	-	No	-	VU
	Linum tauricum ssp. bosphori	-	Yes	CR	CR
	Peucedanum obtusifolium	-	No	VU	VU
	Silene sangaria	-	Yes	VU	VU
	Verbascum degenii	-	Yes	CR	CR
	Pancratium maritimum	Sea daffodil	No	-	VU
	Linaria odora	-	No	NT	VU
	Matthiola fruticulosa	Sad Stock	No		VU

During surveys completed in 2014 within the Agacli Sand Dunes, four endemic species (*Centaurea kilaea, Silene sangaria, Verbascum degenii* and *Asperula littoralis)* were recorded. In addition, five more non-endemic threatened species (*Aurinia uechtritziana, Peucedanum obtusifolium*, *Jurinea kilaea, Linaria odora,* and *Pancratium maritimum*) were found within the area. Three of the species listed in Table 7.8.14 were not recorded during 2014 (*Isatis arenaria, Linum tauricum ssp. Bosphori* and *Matthiola fruticulosa*). The threatened and endemic species of plants were found to have a very restricted range within the area designated as the Agacli Sand Dunes KBA. The area supporting the notable plant species is very distinctive with permanent yellow sand dunes, which support a sparse, but diverse flora (Photograph 2, Annex 7.8.I and Figure 7.8.11). It is likely that this type of vegetation was present within the Project Area prior to the mining and sand extraction activities and subsequently destroyed. None of the plant species listed in Table 7.8.14 were found to be present in the Project Area.

Figure 7.8.11 Agacli Sand Dunes – Area of High Botanical Interest



Bosphorus Region KBA, IBA and IPA

Surface Area: 55,631 ha **Altitude:** 0 m – 400 m
Longitude: 29,12°E **Province(s):** Istanbul
Latitude: 41.16°N **District(s):** Eyup, Sariyer, Beykoz, Sile, Sisli, Umraniye, Kagithane, Besiktas, Uskudar, Beyoglu, Fatih, Zaytinburnu, Eminonu, Kadikoy

Bosphorus Region is designated as a KBA, IPA and IBA. The ecological features of the site are partially protected under the Bosphorus Law. The law was passed in 1983 with the aim of protecting the cultural and natural values of the coastal parts of the region against development.

The area is covered with several types of habitats including: marine, scrub communities on the sea coast, meadows, rocky areas, dunes and reeds and *Fagus*-oak-*Carpinus* forests. The distance between the Bosphorus Region IBA and the Project Area is about 2.3 km. Endemic and threatened species that are present within the Bosphorus Region KBA is presented in Table 7.8.15.

Table 7.8.15 Endemic and Threatened Species Present within the Bosphorus Region Key Biodiversity Area

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP /RBBT
Plants	*Alcea lavateriflora*	Hollyhocks	No	-	VU
	Asperula littoralis		Yes	-	VU
	Aubrieta olympica		Yes	-	EN
	Aurinia uechtritziana		No	-	VU
	Centaurea hermannii		Yes	-	EN
	Centaurea kilaea		Yes	-	EN
	Cirsium polycephalum		Yes	-	CR
	Erysimum aznavouri		Yes	-	-
	Erysimum degenianum		Yes	-	EN
	Linum tauricum ssp. bosphori		Yes	-	CR
	Ornithogalum euxinum		No	-	EN
	Peucedanum obtusifolium		No	-	VU
	Ranunculus thracicus		No	-	EN
	Symphytum pseudobulbosum		Yes	-	CR
	Tanacetum heterotomum		Yes	-	VU
	Taraxacum aznavourii		Yes	-	DD
	Taraxacum pseudobrachyglossum		Yes	-	NT
	Trifolium pachycalyx		Yes	-	DD

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP /RBBT
	Verbascum degenii		Yes	-	CR
Birds	*Accipiter brevipes*	Levant sparrowhawk	No	LC	-
	Ficedula semitorquata	Semi-collared flycatcher	No	NT	-
	Garrulus glandarius hansguentheri	Eurasian jay	Yes (endemic sub-species)	LC	-
	Milvus migrans	Black kite	No	LC	-
	Sitta krueperi	Krueper's nuthatch	No	NT	-
Reptiles	*Emys orbicularis*	European pond turtle	No	NT	-
	Testudo graeca	spur-thighed tortoise	No	VU	-
Mammals	*Tursiops truncatus*	Common bottlenose dolphin	No	LC	-
Insects	*Anthocharis damone*	Eastern orange Tip	No	-	LC
	Archon apollinus nikodemusi		Yes	NT	-
	Glaucopsyche alexis	Green-underside blue	No	-	LC
	Glaucopsyche arion	Large blue	No	-	-
	Pseudophilotes bavius	Bavius blue	No	-	LC
	Pseudophilotes vicrama	Eastern baton blue	No	-	LC
	Scolitantides orion	Chequered blue butterfly	No	-	NT

The qualifying bird populations for the Bosphorus Region IBA are provided in Table 7.8.16 (Ref. 7.8.36).

Table 7.8.16 Populations of Important Bird Area Trigger Species for the Bosphorus Region Important Bird Area

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria[1]	IUCN RL
Yelkouan shearwater *Puffinus yelkouan*	non-breeding	2000	1,000-25,000 individuals	medium	A4ii, B1ii	VU
Yelkouan shearwater *Puffinus yelkouan*	winter	-	1,377 individuals	-	A4ii, B1ii	VU
Black stork *Ciconia nigra*	passage	-	8,000 individuals	-	A4i, B1i	LC
White stork *Ciconia ciconia*	passage	-	32,000-338,353 individuals	-	A4i, B1i	LC
Great cormorant *Phalacrocorax carbo*	winter	-	3,456-10,000 individuals	-	A4i, B1i	LC
European shag *Phalacrocorax aristotelis*	resident	2002	450 individuals	-	B1i	LC
Larus michahellis	winter	1999	40,000 individuals	-	A4i, B1i	Not assessed
Black-headed Gull Larus ridibundus	winter	1999	15,040 individuals	-	B1i	LC
Mediterranean Gull Larus melanocephalus	passage	2000	14,500 individuals	-	A4i, B1i	LC
A4iii Species group – waterbirds	winter	-	20,310-22,644 individuals	-	A4iii	-
A4iv Species group - soaring birds/cranes	passage	-	92,000 individuals	-	A4iv, B1iv	-

Notes:

A4. Congregations

i. The site is known or thought to hold, on a regular basis, ≥ 1% of a biogeographic population of a congregatory waterbird species.

ii. The site is known or thought to hold, on a regular basis, ≥ 1% of the global population of a congregatory seabird or terrestrial species.

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria[1]	IUCN RL
iii. The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabird of one or more species. iv. The site is known or thought to be a 'bottleneck' site where at least 20,000 storks (Ciconiidae), raptors (Accipitriformes and Falconiformes) or cranes (Gruidae) regularly pass during spring or autumn migration. B1. Congregations i. The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species. ii. The site is known or thought to hold ≥ 1% of a distinct population of a seabird species. iii. The site is known or thought to hold ≥ 1% of a flyway or other distinct population of other congregatory species. iv. The site is a 'bottleneck' site where over 5,000 storks, or over 3,000 raptors or cranes regularly pass on spring or autumn migration. See Birdlife International website for full list of definitions of IBA criteria (http://www.birdlife.org/datazone/info/ibacriteuro)						

West Istanbul Pasture KBA and IPA

Surface Area: 9,612 ha **Altitude:** 10 m – 230 m
Longitude: 28.86°E **Province(s):** Istanbul
Latitude: 41.13°N **District(s):** Eyup, Gaziosmanpasa, Kucukcekmece, Esenler, Bagcilar

West Istanbul pastureland is determined to be both a KBA and an IPA. This area includes the only known distribution of Istanbul thyme *Thymus aznavourii* in the world. The area is covered with dry scrub and meadows especially on the carstic rocky areas. West Istanbul Pasture land KBA and IPA is located at a distance of about 6 km from the Project Area. Endemic and threatened species that are present within West Istanbul Pasture is presented in Table 7.8.17.

Table 7.8.17 Endemic and Threatened Species Present within West Istanbul Pasture Key Biodiversity Area

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP /RBBT
Plants	*Alchemilla microscopica*		-	-	VU
	Amsonia orientalis		Yes	-	CR
	Bupleurum pendikum		Yes	-	EN
	Cirsium polycephalum		Yes	-	CR
	Erysimum degenianum		Yes	-	EN
	Hypericum aviculariifolium ssp. Byzantinum		Yes	-	NT
	Linum tauricum ssp. bosphori		Yes	-	CR
	Onosma proponticum		Yes	-	EN
	Thymus aznavourii	Istanbul thyme	Yes	-	CR
Reptiles	*Emys orbicularis*	European pond turtle	-	NT	-

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP /RBBT
	Testudo graeca	Spur-thighed tortoise	-	VU	-
Insects	*Glaucopsyche alexis*	Green-Underside blue	-	-	LC
	Glaucopsyche arion	Large blue	-	-	LC
	Lycaena dispar	Large copper	-	NT	LC
	Scolitantides orion	Chequered blue butterfly	-	-	NT

Kucukcekmece Basin KBA, IBA and IPA

Surface Area: 11,715 ha **Altitude:** 0 m – 230 m
Longitude: 41,10°E **Province(s):** Istanbul
Latitude: 41,10°N **District(s):** Catalca, Gaziosmanpasa, Kucukcekmece, Buyukcekmece, Avcilar

Kucukcekmece Basin is determined to be a KBA, IBA, and IPA. The distance between Kucukcekmece Basin and the Project Area is approximately 6.5 km. Kucukcekmece is mainly composed of a lake ecosystem surrounded by a mixture of agricultural land, reed beds, scrub and oak forests. The northern portion of the designated site supports similar forest habitat as the Project Area and therefore it is possible similar species occur in both. Endemic and threatened species that are present within Kucukcekmece Basin is listed in Table 7.8.18. *Veronica turrilliana* which has a small global distribution, supports the IPA designation. Also, the basin is known to be an important breeding and wintering region for aquatic bird species.

Table 7.8.18 Endemic and Threatened Species Present within Kucukcekmece Basin

	Species/Subspecies	English Name	Endemic to Turkey	IUCN RL	RDBTP /RBBT
Plants	*Veronica turrilliana*		No	DD	VU
Birds	*Oxyura leucocephala*	White-headed duck	No	EN	-
Insects	*Archon apollinus nikodemusi*	False Apollo	Yes (endemic sub-species)	NT	LC
	Erebia medusa	Woodland Ringlet	No	-	LC
	Euphydryas aurinia	Marsh Fritillary	No	-	LC
	Glaucopsyche alexis	Green-Underside Blue	No	-	LC
	Pseudophilotes bavius	Bavius Blue	No	-	LC
	Pseudophilotes vicrama	Eastern Baton Blue	No	-	LC

The qualifying bird populations for the Kucukcekmece Basin IBA are provided in Table 7.8.19 (Ref. 7.8.37).

Table 7.8.19 Populations of Important Bird Area Trigger Species for Kucukcekmece Basin Important Bird Area

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria	IUCN RL
Pygmy cormorant *Microcarbo pygmaeus*	passage	1995	126-160 individuals	-	A1	LC
Great cormorant *Phalacrocorax carbo*	winter	1993	10,200 individuals	-	A4i, B1i	LC
A4iii Species group – waterbirds	winter	-	21,177-21,273 individuals	-	A4iii	

Nationally Protected Designated Sites

This section describes designated sites that are defined and protected by Turkish laws and regulations, which are relevant to the ESIA.

There are no nationally protected designated sites located within the Project Area. However, a number of nationally protected designated sites occur in the surrounding area (Figure 7.8.12). These include the following:

- Within the Bosphorus Region KBA boundaries there are a Natural Protection Area, Natural Park, and Wildlife Development Area that are located 2.3 km away from the Project Area; and
- Kucukcekmece Basin has been designated as a Natural Protection Area according to Turkish Nature Conservation Categories. In Terkos Basin there are Protection Forest, Natural Protection Area and Wildlife Development Area. Also, a protection zone defined for the Lake Terkos is located 1.3 km to the north-west of the Project Area.

According to the Map of Prohibited and Open Hunting Areas for Istanbul, prepared by the MFWA, General Directorate of Nature Conservation and National Parks; a protected area with prohibited area status “Durusu Hunting Banned Area” (according to the decision of Central Hunting Commission for 2013-2014) is located 2.3 km to the north-west of the Project Area.

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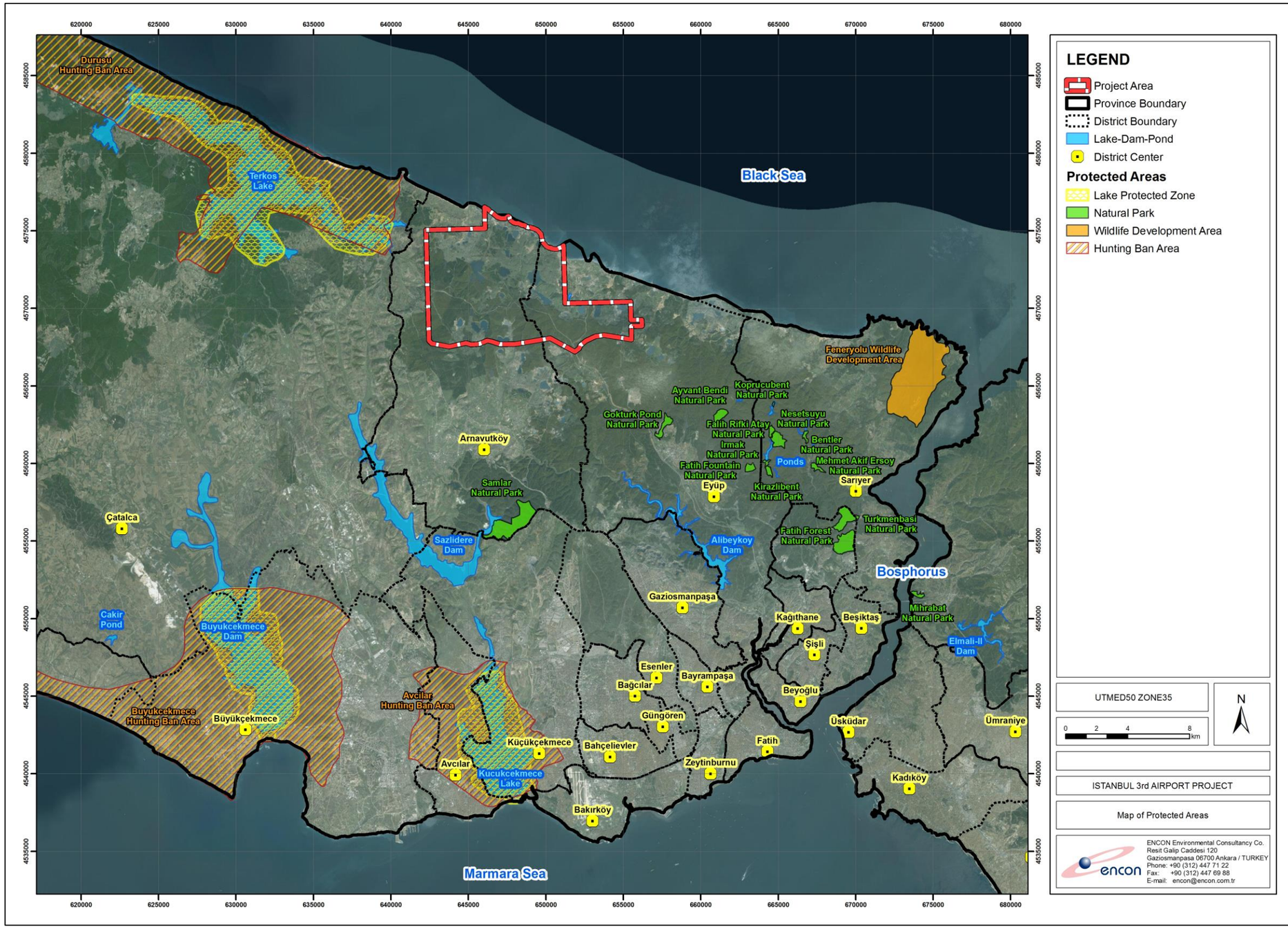
Figure 7.8.12 Protected Areas In the Vicinity of the Project Area



Habitats Within The Project Area

Introduction

The Project Area is situated along the Black Sea coastline on the European side of the Istanbul isthmus. The geographic location of the Project Area has a significant effect on the ecology of the area. From a bio-geographic perspective, European Turkey is the meeting point of several floristic elements, notably the Mediterranean element, the Balkan-Central European element, the Sarmatian element and the Euxine element (Ref. 7.8.38). A range of low hills runs along the southern portion of the Project Area with a maximum height of 164 m above sea level. The northern boundary of the Project Area is formed by the Black Sea coastline, although this has been heavily modified by mining activities. Beyond the Project Area boundary, the line of hills extends to the south-east as far as the Bosphorus. The hills also extend north-eastwards where they link up with the Yıldız Mountain range (Istranca Mountains) and on into south-eastern Bulgaria.

The Project Area can be split into two geologically different parts: the northern part is characterised by mine spoil material, whereas the southern part is underlain by natural sediments. The spoil material covering the northern portion of the Project Area occurs primarily around and over former mining pits, from which the material was excavated. Many of the former pits are now water bodies. The spoil consists primarily of fine-grained, clayey sediments. The southern line of hills is formed by Middle-Oligicene Lower Miocene delta sediments of the Danisment Formations, comprising shale rich with organic matter and coal. These comprise mostly claystone, siltstone and sandstone. On top of the solid rock, the soils are largely of a clay or clayey sandy nature. The geology of the Project Area is described in more detail in **Chapter 7.4 Geology and Soils**.

The climate of the Project Area is Mediterranean, although the exposure to the Black Sea significantly affects local weather patterns. Mean annual rainfall is approximately 800 mm, with the highest amounts falling in winter (approximately 500 mm, November to April). Although significant amounts of rain can fall during the summer, the region can also be subject to droughts. Mean monthly temperatures range from a minimum of 5.6^{o}C in February to a high of 24^{o}C in August. Prevailing wind directions are south-easterly, followed by north-westerly. A more detailed description of the climate in the Project Area is provided in **Chapter 7.2 Air Quality.**

The Project Area has been subject to a range of anthropogenic influences. The land uses currently include portions of land within the Project Area that are mined for sand, gravel and lignite. An area of 298 ha is being used for agricultural purposes. The majority of the remaining Project Area is utilised as forestry. Details on the forestry uses of the Project Area are provided in **Chapter 7.6 Forestry**. There are three landfill sites (one of which has recently closed), within the boundary of the Project Area, a small number of roads and a small amount of human settlement.

The geographic location, topography, geology, climate, as well as anthropogenic influences have created relatively diverse conditions on which a range of habitat types have developed. The following section describes these habitats and presents those species which either have been, or have the potential to be, present within the Project Area.

Terrestrial and Freshwater Habitats

The habitats within the Project Area have been described through a combination of mapping from satellite imagery and field surveys. A total of three natural and ten modified terrestrial and

freshwater habitat types were identified within the Project Area, based on the EUNIS habitat classification system. The dominant vegetation types within the Project Area are thermophilous deciduous forests and highly artificial coniferous woodland. Aquatic vegetation occurs near the lakes and ponds, wet meadow vegetation in glades and coastal dune vegetation adjacent to the sea coast.

These habitat types are discussed in further detail below and their location and extent mapped on Figure 7.8.13. Table 7.8.20 presents the area of each habitat type within the Project Area.

Table 7.8.20 Habitat Types within the Project Area

Habitat Type	Area (ha)	Percentage of Project Area
B1.3 - Shifting coastal dunes	7.05	0.1
C1.3 - Permanent eutrophic lakes, pond and pools	554.18	7.4
C2.5 - Temporary running waters	11.36	0.2
C3.2 - Water-fringing reedbeds and tall heleohytes other than canes	155.88	2.1
E3.4 - Moist or wet eutrophic and mesotrophic grassland	856.73	11.5
F5.4 - Spartium junceum fields	134.10	1.8
G1.3 - Mediterranean riparian woodland	15.78	0.2
G1.7 - Thermophilous deciduous woodland	2,612.28	35.0
G3.F - Highly artificial coniferous woodland	2,394.69	32.0
I1 - Regularly or recently cultivated agricultural, horticultural and domestic habitats	54.94	0.7
J1.2 - Residential buildings of villages and urban peripheries	16.31	0.2
J3.2 - Active opencast mineral extraction sites, including quarries	598.76	8.0
J4.2 - Road networks	61.81	0.8
Total	7473.87	

B1.3: Shifting Coastal Dunes

Shifting coastal dunes is confined to a small seven ha remnant in the north-east corner of the Project Area, adjacent to the Black Sea. Prior to mining activities, it was probably much more widespread along the coastal section of the Project Area. The habitat comprises predominantly native plant species and there is relatively little evidence of human modification of this habitat type. Typical plant species found within this habitat include: *Euphorbia paralias, Leymus racemosus subsp. sabulosus,* sea holly *Eryngium maritimum, Convolvulus persicus,*

Calystegia soldanella, Salsola ruthenica, Polygonum maritimum, Tussilago farfara, Glacium flavum, Eryngium campestre var. virens, Cakile maritime and *Elymus farctus subsp. bessarabicus var bessarabicus. Convolvulus persicus* is listed as Endangered within the RDBTP.

Although shifting coastal dunes is a very common habitat in the Mediterranean, Aegean, Marmara and Black Sea coasts, the floristic composition changes from region to region. The type of habitat and its floristic composition within the Project Area is found only in the Black Sea coasts of the Marmara Region.

Shifting coastal dunes are therefore considered to be a **natural habitat** according to IFC PS6 criteria.

C1.3: Permanent Eutrophic Lakes, Pond and Pools

This habitat type includes lakes and pools that are typically more or less turbid, waters rich in nutrients (nitrogen and phosphorus) and dissolved bases (pH usually > 7). There are some 70 different waterbodies within the Project Area, which cover approximately 600 ha. They range in size from less than 0.17 to 100 ha. Some of the water bodies within the Project Area occur within the active mine areas and support relatively little vegetation. The most recently disturbed water bodies could also be considered to fall under the EUNIS classification of J5.3 Highly artificial non-saline standing waters. However, most of the water bodies within the Project Area have been allowed to naturalise over time and have been colonised by vegetation. The aquatic vegetation of water bodies within the Project Area are characteristically formed by European white waterlily *Nymphaea alba*. A survey of phytoplankton was completed in Lake Kulakcayiri, and the species composition and a chlorophyll-a content of 11.32 µg/l fall between a mesotrophic and eutrophic character (Table 7.8.21). However, the shores of water bodies support dense beds of macrophytes such as *Phragmites, Typha* and *Juncus*, which suggest that a eutrophic classification according to EUNIS criteria is more appropriate.

Large freshwater ponds and lakes are not a common habitat within the Marmara region, and are limited mainly to water bodies created through opencast mining activities and reservoirs created with dams. The Project Area and its surrounding area have the highest concentration of water bodies in the region.

The water bodies found within the Project Area result from previous quarry excavations, which have been filled by precipitation. Therefore, these water bodies can be considered to be of relatively recent anthropogenic origin and represent a **modified habitat** in accordance with IFC PS6.

Table 7.8.21 List of the Algae Identified in Lake Kulakcayiri

Division	Species
Bacillariophyta	*Amphora sp.*
	Diatoma vulgare
	Fragilaria capucina
	Fragilaria nanana
	Navicula cryptotenella
	Nitzschia pellucida

Division	Species
	Synedra amphicephala
	Ulnaria ulna
Chlorophyta (Green algae)	*Chlorella ellipsoidea*
	Scenedesmus cf. acuminatus
	Scenedesmus quadricauda
Cyanophyta (Cyanobacteria)	*Komvophoron constrictum*
	Limnothrix obliqueacuminata
	Merismopedia punctata

C2.5: Temporary Running Waters

This habitat type is found in the Project Area along the streams that feed Lake Kulakcayiri. These streams flow during the spring and winter seasons and are generally dry during summer and autumn. The stream beds are typically formed from a clay substrate. This habitat type mostly supports hydrophilous plant species. The characteristic plant type of the habitat is common duckweed *Lemna minor,* which indicates a eutrophic character. Overhead, common alder *Alnus glutinosa* often forms a canopy over the watercourses. This habitat type is widespread in the Black Sea and Marmara regions; however, it is not widespread within the Project Area.

These watercourses have formed as a result from changes in topography caused by recent mining activity. Therefore, this vegetation type can be considered to be of recent anthropogenic origin and represent a **modified habitat** in accordance with IFC PS6.

C3.2: Water-fringing Reedbeds and Tall Heleohytes other than Canes

The EUNIS classification for this habitat includes water-fringing stands of tall vegetation by lakes (including brackish lakes), rivers and brooks, usually species-poor and often dominated by one species**.** Within the Project Area the characteristic flora species of this habitat are common reedmace *Typha latifolia,* common reed *Phragmites australis, Schoenoplectus lacustris* subsp. *Lacustris* and *Eleocharis palustris. Juncus heldreichianus* can also be seen in the coastal areas.

This habitat type is very widespread in Turkey and found on lake and pond shores and river banks. The flora types characterising the habitat are also widely distributed.

The water bodies around which these vegetation types have formed, result from recent mining activity. Therefore, this vegetation type can be considered to be of recent anthropogenic origin and represent a **modified habitat** in accordance with IFC PS6.

E3.4. Moist or Wet Eutrophic and Mesotrophic Grassland

This habitat type is represented within the Project Area by glades within the forest areas and moist meadow on the shores of water bodies. The majority are being heavily grazed by livestock. Dominant species of this habitat are white clover *Trifolium repens* var. *repens,* narrow-leaved water-dropwort *Oenanthe silaifolia*, *Bellardia trixago,* red bartsia *Parentucellia latifolia* subsp. *latifolia*, soft brome *Bromus hordeaceus* subsp. *hordeaceus, Ranunculus constantinopolitanus,* giant fescue *Festuca gigantea,* common daisy *Bellis perennis,* rough

stemmed meadowgrass *Poa trivialis*, *Silybum marianum*, creeping buttercup *Ranunculus repens*, *Medicago minima* var. *minima, Carduus pycnocephalus,* subsp. *albidus, Cynoglossum montanum*, stinking hawksbeard *Crepis foetida* subsp.*foetida* and small-flowered catchfly *Silene gallica.*

This habitat type is found in the Marmara and Black Sea Regions, the high elevations of Central Anatolia and in the Eastern Anatolia Region.

The moist or wet eutrophic and mesotrophic grassland within the Project Area mostly occur on previously mined areas, or have derived from cleared glades within woodland. The habitat is now probably dependant on continuous grazing by livestock to prevent scrub and trees from colonising the areas. Therefore, this vegetation type can be considered to be a **modified habitat** in accordance with IFC PS6.

F5.4: Spartium Junceum Fields

This habitat comprises thickets and scrub of Spanish broom *Spartium junceum.* It can be observed in sand dune hills within the Project Area.

This habitat is a natural habitat in the Aegean and Mediterranean Regions; however, they have been formed in the Project Area due to the disturbance of deciduous forests (as a result of mining activities). For this reason, *Spartium junceum* fields are considered to be a **modified habitat** in accordance with IFC PS6.

G1.3: Mediterranean Riparian Woodland

The EUNIS classification for this habitat includes alluvial forests and gallery woods of the Mediterranean region. Dominance may be of a single species, of few species or mixed with many species including *Fraxinus, Liquidambar, Platanus, Populus, Salix*, and *Ulmus*. Within the Project Area, these woods comprise forests with high groundwater level and can be only observed on shore of Lake Kulakcayiri. The characteristic flora species of this habitat are *Fraxinus angustifolia* subsp. *syriaca*, small-leaved lime *Tilia cordata, Ulmus minor* subsp. *minor,* Hungarian Oak *Quercus frainetto,* field maple *Acer campestre* subsp. *campestre,* and common oak *Quercus robur* subsp. *robur.*

The dominant tree species of this vegetation within the Project Area are narrow-leafed ash *Fraxinus angustifolia* subsp. *syriaca,* with varying proportions of *Ruscus aculeatus, Cornus mas,* common hornbeam *Carpinus betulus,* small-leaved lime *Tilia cordata,* field elm *Ulmus minor* subsp. *minor*, common hawthorn *Crataegus monogyna* subsp. *monogyna, Prunus divaricata* subsp. *Divaricate,* dog rose *Rosa canina*, Hungarian Oak *Quercus frainetto*, field maple *Acer campestre* subsp. *campestre, Vitis sylvestris*, *Smilax aspera*, Turkey oak *Quercus. cerris* var. *cerris, Mespilus germanica,* honeysuckle *Lonicera etrusca* var. *etrusca* andcommon oak *Quercus robur* subsp. *robur*. The ground flora of this woodland type include *Ranunculus ficaria, Ranunculus constantinopolitanus, Scila bifolia, Bellis perennis, Vicia bithynica, Brachypodium sylvaticum, Oenanthe silaifolia, Orchis laxiflora Geranium asphodeloides* subsp. *Asphodeloides* and *Nectaroscordum siculum subsp. Bulgaricum.* The ground flora includes the nationally threatened plant species *Galanthus x valentiei* (Endemic) and *Lilium martagon*.

Mediterranean riparian woodland can only develop on marshes with high ground water. It has a very limited distribution within Turkey and globally. Within Turkey, this woodland type occurs around Igneada and Sakarya Karasu .

Mediterranean riparian woodland within the Project Area comprises predominantly native plant species and there is relatively little evidence of human modification of this habitat type. Mediterranean riparian woodland is therefore considered to be a **natural habitat** according to IFC PS6 criteria.

G1.7: Thermophilous Deciduous Woodland

This is the most widespread habitat in the Project Area, covering over 2,600 ha. Within Turkey, similar forests are spread within the Marmara Region and the West Black Sea Region. These forests probably represent the natural climax vegetation within the region. Where undisturbed, the vegetation cover is 100% and the height of the trees is around 2-4 m. The characteristic tree species of this vegetation is deciduous oak. The dominant tree species of this vegetation are *Quercus frainetto*, Turkey oak *Quercus cerris, Quercus hartwissiana* and sessile oak *Quercus petraea* subsp. *Iberica.* Tree heath *Erica arborea*, strawberry tree *Arbutus unedo, Chamaecytisus hirsutus,* dog rose *Rosa canina*, *Phillyrea latifolia*, *Ruscus aculeatus* var. *aculeatus, Osyris alba*, *Ligustrum vulgare*, *Hypericum calycinum*, wild service tree *Sorbus torminalis* var. *torminalis*, rowan *Sorbus aucuparia*, cherry plum *Prunus divaricata* subsp. *divaricate*, *Pyrus elaeagnifolia* and common medlar *Mespilus germanica* can be also seen in these vegetation type with low dominance. The understory is also quite rich and represented by herbaceous species like wood false brome *Brachypodium sylvaticum*, *Ferulago confusa, Pilosella piloselloides* subsp. *megalomastix,* cocksfoot *Dactylis glomerata* subsp. *hispanica, Anthemis tinctoria* var. *tinctoria, Verbascum bugulifolium,* southern meadow sage *Salvia virgate, Iris sintenisii*, *Polygala anatolica,* common primrose *Primula vulgaris* subsp. *vulgaris, Salvia glutinosa*, *Oenanthe silaifolia, Stellaria holostea*, *Lapsana communis* subsp. *intermedia*, *Symphytum tuberosum* subsp. *nodosum, Scorzonera cana* var. *cana, Hyoseris radiate*, lesser quaking-grass *Briza minor* and *Inula montbretiana.*

Thermophilous deciduous woodland within the Project Area supports a total of eight nationally threatened and endemic plant species: *Lathyrus undulates, Centaurea hermannii, Cirsium polycephalum, Euphorbia amygdaloides subsp. Robbiae, Galanthus x valentiei, Ferulago confuse, Symphytum tuberosum subsp. Nodosum* and *Lilium martagon*.

Thermophilous deciduous woodland within the Project Area comprises predominantly native plant species and there is relatively little evidence of human modification of this habitat type. Thermophilous deciduous woodland is therefore considered to be a **natural habitat** according to IFC PS6 criteria.

G3.F: Highly Artificial Coniferous Woodland

This is the second most widespread habitat within the Project Area, covering almost 2,400 ha. EUNIS defines highly artificial coniferous woodland as plantations of exotic conifers or of European conifers out of their natural range, or of native species planted in clearly unnatural stands, typically as monocultures in situations where other species will naturally dominate. Coniferous plantations cover a significant proportion of the Project Area and are dominated by two tree species, maritime pine *Pinus pinaster* and stone pine *Pinus pinea.* The ages of the tree stands vary between 3-5 and 25-30. The understory varies depending on the age of the stand and the density of trees. However, understorey plant species are represented by *Erica arborea, Arbutus unedo, Hypericum calycinum, Phillyrea latifolia, Crepis sancta*, *Trifolium stellatum* var. *stellatum, Trifolium resupinatum* var. *resupinatum*, *Bellis perennis, Sherardia arvensis*, *Silene gallica, Vicia sativa* subsp. *sativa, Ranunculus muricatus, Orchis purpurea, Cirsium vulgare, Hippocrepis unisiliquosa* subsp. *unisiliquosa, Trifolium repens* var. *repens ,Crepis alpine* and *Parentucellia latifolia.*

Highly artificial coniferous woodland has been planted to create uniform stands of trees for the purposes of forestry timber production. Although these areas contain pockets of semi-natural vegetation, they are considered to be a **modified habitat** in accordance with IFC PS6.

Although highly artificial coniferous woodland is a modified habitat, it supports a total of eight nationally threatened and endemic plant species: *Lathyrus undulates, Centaurea hermannii, Cirsium polycephalum, Euphorbia amygdaloides subsp. Robbiae, Galanthus x valentiei, Ferulago confuse, Symphytum tuberosum subsp. Nodosum* and *Lilium martagon*.

I1 - Regularly Or Recently cultivated agricultural, Horticultural And Domestic Habitats

Farming activities within the Project Area are largely limited to extensive grazing of the grasslands covering the previously mined areas. However, a few arable fields occur in the north-west corner of the Project Area, close to the village of Yenikoy. These fields are used to grow a mixture of crops including cereals. This habitat covers less than one percent of the Project Area.

Regularly or recently cultivated agricultural, horticultural and domestic habitats are maintained solely by frequent tilling and are therefore considered to be a **modified habitat** in accordance with IFC PS6.

J1.2 - Residential Buildings Of Villages And Urban Peripheries

This habitat classification includes residential buildings in suburbs and villages where buildings and other impermeable surfaces occupy between 30% and 80% of the land area. Human habitation is not widespread within the Project Area and limited to the Yukari Agacli neighbourhood on the eastern boundary of the Project Area.

Residential buildings of villages and urban peripheries is considered to be a **modified habitat** in accordance with IFC PS6.

J3.2 - Active Opencast Mineral Extraction Sites, Including Quarries

Opencast mining activity is widespread across the north and eastern portions of the Project Area, covering a total of nearly 1,180 ha. The habitat largely comprises bare ground, disturbed through mining activities, although ruderal plant communities can develop in areas that remain undisturbed for a year or more.

Active opencast mineral extraction sites, including quarries is considered to be a **modified habitat** in accordance with IFC PS6.

J4.2 - Road Networks

The southern portion of the Project Area is traversed by the D-010 dual carriageway. There are relatively few other roads present, except for those linking to the various mines and quarries. In total, roads cover less than one percent of the Project Area. Due to the hard road surfaces and constant disturbance, roads support no natural vegetation and are considered to be a **modified habitat** in accordance with IFC PS6.

Marine Habitats

Introduction

The Black Sea (excluding the Sea of Azov covers an area of 436,400 km^2 and has a depth of over 2,000 m. The Black Sea is a semi-enclosed body of water, surrounded by Bulgaria, Romania, Ukraine, Russia, Georgia and Turkey. Whilst mainly enclosed by land, the Black Sea is connected to the Sea of Azov in the north by the Strait of Kerch and in the south-west

it is connected to Marmara Sea through the Bosphorus strait. At various times through geological history, the Black Sea has been completely isolated. Many rivers flow into the Black Sea of which the two most important are the Danube (Romania) and the Dnipro (Ukraine). The rivers pass through many countries prior to discharging to the Black Sea, bringing with them both a high volume of freshwater and also pollutants that have been discharged to the rivers. The inflow of freshwater from rivers to the Black Sea is greater than the volume of freshwater lost to evaporation. Overall this results in a positive freshwater balance in the Black Sea; the surplus of which flows through the Bosphorus Strait into the Marmara Sea, as surface flow. A bottom flow carries saline water from the Mediterranean into the Black Sea. These factors have resulted in two distinct stratified layers in the sea: a less dense upper layer from 0 to 200 m deep and a denser layer from 200 m down to the seabed. Little mixing occurs between these layers and the deeper layer is anoxic, with a hydrogen sulphide zone which is thought to be relatively devoid of life. Oxygen rich surface waters constitute only about 13% of the Black Sea volume, with a salinity ranging from 17.5 to 18 ppm. These features influence the condition and ecology of the marine environment, with the majority of the life thought to inhabit the oxygenated surface layers. Coastal areas are shallower and therefore often have more diverse ecology.

According to the UNEP-World Conservation Monitoring Centre (World Protected Areas DataBase, 2007), there are 125 Marine Protected Areas (MPA) designations bordering the Black Sea coast. The closest MPA designation to the Project Area is the Acarlar Golu Game Reserve (Code 6425), some 140 km distant (Ref. 7.8.39).

The flora and fauna of the Black Sea reflect the general processes that influence the sea, including the stratification, low salinity areas and the semi-isolated nature of the habitat. The origins of the species in the Sea are divided into five main groups; Pontian relics (ancient species inhabiting low salinity waters), boreal-Atlantic relics (species originating from cold sea and living in deep layers of sea), Mediterranean species (species that prefer warm, saline water, mainly the upper layers), freshwater species (species introduced from river discharges) and alien species. The Black Sea commission (comprised of a representative from each bordering country) (Ref. 7.8.40), have compiled a list of species considered to be of Black Sea importance (Annex II, of the Protocol). This includes IUCN protected organisms and rare species, amongst other criteria. Approximately 130 species are included on the list, including alga and cormophyta, plychaetas, crustaceans, molluscs, echinoderms, fish, mammals and avian species. A Black Sea Red Data Book (RDB) (Ref. 7.8.41) has also been produced, which details species considered at risk of extinction in the region.

Marine Habitats Within Project Area

Almost a quarter of the marine habitat types listed in the Habitats Directive are found in the Black Sea. Research carried out for the European Community's Seventh Framework Programmes (FP7/2007-2013), known as the MESMA Report (Ref. 7.8.42), provided special attention to the Black Sea due to its Pontic habitats (e.g. areas with low salinity), with a total of six habitats being added. The MEMSA report identified a total of 28 different seabed biotopes in the Black Sea, including:

- multiple Pontic biotopes that are unlikely to have extensive distribution elsewhere and therefore represent rare habitats;
- many habitats that fall under classification listed on Annex I of the Habitats Directive and included in other conservation regulations such as the Bern Convention; and

- Priority species/habitat types for international conservation, e.g. under the Rio Convention.

A list of the seabed biotopes identified by MESMA as being potentially in the vicinity of the Project Area are provided in Table 7.8.22.

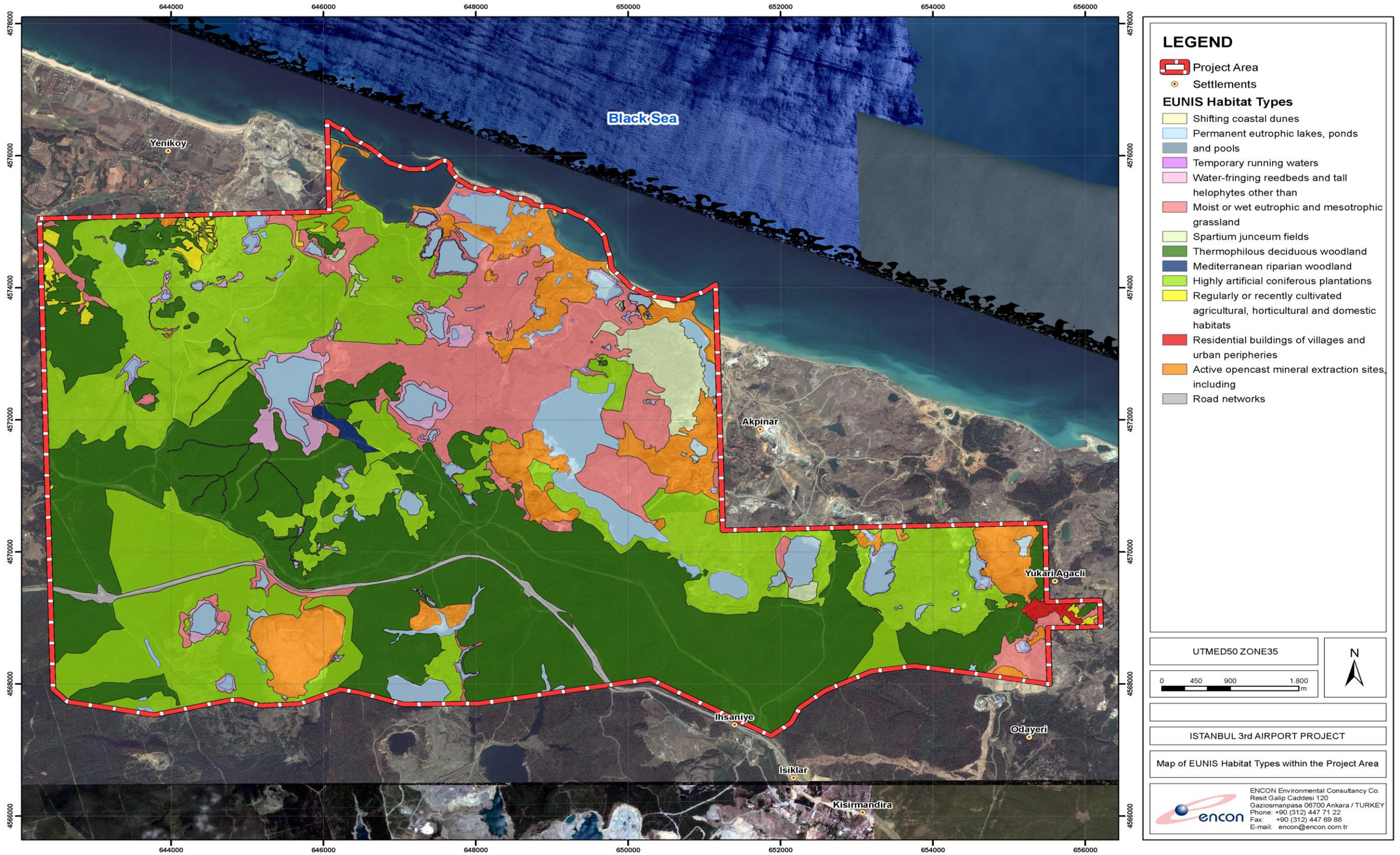
Table 7.8.22 Identified Marine Biotopes in the Black Sea

Marine Biotope	Recognised Conservation Status
Pontic communities of exposed mediolittoral rock	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive[1]. *Pachygrapsus marmoratus* (enlisted as vulnerable), and *Eriphia verrucosa* and *Patella ulyssiponensis* (enlisted as endangered) in the Black Sea Red Data Book.
Pontic communities of lower mediolittoral rock moderately exposed to wave action	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive. *Pachygrapsus marmoratus* (enlisted as vulnerable), and *Eriphia verrucosa* and *Patella ulyssiponensis* (enlisted as endangered) in the Black Sea Red Data Book.
Pontic communities of mediolittoral sands	Habitat falls under classification of *Sand flats not covered by seawater at low tide*, a habitat listed on Annex I of EU Habitats Directive. *Ophelia bicornis, Hesionides arenarius*, *Donacilla cornea are listed as* endangered in the Black Sea Red Data Book.
Pontic *Ficopomatus enigmaticus* reefs	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive.
Sediment affected or disturbed kelp and seaweed communities	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EUHabitats Directive.
Mediterranean and Pontic communities of infralittoral algae very exposed to wave action	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive.
Kelp and red seaweeds	Habitat falls under classification of *Reefs* and *Large shallow inlets and bays*, habitats listed on Annex I of Recognised under EU Habitats Directive. Endangered in the Resolution no. 4, Council of Europe Bern Convention (1996): “Sublittoral rocky seabeds and kelp forests” (code 11.24).
Mediterranean and Pontic communities of infralittoral algae moderately exposed to wave action	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive. Bern Convention under the code 11.24 (*Sublittoral rocky seabeds and kelp forests*).
Infralittoral fouling seaweed communities –	No conservation status.
Mixed faunal turf communities on circalittoral rock	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive.

Marine Biotope	Recognised Conservation Status
Pontic Phyllophora crispa beds on circalittoral bedrock and boulders	The Black Sea Red Data Book lists *Phyllophora crispa* (Vulnerable)*, Halichondria panicea* (Vulnerable)*, Eriphia verrucosa* (Endangered), *Pilumnus hirtellus* (Vulnerable)*, Scorpaena porcus* (Vulnerable) – likely to occur in this biotope.
Faunal communities on deep low energy circalittoral rock	None
Communities of circalittoral caves and overhangs	Endangered natural habitat type in Resolution no. 4 (Council of Europe Bern Convention, 1996): *Sea-caves* (code 12.7). Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive.
Infralittoral coarse sediment	Endangered natural habitat type in the Resolution no. 4 (Council of Europe Bern Convention, 1996): *Sublittoral soft seabeds* (code 11.22).
Circalittoral coarse sediment	Council of Europe Bern Convention Resolution no. 4 1996 as *Sublittoral soft seabed* (code 11.22), and in the Barcelona Convention (1998) as *Biocoenosis of coarse sands and fine gravels under the influence of bottom currents* (code IV.2.4).
Infralittoral fine sand	Endangered natural habitat type in the Resolution no. 4 (Council of Europe Bern Convention, 1996): *Sublittoral soft seabeds* (code 11.22).
Circalittoral fine sand	*Sublittoral sands* in EUNIS, therefore in the Council of Europe Bern Convention Res. No. 4 1996 as *Sublittoral soft seabed* (code 11.22).
Infralittoral sandy mud	Endangered natural habitat type in the Resolution no. 4 (1996): *sublittoral soft seabeds* (code 11.22).
Infralittoral fine mud	Endangered natural habitat type in the Resolution no. 4 (1996): *sublittoral soft seabeds* (code 11.22).
Mediterranean communities of muddy detritic bottoms	Council of Europe Bern Convention Resolution no. 4 1996 as sublittoral soft seabed.
Mediterranean communities of coastal terrigenous muds	Infralittoral mixed sediments - Council of Europe Bern Convention Resolution no. 4 1996. Sublittoral soft seabeds. Code: 11.22. Included in the Council of Europe Bern Convention Resolution no. 4 1996 as “sublittoral soft seabed” [3].
Mediterranean communities of shelf edge detritic bottoms	Included in the Council of Europe Bern Convention Resolution no. 4 1996 as *Sublittoral soft seabed* (code 11.22). Included in the Barcelona Convention (1998) as *Biocenosis of shelf-edge detritic bottom* (code IV.2.3) [2].
Sublittoral seagrass beds	Priority species/habitat types for conservation efforts in international (e.g. Rio Convention, Barcelona

Marine Biotope	Recognised Conservation Status
	Convention, Bern Convention, EU Habitats Directive, EU Water Framework Directive) and national frameworks.
Communities of bathyal detritic sands with Gryphus vitreus	None
Deep sea sponge aggregations	One of the five deep-sea habitats listed by OSPAR as threatened or declining. Protected under the habitat type 1170 (Habitats Directive).
Submarine canyons on the continental slope	Two known canyons in close proximity. No conservation status.
Pontic anoxic H_2S black muds of the slope and abyssal plain with anaerobic sulphate reducing bacteria and nematodes	None
Pontic anaerobic microbial biogenic reefs above methane seeps	Habitat falls under classification of *Reefs*, a habitat listed on Annex I of EU Habitats Directive.
Note: 1: The EC 92/43 Habitats Directive has not been transposed into Turkish law. However, Annex I of the Habitats Directive provides a list of natural habitat types of community interest, which include habitats that: (i) are in danger of disappearance in their natural range; or (ii) have a small natural range following their regression or by reason of their intrinsically restricted area; or (iii) present outstanding examples of typical characteristics in the relevant biogeographical regions. Therefore, it provides a useful classification of conservation status relevant to the Black Sea region.	

Figure 7.8.13 Habitat Map of the Project Area



Terrestrial and Marine Species

Endemic and Threatened Plant Species

The Project Area contains many different habitats and can be considered to support as rich and interesting flora. During the floristic surveys completed in the Project Area and adjacent reference points, a total of 301 species and subspecies, belonging to 67 families were determined (see Annex 7.8.A). A total of nine endemic species were recorded. Of these endemic species, five (*Lathyrus undulatus, Centaurea hermannii, Cirsium polycephalum, Euphorbia amygdaloides subsp. robbiae* and *Galanthus x valentiei*) were found in the Project Area. In addition to these five endemic species, four threatened plant species (*Ferulago confusa, Symphytum tuberosum subsp. nodosum, Convolvulus persicus* and *Lilium martagon*) were found in the Project Area.

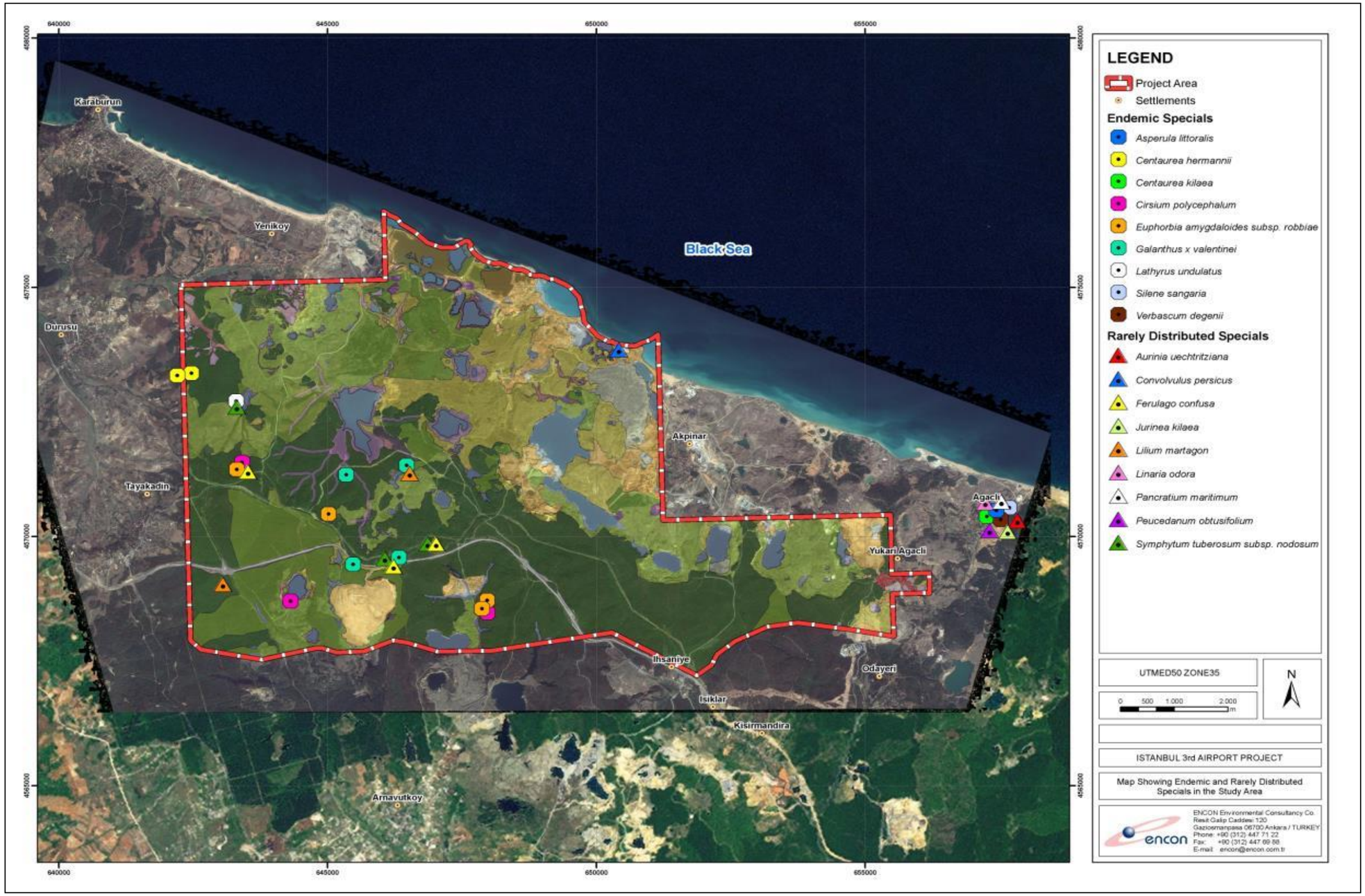
The status of each endemic and rarely distributed/threatened plant species, as well as the habitats in which they are found within the Project Area is provided in Table 7.8.23. The location of these species are shown in Figure 7.8.14. Photographs of these species are presented in Annex 7.8.I.

Table 7.8.23 Threatened and Endemic Plant Species within the Project Area

Species	IUCN RL	RDBTP	BERN	Endemic or range restricted	Habitat	Relative Abundance*	Distribution in Turkey
Lathyrus undulatus	DD (IUCN European RL)	VU	-	Yes	G1.7, G3.F	Rare	Marmara Region (Istanbul, Bursa, Balikesir, Kütahya, Yalova)
Centaurea hermannii	DD (IUCN European RL)	EN	-	Yes	G1.7, G3.F	Moderate	Marmara Region (Istanbul, Kocaeli)
Cirsium polycephalum	Not assessed	CR	-	Yes	G1.7, G3.F, E3.4	Abundant	Marmara Region (Istanbul, Yalova, Bursa)
Euphorbia amygdaloides subsp. robbiae	Not assessed	VU	-	Yes	G1.7, G3.F	Abundant	Marmara Region (Istanbul)
Galanthus x valentiei	Not assessed	VU*	-	Yes	G1.7, G3.F	Abundant	Marmara Region (Istanbul)
Ferulago confusa	Not assessed	VU	-	No	G1.7, G3.F	Abundant	Marmara Region (Edirne, Canakkale,

Species	IUCN RL	RDBTP	BERN	Endemic or range restricted	Habitat	Relative Abundance*	Distribution in Turkey
							Kırklareli, Istanbul)
Symphytum tuberosum subsp. nodosum	Not assessed	VU	-	No	G1.7, G3.F	Abundant	Marmara Region (Istanbul)
Convolvulus persicus	Not assessed	EN	-	No	B1.3	Rare	Marmara Region (Istanbul)
Lilium martagon	Least concern	VU	-	No	G1.7, G3.F, G1.3	Abundant	Marmara and West Black Sea Region
(*) Based on expert judgement.							

Figure 7.8.14 Location of Endemic and Rarely Distributed/Threatened Plant Species within the Project Area



Terrestrial Invertebrates

During the field surveys carried out within the Project Area a total of 165 insect species were identified by using different collection methods. This includes 26 Lepidoptera (butterflies), 76 Coleoptera (beetles), 23 species Odonata (dragonflies) and 40 Diptera (flies). The identified species, their systematic categories, English names, threat categories and the EUNIS habitat codes where the species have been detected are given in Annex 7.8.B.

No threatened or endemic species of insect were recorded during the surveys. Two of the beetle species recorded are listed as Near Threatened (NT) on the IUCN European RL: *Cerambyx dux* and stag beetle *Lucanus cervus*. Stag beetle is also listed in Appendix III of the Bern Convention (protected fauna species). *Cerambyx dux* has a very restricted range within Europe, limited to Crimea, Bulgaria, Macedonia, Greece and the European part of Turkey (Ref. 7.8.43). In Europe, the species is reliant on veteran trees as it is an obligate saproxylic species found in dying, diseased or stressed trees, but not in dead trees. This is a highly specialised habitat which tends to be highly fragmented in the landscape and subject to continuing significant decline. However, the species is widespread in Turkey (Ref. 7.8.44) and also occurs in the Minor Caucasus, Asia Minor and Iran. In some parts of its range, the species can be a pest in apricot and peach trees (Ref. 7.8.45). Stag beetle has a much wider distribution within Europe compared to *Cerambyx dux* (Ref. 7.8.46). Neither species are therefore considered to be endemic or range-restricted. Like *Cerambyx dux*, stag beetle is also a saproxylic species and the larva can take up to five years to develop into an adult. Other saproxylic and wood-boring beetle species (e.g. Buprestidae and Cerambycidae) are well represented in Annex 7.8.B, which reflects the large area of forest within the Project Area. The Scarabaeidae beetles largely feed on dung and are likely to be supported by the faeces of both wild animals and grazing livestock.

All of the 26 butterfly species recorded during the surveys have been assessed as of Least Concern (LC) by the RBBT. None of the butterfly species that contribute towards the designation of the nearby KBAs were recorded within the Project Area (i.e. Bosphorus Region KBA, West Istanbul Pasture KBA and Kucukcekmece Basin KBA). The majority of butterfly species recorded are common and widespread in grassland and ruderal habitats. Only five butterfly species are woodland species whilst the others are grassland species.

Most of the diptera species identified within the Project Area are those that feed on flowers of herbaceous plant species; for instance species of *Bombyliidae* and *Empididae*. Most of the other species are *Tipulidae* species, which inhabit humid forest areas and shrubs. These species are widespread and have no threat or conservation status.

Marine Invertebrates

A total of 1983 species of marine invertebrates are thought to live in the Black Sea (Ref. 7.8.47). These invertebrates play an important role in the food chain for fish and aquatic birds and are also consumed and harvested by humans, including species such as the Mediterranean mussel *Mytillus galloprovinicialis*, sea snail *Rapana spp*. and clams *Chamelea gallina*.

Sampling was carried out for marine benthic organisms in the Project Area and its surroundings during 2014. A total of 23 species were identified in the benthic and zooplankton surveys (Table 7.8.24 and Table 7.8.25). Of these, only *Centropages ponticus* is assessed as being threatened (Endangered at the sub-regional level, Black Sea RDB). None of the

species recorded are listed on Annex II of the Black Sea Biodiversity and Landscape Conservation Protocol.

Table 7.8.24 List of the Benthic Organisms of Marine Identified within the Project Area and its Surroundings

Division	Sub-division	Species	Common Name	IUCN RL	Black Sea Biodiversity and Landscape Conservation Protocol (Annex II), or Black Sea RDB
Arthropoda	Crustacea	*Calappa granulata*	Box crab or shame faced crabs	Not assessed	-
		Calcinus tubularis	Hermit crab	Not assessed	-
		Macropodia sp	Long legged spider crab	Not assessed	-
		Maja crispata	Lesser Spider Crab	Not assessed	-
		Pagurus sp	Hermit crab	Not assessed	-
		Palinurus sp.	Spiny lobster	Not assessed	-
		Stenopus spinosus	Golden Coral shrimp	Not assessed	-
Mollusca		*Anadara inaequivalvis*	Ark Clam	Not assessed	-
		Chlamys varia	Variegated scallop	Not assessed	-
		Crassostrea gigas	Pacific oyster	Not assessed	-
		Lima inflate	No common name	Not assessed	-
		Mya arenaria	Soft shell clam	Not assessed	-
		Mytilus gallaprovicialis	Blue mussel	Not assessed	-
		Pecten jacobaeus	Saint jame scallop	Not assessed	-
		Pinna nobilis	Noble pen shell or fan mussel	Not assessed	-
		Rapana venosa	Veined rapa whelk	Not assessed	-

Division	Sub-division	Species	Common Name	IUCN RL	Black Sea Biodiversity and Landscape Conservation Protocol (Annex II), or Black Sea RDB
		Venus verrucosa	Warty venus	Not assessed	-

Table 7.8.25 List of the Zooplankton of Marine Identified within the Project Area and its Surroundings

Division	Sub-division	Species	Common Name	IUCN RL	Black Sea Biodiversity and Landscape Conservation Protocol (Annex II), or Black Sea RDB
Rotifera		*Keratella quadrata*	No common name	Not assessed	-
		Keratella sp.	No common name	Not assessed	-
Arthropoda	Crustacea	*Acartia clausi*	No common name	Not assessed	-
		Centropages ponticus	No common name	Not assessed	EN Black Sea RDB (sub-regional level)
		Pseudocalanus elongatus	No common name	Not assessed	-
		Evadne tergestina	No common name	Not assessed	-

Freshwater Fish

Thirteen fish species were identified during the surveys carried out in Lake Kulakcayiri, as well as the streams within and surrounding the Project Area. The species identified, their threat categories and relative abundance is given in Table 7.8.26 and photographs of the species and their habitats are presented in Annex 7.8.1.

Table 7.8.26 List of the Freshwater Fish Species Identified within the Project Area and its Surroundings

Species	English Name	IUCN RL	BERN	Relative Abundance[1]	Area Recorded
Family: Cyprinidaae *Cyprinus carpio*	Wild common carp	VU	-	Abundant	Kulakcayiri Lake
Carassius gibelio (non-native)	Prussian carp	-	-	Abundant	Kulakcayiri Lake
Scardinius erythrophthalmus	Rudd	LC	-	Abundant	Kulakcayiri Lake
Petroleuciscus borysthenicus	Black Sea chub	LC	-	Abundant	Balikli Stream Tayakadin Stream Sogut Stream Pirincsuyu Stream
Rutilus frisii	Black Sea roach	LC	-	Moderate	Tayakadin Stream
Gobio gobio	Gudgeon	LC		Moderate	Sogut Stream Pirincsuyu Stream
Tinca tinca (non-native)	Tench	LC	-	Abundant	Kulakcayiri Lake
Family: Esocidae *Esox lucius*	Northern pike	LC	-	Moderate	Kulakcayiri Lake
Family: Siluridae *Silurus glanis*	Wels catfish	LC	-	Moderate	Kulakcayiri Lake
Family: Poecilidae *Gambusia holbrooki* (non-native)	Eastern mosquitofish	LC	-	Abundant	Ayazma Stream Balikli Stream Yenikoy Stream Tayakadin Stream Boyalik Stream Kulakcayiri Lake Sogut Stream Pirincsuyu Stream

Species	English Name	IUCN RL	BERN	Relative Abundance[1]	Area Recorded
Family: Cobitidae *Cobitis vardarensis*	Ray-finned fish	LC	-	Abundant	Balikli Stream Tayakadin Stream Boyalik Stream Sogut Stream Pirincsuyu Stream
Family: Gobiidae *Neogobius fluviatilis*	Monkey goby	LC	Ap. III	Moderate	Balikli Stream
Family: Percidae *Perca fluviatilis*	European perch	LC	-	Abundant	Kulakcayiri Lake
Note: Low: Population density of identified species calculated as 1-4 per 100 metres due to the individual number and limited distribution Moderate: Population density of identified species calculated as 5-9 per 100 metres due to the individual number High: Population density of identified species calculated as more than 10 per 100 metres due to the individual number and wide distribution					

The fish fauna of Lake Kulakcayiri comprises eight species: three species of native carnivorous fish (northern pike *Esox Lucius*, European perch *Perca fluviatilis* and Wels catfish *Silurus glanis*)*;* two species of native omnivores fish (wild common carp *Cyprinus carpio* and rudd *Carassius gibelio*); and three non-native species (Eastern mosquitofish *Gambusia holbrooki,* originally native to North America; Prussian carp *Carassius gibelio,* originally native to Siberia and tench *Tinca tinca*, originally from Europe). It is likely that the majority of the species present have been introduced to Lake Kulakcayiri for the purposes of fishing.

The streams, both within and surrounding the Project Area, support a fish fauna that is likely to be of natural origin, comprising several small species that are not targeted by fishermen. The only non-native species found in the streams is the non-native Eastern mosquitofish.

Of the native fish species present within the Project Area, the only threatened species is wild common carp (IUCN VU). However, it is known that the population within the Project Area is artificially bred. The only other notable species recorded during the surveys was monkey goby *Neogobius fluviatilis* (Bern Convention Appendix III), which was observed in Balikli Stream outside of the Project Area. Two endemic species of fish occur in the Marmara Region (*Alburnus istanbulensis* and Marmara chub *Squalius cii*). Neither species was recorded during the surveys and therefore it is unlikely that they occur within the Project Area or the surrounding catchments.

Marine Fish

Marine fish in the Black Sea are important as both a food source for seabirds and cetaceans, as well as an economic resource for local fisheries. Marine fish species potentially in the Project Area were investigated through a combination of existing literature, catch data from fishermen and a field survey. Annex 7.8.C provides a full list of species identified as potentially present or confirmed to be so, along with details of their extinction risk status.

A total of twenty eight species were recorded through a combination of the field survey and fishing records. Large numbers of wide-eyed flounder *Bothus podas* and short-snouted seahorse *Hippocampus hippocampus* are reportedly found in the area between Karaburun and the Project Area. Of the species identified through a combination of the fishing catch records and field survey, none are assessed as threatened by the IUCN. Short-snouted seahorse is classified as IUCN Data Deficient (DD). Global trend data for this species is not available; however, some survey data on local areas suggests significant population declines. Seahorses mainly inhabit the shallow coastal areas and are vulnerable to habitat degradation through coastal developments and fishing (Ref. 7.8.48). Two species have been identified as present from fishing catch data that are listed on the Black Sea RDB Greater weever *Trachinus draco* is listed as Critically Endangered at the Bulgarian coastline sub-regional level only and therefore not relevant to this assessment in Turkey. Red mullet *Mullus barbatus* is assessed as Endangered at the Black Sea regional level(including Turkey). Three species are listed on Annex II of the Black Sea Biodiversity and Landscape Conservation Protocol (Annex II): *Dicentrarchus labrax, Serranus cabrilla*, and *Boops boops*.

Two additional fish species were identified as potentially present from published literature (Annex 7.8.C), which are listed on the Black Sea RDB: European conger *Conger conger* (Vulnerable), long-snouted seahorse *Hippocampus guttulatus* (Endangered).

Data from commercial fish stocks indicate that the most important overwintering grounds for fish in the Black Sea to be the Anatolian coast of Turkey, the Bosphorus and southern part of the Black Sea (Ref. 7.8.49). Many species also overwinter in the warmer Sea of Marmara

and move into the Black Sea in the spring often to feed and spawn (Ref. 7.8.50). Given the proximity of the Project Area to these areas, it is conceivable that fish use it for both spawning and migration.

Herptiles

During the surveys completed within the Project Area a total of six amphibian and 13 reptile species were recorded. The identified species, their systematic categories, threat categories, the EUNIS habitat codes where the species have been detected and their relative abundance are given in Table 7.8.27. Figure 7.8.15 provides a map showing locations where Spur-thighed tortoise *Testudo graeca ibera* and European pond turtle *Emys orbicularis* were found in the Project Area. Photographs of the species and their habitats are given in Annex 7.8.I.

Table 7.8.27 List of the Amphibia and Reptilia Species Identified within the Project Area

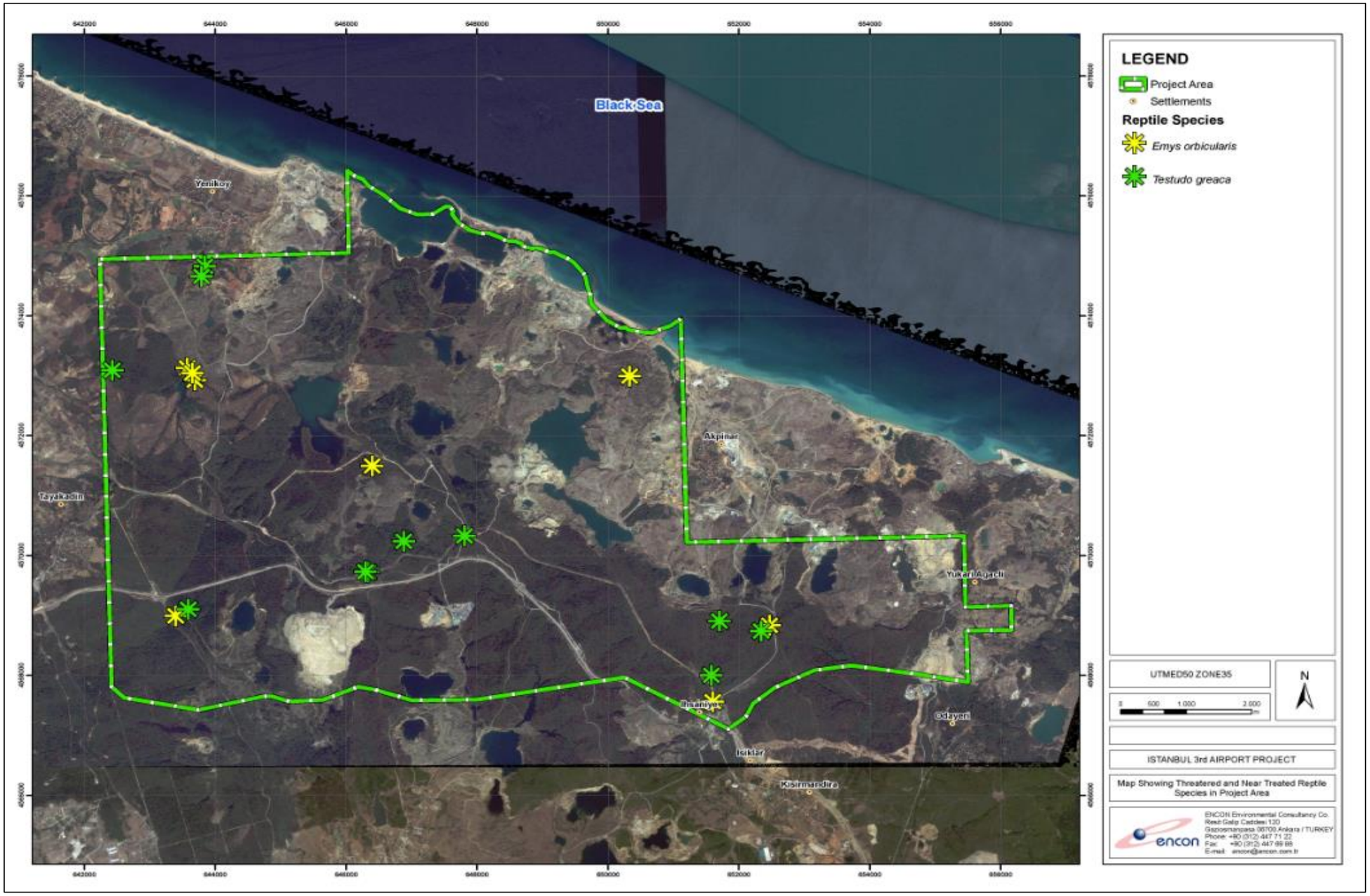
Order	Family	Taxon	English Name	END	International Threat Categories		National Threat Categories	EUNIS Habitat Class	Relative Abundance (*)
					IUCN RL	BERN	CHC		
AMPHIBIA									
Anura	Bufonidae	*Pseudepidalea variabilis*	Green toad	-	DD	App II	-	B1.3, C3.2	Rare
Anura	Hylidae	*Hyla orientalis*	Eastern tree frog	-	Not assessed	App II	-	G1.7, C3.2, F5.4	Rare
Anura	Ranidae	*Pelophylax ridibundus*	Eurasian marsh frog	-	LC	App III	-	G1.7, E3.4, E3.4, G1.A, B1.3, C3.2, E3.4, F5.4	Very abundant
Anura	Ranidae	*Rana dalmatina*	Agile frog	-	LC	App II	-	G1.7	Rare
Urodela	Salamandridae	*Triturus karelinii*	Southern crested newt	-	LC	App II	-	F5.4, E3.4	Very rare
Urodela	Salamandridae	*Lissotriton vulgaris*	Smooth newt	-	LC	App III	-	G1.7	Rare

Order	Family	Taxon	English Name	END	International Threat Categories		National Threat Categories	EUNIS Habitat Class	Relative Abundance (*)
					IUCN RL	BERN			
REPTILIA									
Testudines	Testudinidae	*Testudo graeca*	Spur-thighed tortoise	-	VU	App II	-	G1.7, B 1	Moderate
Testudines	Emydidae	*Emys orbicularis*	European pond turtle	-	NT (European RL)	App II	-	G1.7, G1.A, C3.2	Moderate
Squamata	Lacertidae	*Lacerta trilineata*	Balkan green lizard	-	LC	App II	-	G1.7, E3.4, B 1	Rare
Squamata	Lacertidae	*Lacerta viridis*	Green lizard	-	LC	App II	-	G1.7, F5.4, G1.A, E3.4	Abundant
Squamata	Lacertidae	*Podarcis siculus*	Italian wall lizard	-	LC	App II	-	G1.7, E3.4, G1.A, B1.3	Moderate
Squamata	Lacertidae	*Podarcis tauricus*	Balkan wall lizard	-	LC	App II	-	G1.7, C3.2	Rare

Order	Family	Taxon	English Name	END	International Threat Categories		National Threat Categories	EUNIS Habitat Class	Relative Abundance (*)
					IUCN RL	BERN			
Squamata	Anguidae	*Pseudopus apodus*	European legless lizard	-	LC (European RL)	App II	-	G1.7	Rare
Squamata	Anguidae	*Anguis fragilis*	Slow-worm	-	LC (European RL)	App III	-	G1.7	Moderate
Squamata	Scincidae	*Ablepharus kitaibelii*	European copper skink	-	LC	App II	-	G1.7, C3.2, E3.4	Rare
Squamata	Colubridae	*Natrix natrix*	Grass snake	-	LC (European RL)	App III	-	G1.7, C3.2, E3.4	Moderate
Squamata	Colubridae	*Natrix tessellata*	Tessellated water snake	-	LC	App II	-	G1.A, E3.4	Rare
Squamata	Colubridae	*Elaphe sauromates*	Eastern Four-Lined Ratsnake	-	LC (European RL)	App II	-	G1.A	Very rare
Squamata	Colubridae	*Dolichophis caspius*	Caspian whip snake	-	LC (European RL)	App II	-	C3.2	Very rare

(*) Relative abundance based on number of indiduals recorded during surveys: Very abundant: >50 individuals, Abundant: 21-50 individuals, Moderate: 11-20 individuals, Rare: 6-10 individuals, Very rare: 1-5 individuals.

Figure 7.8.15 Locations of Reptilia Species (*Testudo graeca* and *Emys orbicularis*) Encountered within the Project Area



No threatened amphibian species were recorded during the field surveys, although green toad *Pseudepidalea variabilis* is IUCN data deficient. This assessment is largely due to recent changes to the taxonomic status of the species, which has revised the *Bufo viridis* species complex (Ref. 7.8.51). All six species of recorded amphibian are listed on either Appendix II or Appendix III of the Bern Convention. However, within the Turkey, the amphibian species identified within the Project Area are widespread and can be found within all regions of Turkey. The most common species within the Project Area is Eurasian marsh frog which can be found in most habitat types. The relatively rarity of other species within the Project Area probably reflects the relatively recent origin of the lakes and ponds, which were created by opencast mining. Ongoing mining activity in the vicinity of many of the water bodies are also likely to reduce the ability of amphibians to colonise. Information on general distribution of these six widespread amphibian species in and around Turkey are as follows (Ref. 7.8.52):

- Eastern tree frog *Hyla orientalis* is distributed in all regions in Turkey, except for the Eastern and South-eastern Anatolia regions. Outside of Turkey, the species has occurs in West Africa, Central and South-East Asia and Europe;
- Green toad is distributed from Greece, eastwards throughout Turkey, Cyprus to Syria and Lebanon;
- Eurasian marsh frog *Pelophylax ridibundus* is a widespread species in western, central and eastern Europe and ranges as far eastwards as eastern Kazakhstan. It is distributed throughout Turkey;
- Agile frog *Rana dalmatina* is distributed in much of Europe. Within Turkey it is limited the Thrace region and the northern parts of Anatolia;
- Southern crested newt *Triturus karelini* ranges from the eastern side of the Balkan Peninsula (extreme south-eastern Serbia, eastern FYR Macedonia, most of Bulgaria, north-eastern Greece. Within Turkey it is found on the shores of the Black Sea region, the Thrace and Marmara regions and in the vicinity of Denizli in the Aegean region in Turkey; and
- Smooth newt *Lissotriton vulgaris* is common throughout much of Europe. The distribution in Turkey includes the Thrace region, Western Anatolia and north-western Anatolia to Izmir.

A single threatened reptile species was recorded during the surveys; spur-thighed tortoise which is categorised as VU by the IUCN Red List. Spur-thighed tortoise comprises a complex of several species, but its taxonomy remains the subject of debate and some authors propose that the *'ibera*-group' should be elevated to the species level (Ref. 7.8.53). European pond turtle is assessed as Near-threatened by the European RL. Figure 7.8.15 shows the distribution of spur-thighed tortoise and European pond turtle observations within the Project Area. Spur-thighed tortoise was found throughout the Thermophilous woodland areas within the Project Area, albeit with a slightly patchy distribution. European pond turtle was found in the majority of water bodies across the Project Area where this species was searched for.

Both spur-thighed tortoise and European pond turtle are listed under the designation criteria of three adjacent KBAs: Terkos Basin KBA, Bosphorus Region KBA, and West Istanbul Pasture KBA. At least one of the observations of spur-thighed tortoise within the Project Area falls within the Terkos Basin KBA. As can be seen in Figure 7.8.10, the woodland habitats within the Project area, provide a corridor that links the Terkos Basin KBA in the north-west to the Bosphorus Region KBA and West Istanbul Pasture KBA to the south-east.

All 13 species of reptile recorded in the Project Area are listed on either Appendix II or Appendix III of the Bern Convention and comprise the following:

- Spur-thighed tortoise is a widely distributed species found from south-eastern Europe to Iran, including the Thrace region and in a large part of Turkey;
- European pond turtle has a wide, but very fragmented distribution in Europe (especially in the Mediterranean region, in the Black Sea and Caspian Sea regions and in coastal north-western Africa. The species occurs in the Thrace region and a large part of Anatolia in Turkey;
- Balkan green lizard *Lacerta trilineata* occurs in south-east Europe as well as Central Anatolia to the western Anatolia and Thrace region in Turkey;
- Green lizard *Lacerta viridis* occurs in south-east Europe and is also present in Turkey, where it is largely distributed in the area of Marmara and along the Black Sea coastal region;
- Italian wall lizard *Podarcis siculus* native distribution includes Italy, southern France and the Adriatic coast. It has been introduced into Turkey where it occurs around Istanbul and some of the islands in Marmara Sea;
- Balkan wall lizard *Podarcis tauricus* occurs in south-eastern Europe including Greece, Bulgaria and Southern Ukraine. Within Turkey it is limited to the Marmara region;
- European legless lizard *Pseudopus apodus* is widely distributed in eastern Europe, central Asia and the Middle East. Within Turkey it is found in eastern, northern and western Anatolia and the Thrace region;
- Slow worm *Anguis fragilis* is widespread in Europe but is limited to extreme western Turkey and in the Caucasus region of north-eastern Turkey;
- European copper skink *Ablepharus kitaibelii* occurs in south-eastern Europe, Thrace, western, southern and central Anatolia regions in Turkey;
- Grass snake *Natrix natrix* has a widespread distribution in Europe and occurs in appropriate habitat all over Turkey except for the south-eastern Anatolia region;
- Tessellated water snake *Natrix tessellata* is widespread in south-east Europe and central Asia, including Turkey;
- Eastern Four-Lined Ratsnake *Elaphe sauromates* is a widely distributed snake species and is occurs all over Turkey where suitable habitat exist; and
- Caspian whip snake *Dolichophis caspius* is a widely distributed snake species including central and western Anatolia and the Thrace region in Turkey.

Migrating Birds

The Project Area is situated on the Mediterranean / Black Sea Flyway which is one of three Palaearctic-African flyways connecting Europe with Africa (Ref. 7.8.54). For many larger bird species, the Bosphorus presents a major migratory “bottleneck” where they are funnelled through the Istanbul isthmus by the Black Sea to the north and the Mediterranean Sea (including the Sea of Marmara) to the south. Previously published surveys suggest that the vast majority of spring migrating birds pass to the north of Istanbul (Ref. 7.8.55).

During the 2014 spring migration survey, a total of 21,554 observation records were made involving 717,195 individual birds, comprising 132 species. Of these, 35 species can be considered as large soaring migratory birds, which include cranes, storks, herons, pelicans and raptors. These species differ from passerines in that due to their size, they predominantly

rely on daytime sun-generated thermals for migratory flight. In contrast, passerine species tend to use the power of their own muscles to sustain flight and often fly at much higher altitudes and at night. A total of 525,959 individual large soaring migratory birds were recorded, of which 424,223 individuals were white storks *Ciconia ciconia*. Table 7.8.27 provides a full list of the numbers of large soaring migratory birds recorded in spring 2014. Table 7.8.28 also provides the approximate percentage of the global population for each species recorded. Where species are assessed by the IUCN as either Threatened or Near-Threatened, this is noted in Table 7.8.28. A total of seven bird species are in IUCN categories: threatened (EN-VU) or Near Threatened (NT). These species are: Egyptian vulture *Neophron percnopterus* EN, greater spotted eagle *Aquila clanga* VU, eastern imperial eagle *Aquila heliaca* VU, lesser kestrel *Falco naumanni* VU, red footed falcon *Falco vespertinus* NT, pallid harrier *Circus macrourus* NT, and cinereous vulture *Aegypius monachus* NT).

Figure 7.8.16 shows the daily numbers of individuals recorded for all large soaring bird species combined through the spring migration period. According to this, bird migration in the Project Area occurred densely throughout the months of March, April and May (peak count: 20 March 2014: 49,105 individuals). Based on examination of Figure 7.8.16, it is clear that bird migration started before 18 March 2014 (the start date of migration survey). It is possible that an additional 50,000-100,000 individuals may have been recorded had the migration survey started at the beginning of March. Anecdotal conversations with local birdwatchers suggest that the migration of steppe buzzard *Buteo buteo* started at the beginning of March in 2014. Therefore, the approximately 38,000 individual steppe buzzards recorded in 2014 is likely to be an under-estimate. A survey completed in spring 2011 at the Bosphorus crossing points recorded a total of 76,480 individuals, which may be a more accurate estimate of the spring migratory population of this species (Ref. 7.8.56).

In spring 2014, seven species were recorded in numbers that represent greater or equal to 1% of the global population: white stork (discussed above), steppe buzzard, honey buzzard *Pernis apivorus*, lesser spotted eagle *Aquila pomarina*, black stork *Ciconia nigra*, short-toed snake eagle *Circaetus gallicus* and greater spotted eagle. In addition, there is uncertainty in the global population level for two further species, for which the numbers recorded may represent greater or equal to 1% of the global population: Levant sparrowhawk *Accipiter brevipes* and booted eagle *Hieraaetus pennatus*. Whilst less than 1% of the global population of eastern imperial eagle were recorded in 2014, these figures are based on a single year's bird survey results. The spring bird survey completed in 2011 at the Bosphorus crossing points recorded a total of 40 individuals, which represents greater than 1 % of the global population of this IUCN Vulnerable species (Ref. 7.8.56). A further seven species were recorded in numbers that represent between 0.1 and 1 % of their respective global populations (Table 7.8.28).

Table 7.8.28 Numbers of Large Soaring Migratory Birds Species Recorded in Spring 2014

Species	IUCN RL	Number Recorded	Global Population Estimate[1]	Approximate percentage of global population
Ciconia ciconia[2]	LC	424,223	701,000	60.0%
Buteo buteo[3]	LC	37,971	4,000,000	1.0%
Pernis apivorus	LC	25,884	350,000	7.0%
Aquila pomarina	LC	24,581	42,000	58.5%
Ciconia nigra	LC	2,777	24,000	12.0%
Accipiter nisus	LC	2,078	1,500,000	0.1%
Pelecanus onocrotalus[2]	LC	1,434	265,000	0.5%
Milvus migrans	LC	900	1,000,000	<0.1%
Circaetus gallicus	LC	641	51,400	1.0%
Circus aeruginosus	LC	476	500,000	0.1%
Hieraaetus pennatus[i]	LC	462	20,000-100,000	0.1 - 2%
Falco tinnunculus	LC	421	5,000,000	<0.1%
Accipiter brevipes[i]	LC	313	20,000-100,000	0.1 - 1.5%
Circus cyaneus	LC	166	1,300,000	<0.1%
Falco subbuteo	LC	138	400,000	<0.1%
Falco vespertinus	NT	106	300,000	<0.1%
Aquila clanga	VU	73	3,300	2.0%
Circus macrourus	NT	48	18,000	0.3%
Pandion haliaetus	LC	32	500,000	<0.1%
Aquila nipalensis	LC	28	160,000	<0.1%
Circus pygargus[4]	LC	25	Not available	<0.1%
Aquila heliaca	VU	16	3,500	0.5%
Buteo rufinus	LC	14	100,000	<0.1%
Haliaeetus albicilla	LC	13	13,000	0.1%
Falco peregrinus	LC	10	1,200,000	<0.1%
Falco columbarius	LC	9	1,300,000	<0.1%

Species	IUCN RL	Number Recorded	Global Population Estimate[1]	Approximate percentage of global population
Gyps fulvus[5]	LC	8	Not available	<0.1%
Neophron percnopterus	EN	8	13,000	<0.1%
Accipiter gentilis	LC	5	500,000	<0.1%
Aquila chrysaetos	LC	2	170,000	<0.1%
Buteo lagopus	LC	2	500,000	<0.1%
Aegypius monachus	NT	1	14,000	<0.1%
Falco naumanni	LC	1	100,000	<0.1%
Elanus caeruleus	LC	1	10,000	<0.1%
Grus grus	LC	4	360,000	<0.1%
Unidentified Raptor		3089		

Notes:

1: All population estimates taken from BirdLife International (2014) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 15/07/2014, unless otherwise specified below. Where a range of estimates were given by the sources, the lower number was used to ensure that the estimates are conservative.

2: Wetlands International (2014). "Waterbird Population Estimates". Retrieved from wpe.wetlands.org on Tuesday 15 Jul 2014

3: Ferguson-Lees, J.; Christie, D. A. 2001. Raptors of the world. Christopher Helm, London.

4. European population estimated to be 70,000 individuals. http://www.birdlife.org/datazone/userfiles/file/Species/BirdsInEuropeII/BiE2004Sp3411.pdf, downloaded 15/07/2014

5: European population estimated to be 38,000 individuals. http://www.birdlife.org/datazone/userfiles/file/Species/BirdsInEuropeII/BiE2004Sp3378, pdf downloaded 15/07/2014

i: Population estimate imprecise, estimated to be in the tens of thousands. Therefore a range from 20,000 to 100,000 has been used.

An analysis of the data has provided additional information on the behaviour of the birds. Figure 7.8.17 shows that the distribution of birds was fairly even between the four observation points. However, anecdotal reports from the observers located at observation point four indicate that the majority of birds recorded were observed to the north of point four, with relatively few birds to the south. Figure 7.8.18 shows that the dominant flight directions were east to west and south-east to north-west as will be expected for birds on migration from Africa to Europe. Figure 7.8.19 shows that there is a marked diurnal pattern to the migration, peaking between 9 am and 4 pm. Figure 7.8.20 shows that the birds are migrating at relatively low altitudes, mostly below 400 m.

During the spring migration term surveys, it was observed that large numbers of some large soaring migratory birds, especially white stork *Cicconia ciconia*, stopover at open spaces or trees that are in the Project area (see Figure 7.8.21). Precise counts of roosting birds were not recorded during the migration survey. However, flocks exceeding 1,000 individuals were regularly observed in the areas marked yellow in Figure 7.8.21, and flocks of between 10 and 200 individuals in the areas marked red. As such, the Project Area and areas within its close vicinity not only function as a migration route for migratory birds, but also as an important stopover area where they stay overnight, feed, rest and preen.

Figure 7.8.16 Daily Numbers of All Large Soaring Migratory Birds (Spring 2014)

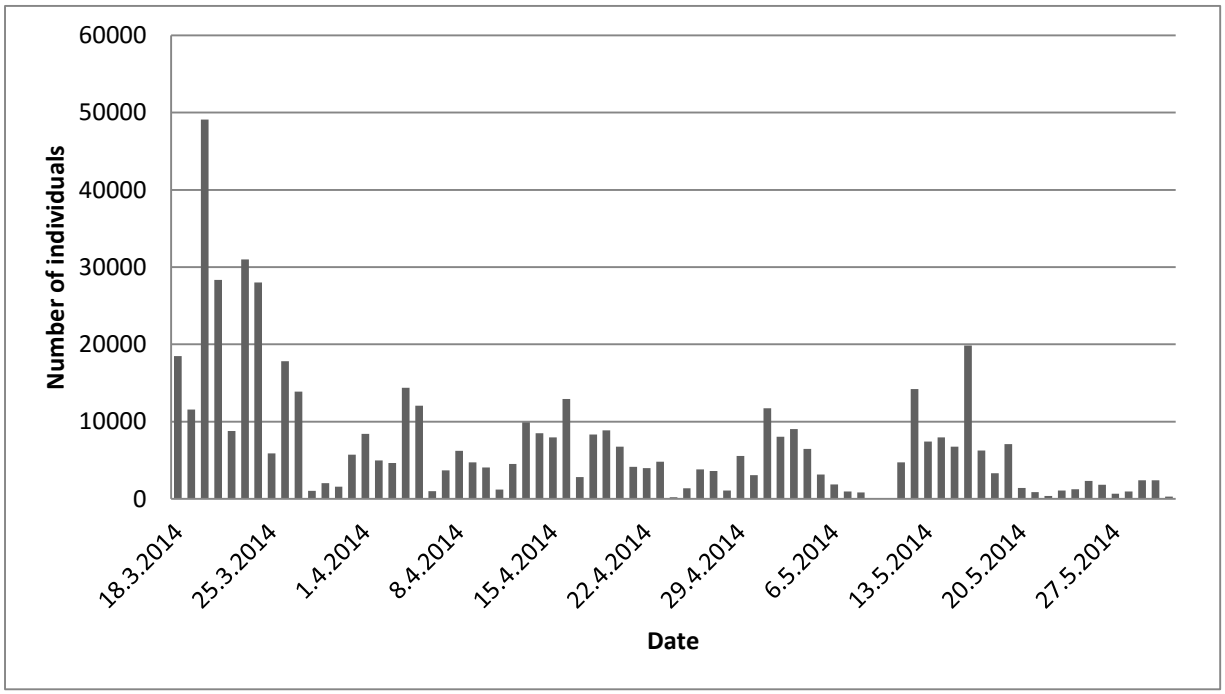


Figure 7.8.17 Numbers of All Large Soaring Migratory Bird Species by Observation Points (Spring 2014)

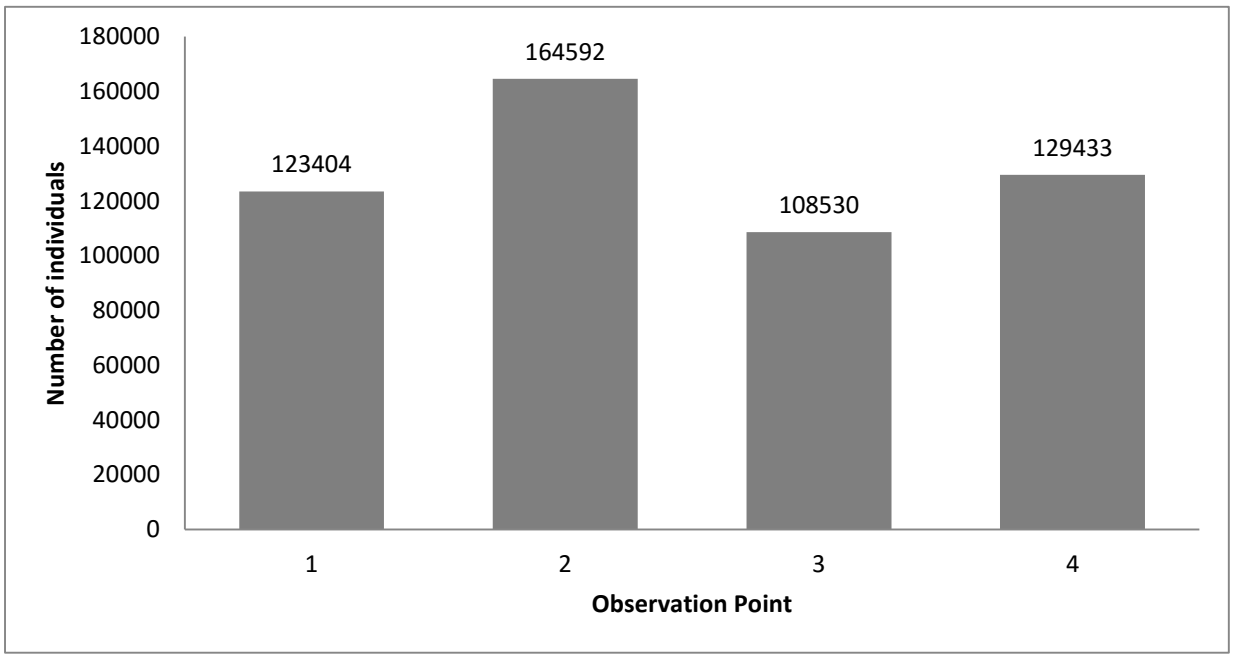


Figure 7.8.18 Numbers of All Large Soaring Migratory Bird Species According to Major Flight Directions (Spring 2014)

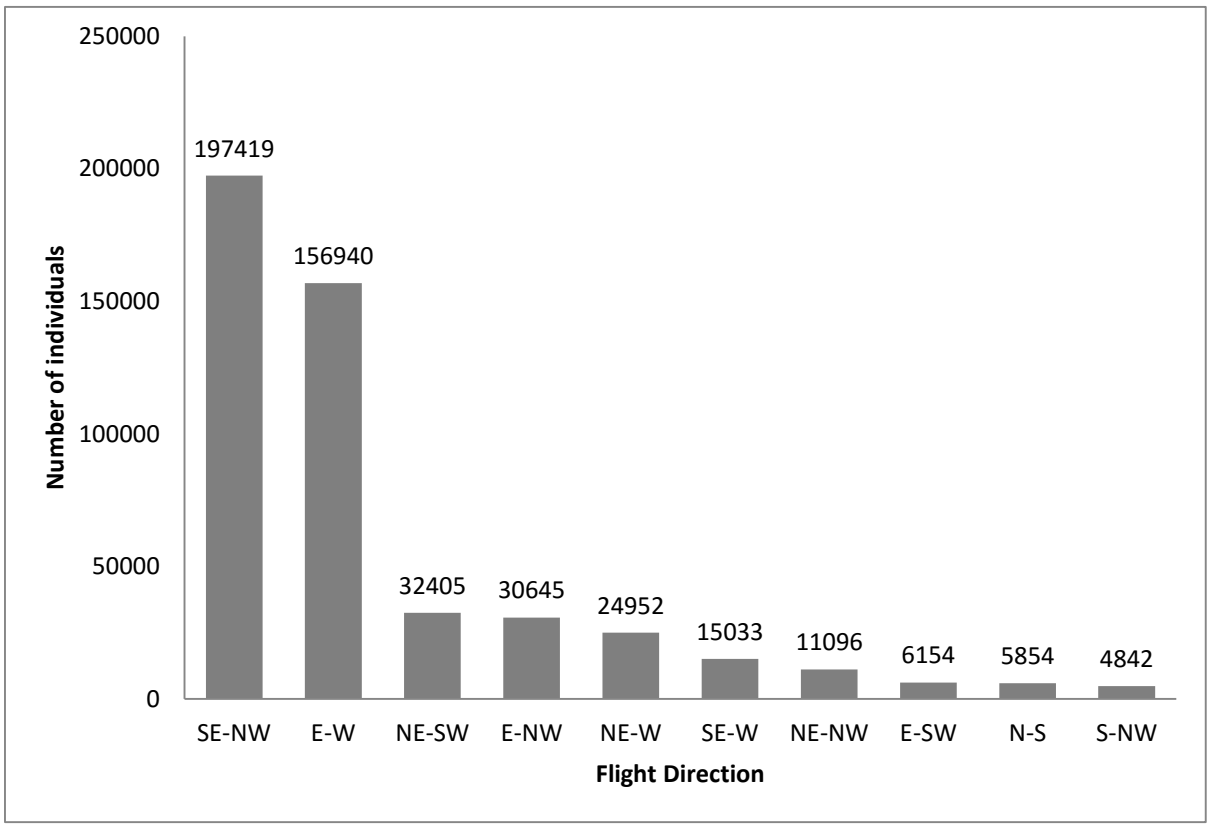


Figure 7.8.19 Diurnal Patterns and Numbers Of All Large Soaring Migratory Birds According to Time Intervals (Spring 2014)

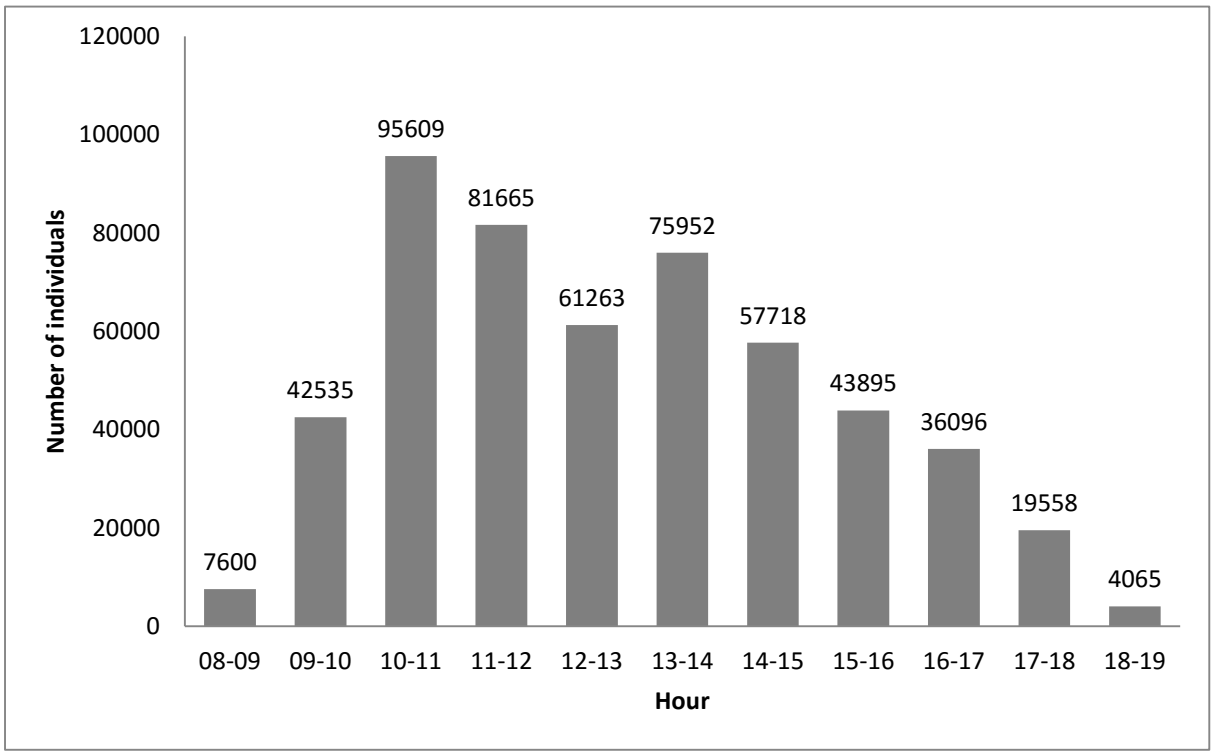


Figure 7.8.20 Numbers of All Large Soaring Migratory Birds According to Approximate Flight Altitudes (Spring 2014)

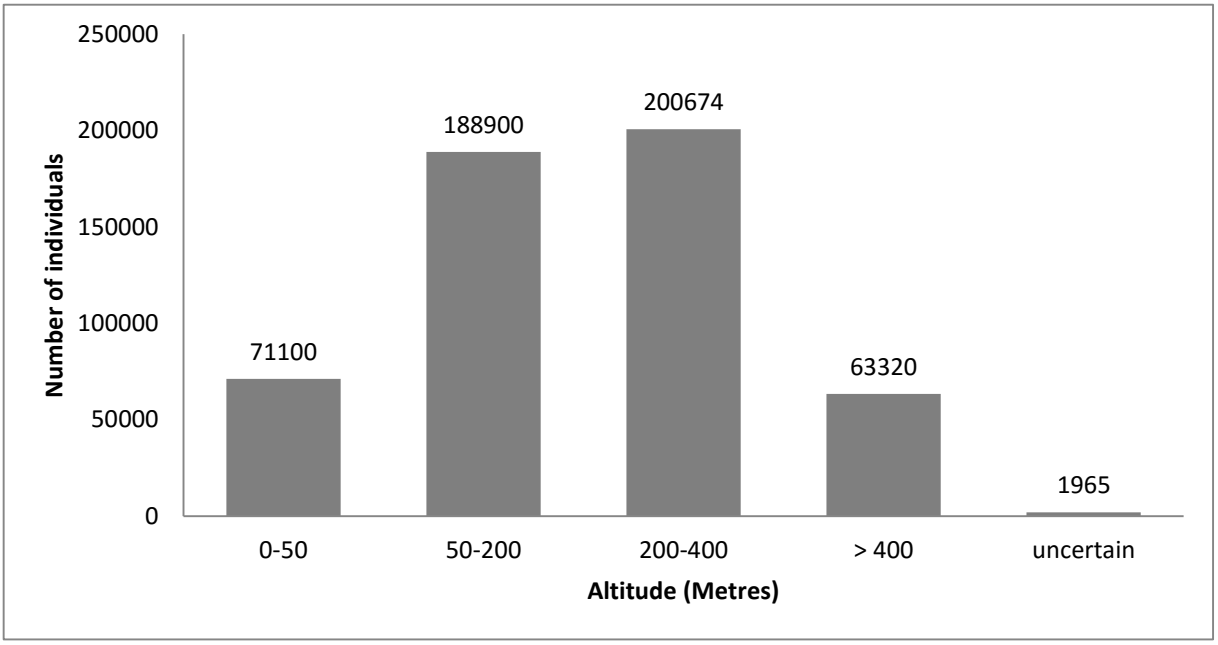
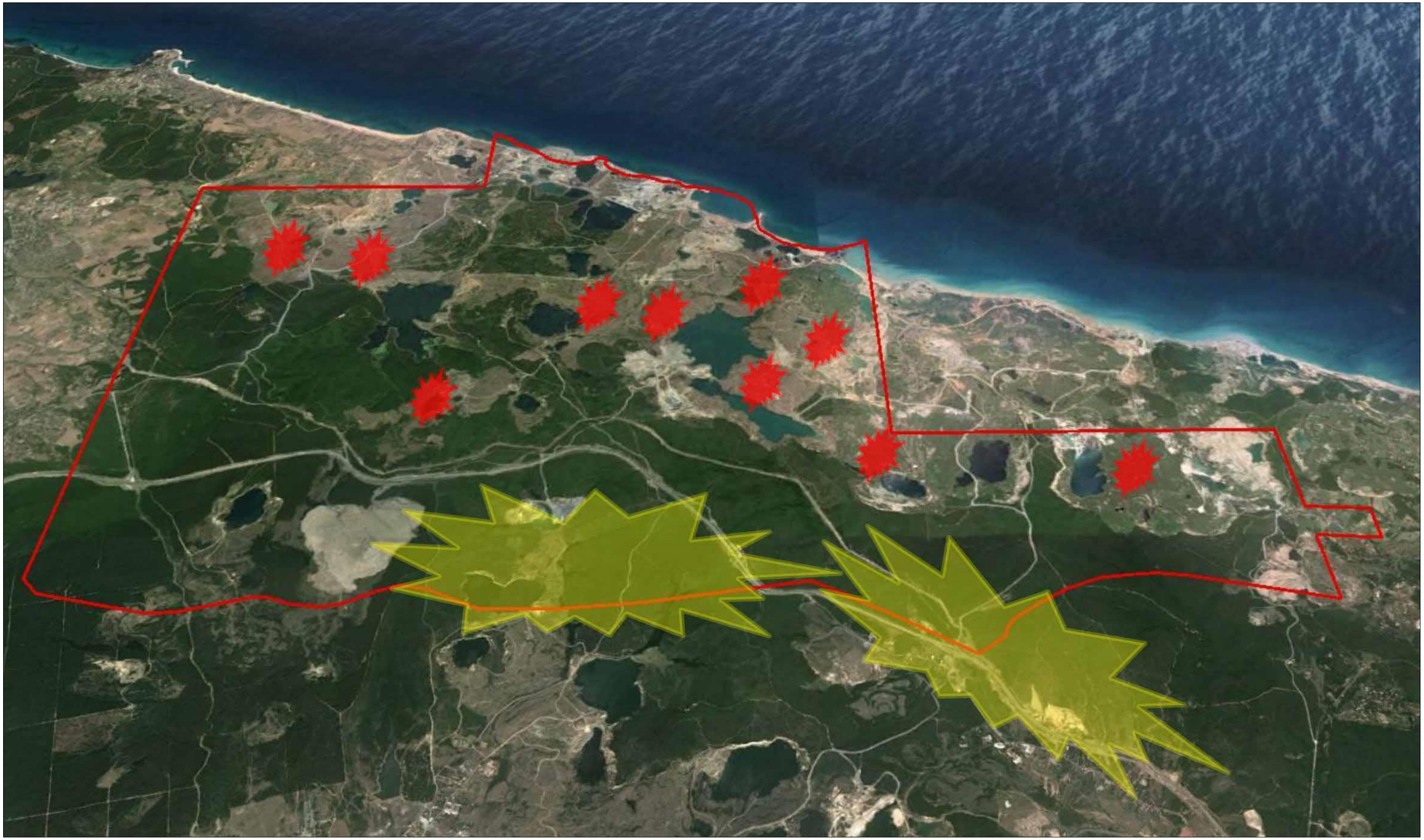


Figure 7.8.21 Stopover Sites (Red: Openland; Yellow: Forestry Areas) Used by White Storks



A total of 97 bird species were recorded during spring migration in addition to the large soaring species discussed above. A list of these 97 species is provided in Annex 7.8.D, along with the numbers recorded and their IUCN threat status. Of the 97 species recorded, a single species is considered to be threatened: yelkouan shearwater *Puffinus yelkouan* (VU). A further three species are assessed as IUCN Near-threatened: ferruginous duck *Aythya nyroca*, corncrake *Crex crex* and European roller *Coracias garrulous*. For the later three species, very small numbers were recorded: ferruginous duck (4 individuals), corncrake (2 individuals) and European roller (20 individuals) representing non-significant proportions of their respective global populations.

During the spring migration period, a total of 33,349 individual yelkouan shearwater *Puffinus yelkouan*, were observed flying offshore (Photograph 97, Annex 7.8.I). This species is endemic for the Mediterranean basin and its estimated global population was reported as 39,000-99,000 (Ref. 7.8.57-58). Therefore, the number of the yelkouan shearwater individuals detected off-shore of the Project Area represent between 35% and 85% of the estimated global population.

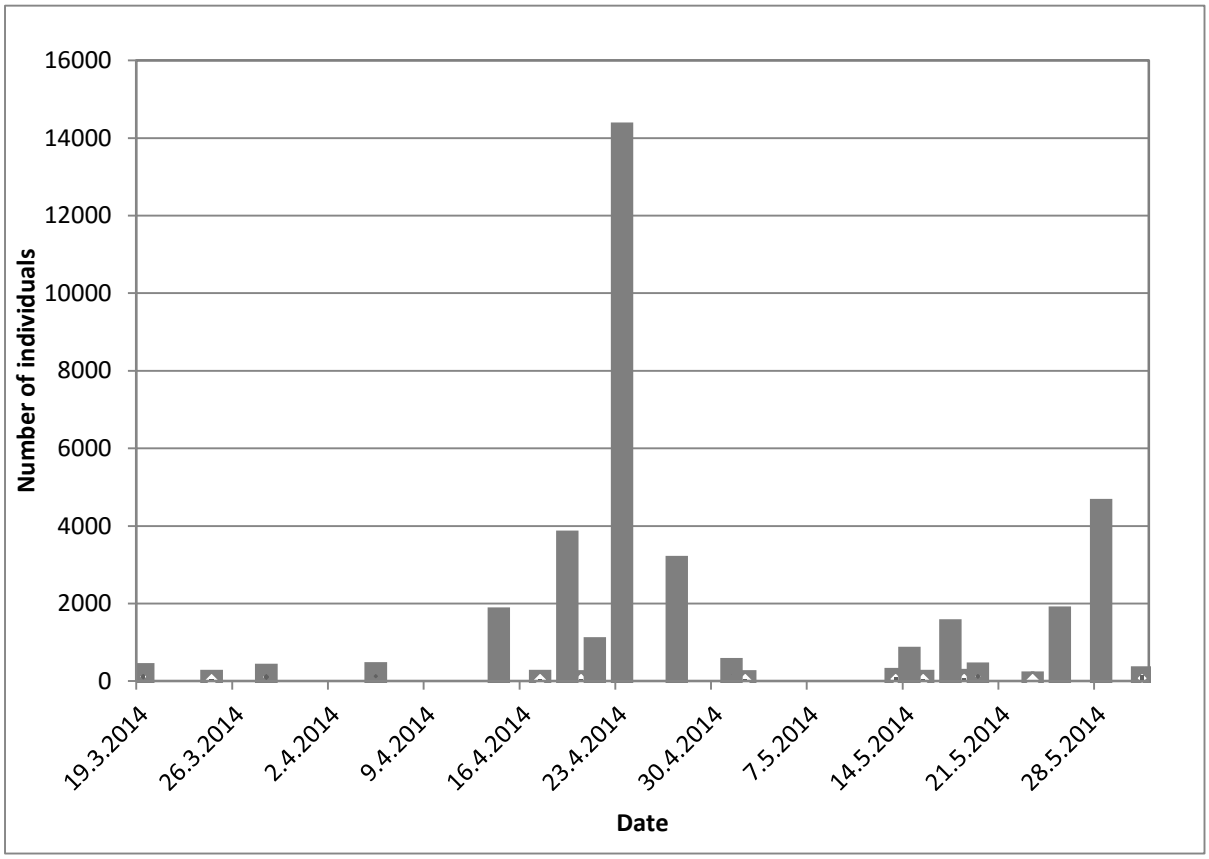
The daily numbers of yelkouan shearwaters recorded during the spring migration survey are shown in Figure 7.8.22. There was a peak of passage during the second half of March 2014, with a peak count of 14,164 individuals on 23 March 2014. Interestingly, the majority of the birds observed during spring 2014, were flying from west to east: 31,250 individuals, compared to 1929 individuals flying from east to west. It is known that yelkouan shearwater use the 33 km long Bosphorus throughout the year to pass between the Black Sea and Mediterranean (Ref. 7.8.59). During a yearlong study between March 2010 and April 2011, Şahin *et al.* (Ref. 7.8.60) recorded a strong seasonal pattern to movements in the Bosphorus. The highest passage occurred during January and February, with a maximum passage of 55,862 individuals through the Bosphorus in one morning on 3 February 2011. The numbers recorded remained high from March through to the end of June, when then quickly dropped off and few birds were recorded between July and the beginning of December. The majority of birds observed in the study were flying from north to south. This provides an indication that the birds flying past the Project Area are likely to have been heading towards the Bosphorus, on route to the Marmara Sea.

The most numerous bird species recorded during the spring migration surveys was yellow-legged gull *Larus michahellis* (IUCN LC), with a total of 110,973 individuals. This species does not breed within the Project Area, although 3,000-5,000 pairs are estimated to breed in nearby Istanbul (Ref 7.8.59). The majority of the birds recorded in the Project Area during the spring are unlikely to be actively migrating at the time of the observations. Large numbers of this species are found in the Project Area, attracted by Odayeri landfill site, as well as roosting within the lakes or on the sea shore. Many of the observation relate to the daily movements of yellow-legged gulls moving between roost sites and feeding areas, particularly the sanitary landfills. The total number of birds recorded during the surveys for this species is likely to include repeat counts of birds between recording days as they are semi-resident during the survey period. A peak daily count of 7,376 individuals was made on 26 March 2014.

There is no accurate up to date global population estimate for this species. Estimating the global population of yellow-legged gull is made difficult due to recent taxonomic splits.It has been variously estimated to be in the region of 770,000-1,800,000 (Ref. 7.8.61) and 630,000-768,000 (ref 7.8.62), although these estimates are over a decade old and the population is suspected to have increased since. Despite the uncertainity of the current global population,

the numbers recorded during the surveys is likely to approach 0.5-1% of the global population of this species.

Figure 7.8.22 Daily Numbers of Yelkouan Shearwaters (Spring 2014)



Autumn Migration

During the 2014 autumn migration survey, a total of 5,622 observation records were made involving 81,826 individual birds, comprising 139 species. Of these, 25 species can be considered as large soaring migratory birds (cranes, storks, herons, pelicans and raptors). Details of the 114 other species are provided in Annex 7.8.E. A total of 9,201 individual large soaring migratory birds were recorded. These results show that many fewer birds migrate over the Project Area during autumn compared to the spring migration period. Table 7.8.29 provides a full list of the numbers of large soaring migratory birds recorded in autumn 2014. Table 7.8.29 also provides the approximate percentage of the global population for each species recorded. Where species are assessed by the IUCN as either Threatened or Near-Threatened, this is noted in Table 7.8.29.

As shown in Table 7.8.29, a total of four bird species are in IUCN categories: threatened (EN-VU) or Near Threatened (NT). These species are: greater spotted eagle *Aquila clanga* VU, eastern imperial eagle *Aquila heliaca* VU, red footed falcon *Falco vespertinus* NT and pallid harrier *Circus macrourus* NT.

In autumn 2014, three species were recorded in numbers that represent greater or equal to 1% of the global population: lesser spotted eagle, black stork and short-toed snake eagle. In addition, there is uncertainty in the global population level for a further species, for which the

numbers recorded may represent greater or equal to 1% of the global population: booted eagle.

Table 7.8.29 Numbers of Large Soaring Migratory Birds Species Recorded in Autumn 2014

Species	IUCN RL	Number Recorded	Global Population Estimate[1]	Approximate percentage of global population
Aquila pomarina	LC	6366	42,000	15.0%
Ciconia nigra	LC	600	24,000	2.5%
Circaetus gallicus	LC	523	51,400	1.0%
Buteo buteo	LC	461	4,000,000	<0.1%
Hieraaetus pennatus[i]	LC	386	20,000-100,000	0.4 - 2%
Falco subbuteo	LC	338	400,000	<0.1%
Accipiter nisus	LC	119	1,500,000	<0.1%
Pernis apivorus	LC	111	350,000	<0.1%
Falco tinnunculus	LC	100	5,000,000	<0.1%
Ciconia ciconia[2]	LC	71	701,000	<0.1%
Milvus migrans	LC	28	1,000,000	<0.1%
Accipiter brevipes[i]	LC	20	20,000-100,000	<0.1%
Circus aeruginosus	LC	20	500,000	<0.1%
Buteo rufinus	LC	19	100,000	<0.1%
Pelecanus onocrotalus[2]	LC	12	265,000	<0.1%
Falco peregrinus	LC	8	1,200,000	<0.1%
Accipiter gentilis	LC	4	500,000	<0.1%
Falco vespertinus	NT	4	300,000	<0.1%
Haliaeetus albicilla	LC	4	13,000	<0.1%
Pandion haliaetus	LC	2	500,000	<0.1%
Aquila clanga	VU	1	3,300	<0.1%
Aquila heliaca	VU	1	3,500	<0.1%
Circus cyaneus	LC	1	1,300,000	<0.1%
Circus macrourus	NT	1	18,000	<0.1%
Falco eleonorae	LC	1	17,700-18,600	<0.1%

Notes:
1: All population estimates taken from BirdLife International (2014) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 15/07/2014, unless otherwise specified below. Where a range of estimates were given by the sources, the lower number was used to ensure that the estimates are conservative.

Species	IUCN RL	Number Recorded	Global Population Estimate[1]	Approximate percentage of global population
2: Wetlands International (2014). "Waterbird Population Estimates". Retrieved from wpe.wetlands.org on Tuesday 15 Jul 2014 i: Population estimate imprecise, estimated to be in the tens of thousands. Therefore a range from 20,000 to 100,000 has been used.				

Figure 7.8.23 shows the daily numbers of individuals recorded for all large soaring bird species combined through the autumn migration period. Bird migration in the Project Area occurred at low numbers throughout the month of August and the first half of September. The numbers recorded peaked during the last week of the survey period (peak count: 29 September 2014: 2,776 individuals). Based on examination of Figure 7.8.23, it is highly likely that bird migration continued beyond the end of the survey period.

Analysis of the survey data provides some interesting comparisons with the behaviour of the birds during spring migration. Figure 7.8.24 shows that the distribution of birds was greatest over observation point 4. During spring, the distribution was much more evenly distributed. Figure 7.8.25 shows that the dominant flight directions were easterly as is expected for birds on migration from Europe to Africa. Figure 7.8.26 shows that there is a bimodal diurnal pattern to the migration, with a large peak between 10:00 and 11:00, and a second peak between 14:00 and 18:00. As in spring, the birds are mostly migrating at relatively low altitudes, below 400 m (Figure 7.8.27).

Figure 7.8.23 Daily Numbers of Large Soaring Migratory Bird Species for Autumn, 2014

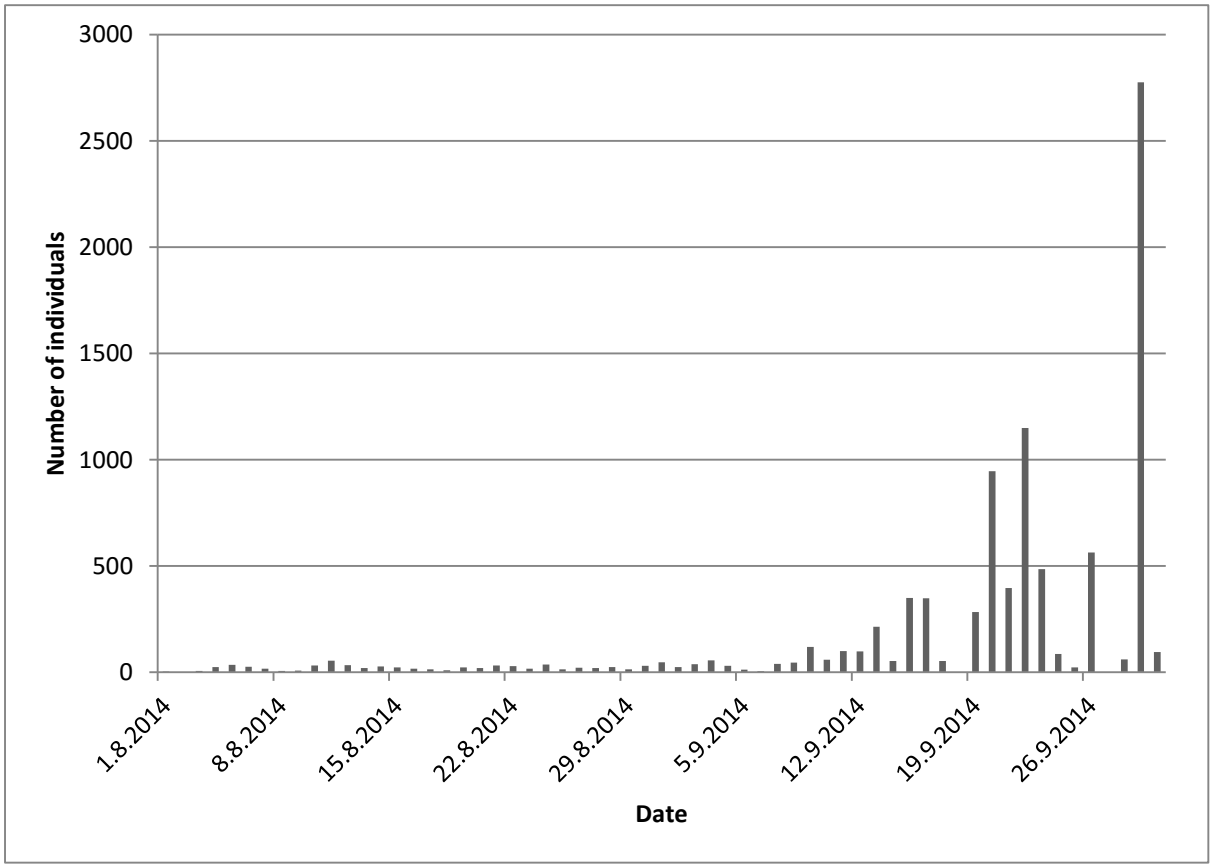


Figure 7.8.24 Numbers of All Large Soaring Migratory Bird Species by Observation Points (Autumn 2014)

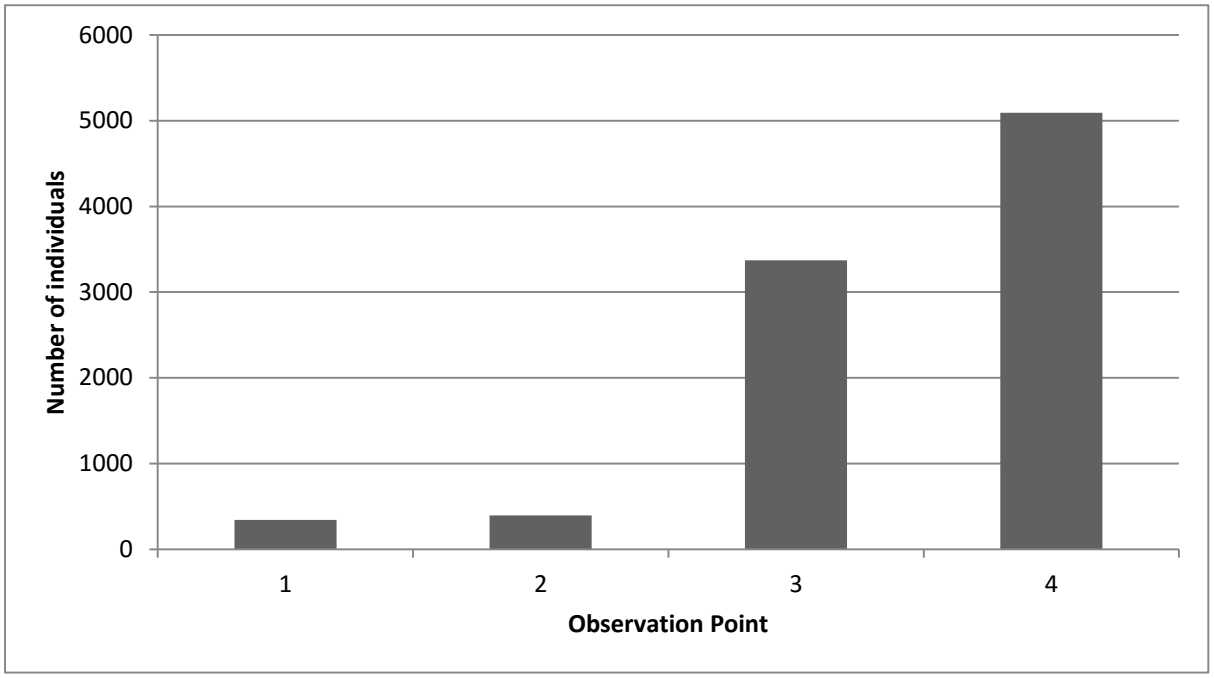


Figure 7.8.25 Flight Direction of All Large Soaring Migratory Birds (Autumn 2014)

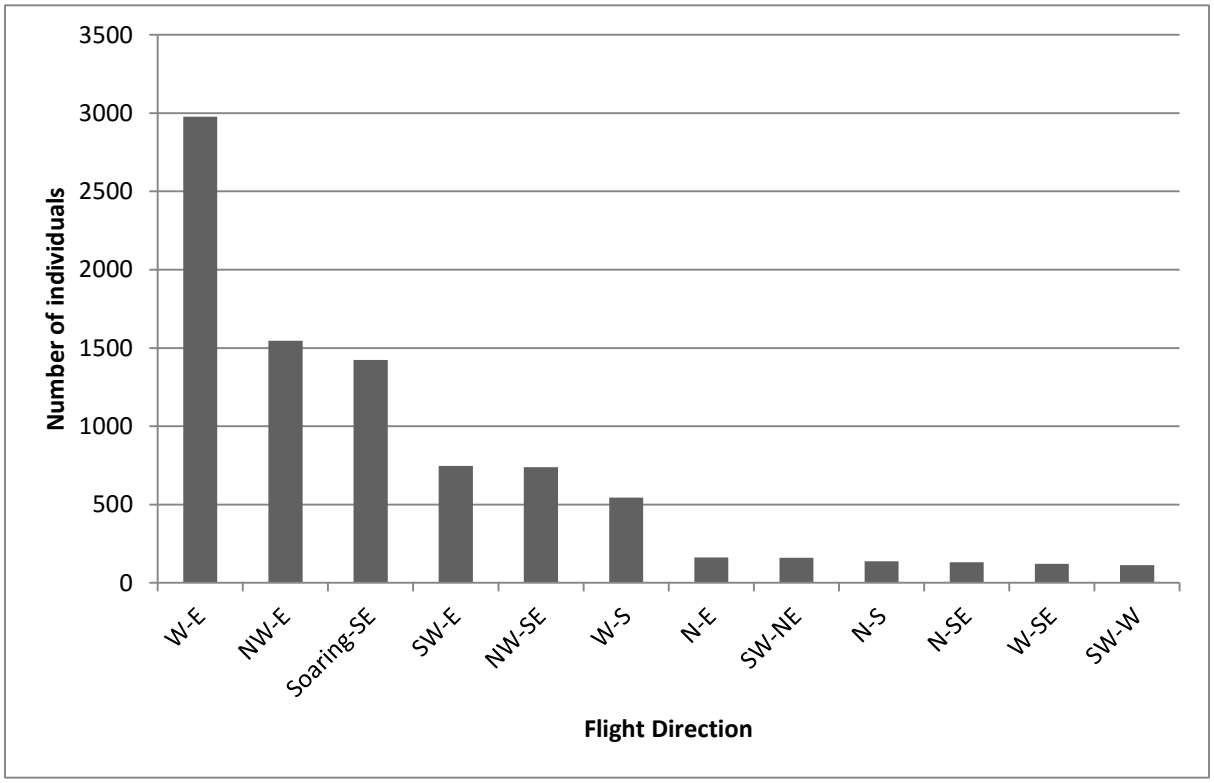


Figure 7.8.26 Diurnal Patterns and Numbers of All Large Soaring Migratory Birds according to Time Intervals (Autumn 2014)

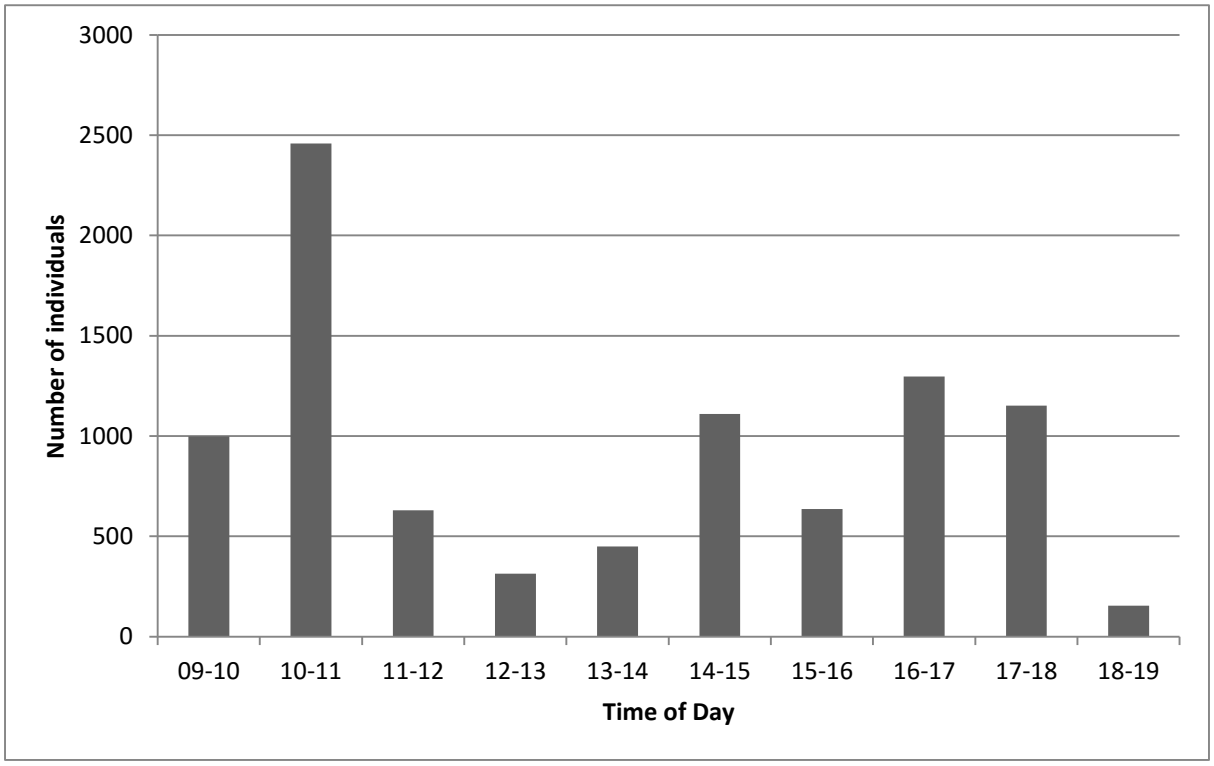
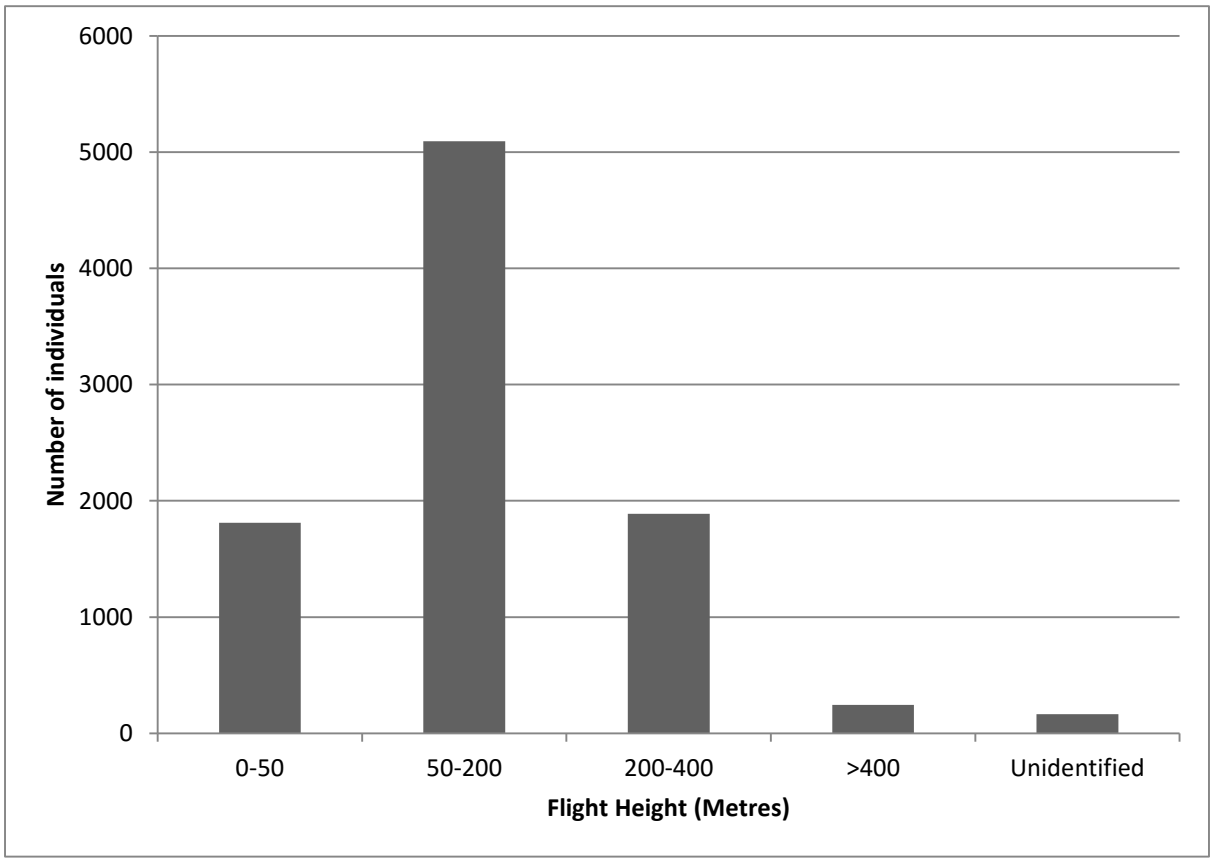


Figure 7.8.27 Flight Height of All Large Soaring Migratory Birds (Autumn 2014)



Wintering Birds

The two wintering bird surveys completed within the Project Area in January and February 2014, recorded a total of 26 species of waterbirds (Table 7.8.30). During the survey in January, a total of 10,471 individuals were recorded, which reduced to 4,673 in February. This reduction probably represents the movement of wintering birds out of the Project Area, as they return towards breeding grounds. The most numerous waterbird recorded was yellow-legged gull with 8,507 and 3,723 individuals recorded respectively in January and February. The 8,507 individuals recorded in January 2014, exceeds 1% of the lower level of global population estimates, as well as the 1% population threshold for the Mediterranean population of this species (7,000 individuals) (Ref. 7.8.62). It also exceeds 1% of the wintering population in Turkey, which is estimated to be between 100,000 and 120,000 individuals (Ref. 7.8.59).

No large concentrations of swans, ducks, geese or waders were recorded. Only Eurasian coot *Fulica atra* and great crested grebe were recorded using the Project Area lakes and ponds in reasonably large numbers, with peak counts of 577 and 106 respectively. Neither represents significant proportions of their global or Turkish populations. The Mediterranean and Black Sea wintering population of Eurasian coot is estimated to be 2.5 million and great crested grebe between 580,000 and 870,000 (Ref. 7.8.62). The Turkish wintering population of Eurasian coot is estimated to be between 400,000 and 1,000,000, and great crested grebe exceeds 30,000 in the Marmara Region alone (Ref. 7.8.59).

Yelkouan shearwater *Puffinus yelkouan* was recorded during the winter bird surveys as well as the spring migration survey (discussed earlier in this chapter). This is the only threatened species of bird recorded during the winter bird surveys (IUCN VU). The survey recorded a total of 988 individuals, which were all recorded flying offshore from the Project Area. This number represents greater than 1% of the estimated global population of yelkouan shearwater of 39,000-99,000 individuals.

Pygmy cormorant *Phalacrocorax pygmeus* is classified as IUCN LC. The species was previously assessed as being IUCN Near Threatened and is assessed to be a Species of European Conservation Concern (SPEC 1) according to BirdLife International (Ref. 7.8.63). The reduction in the assessed threat status of this species is due to an increases in the estimate of global population. The estimated European population (75-94% of the global breeding range) is now 28,000-39,000 pairs, considerably higher than the 13,000 pairs estimated in 1996 (Ref. 7.8.64). A count of 32 pygmy cormorants made in January 2014 represents less than 1% of the global population. However, it does equate to approximately 2% of the lower limit of the estimated wintering population in Turkey (1,500-22,000 individuals, Ref. 7.8.63).

Table 7.8.30 Numbers of Wintering Waterbirds Recorded in Project Area

Bird Species	IUCN RL	Total Number of Individuals (January 2014)	Total number of Individuals (February 2014)
Tachybaptus ruficollis	LC	50	38
Podiceps cristatus	LC	106	44
Puffinus yelkouan	VU	988	35
Phalacrocorax carbo	LC	25	301

Bird Species	IUCN RL	Total Number of Individuals (January 2014)	Total number of Individuals (February 2014)
Phalacrocorax aristotelis	LC	1	
Phalacrocorax pygmeus	LC	32	4
Ardea cinerea	LC	5	2
Cygnus olor	LC		2
Anas platyrynchos	LC	55	
Anas strepera	LC		1
Netta rufina	LC	8	7
Aythya farina	LC	19	13
Circus aeroginosus	LC	3	
Gallinula chloropus	LC	10	3
Fulica atra	LC	577	466
Gallinago gallinago	LC	1	3
Tringa ochropus	LC	1	1
Actitis hypoleucos	LC		1
Stercorarius parasiticus	LC	1	
Larus melanocephalus	LC		3
Larus minitus	LC		22
Larus ridibundus	LC	2	4
Larus canus	LC	5	
Larus michahellis	LC	8,507	3,723
Larus fuscus	LC	5	
Alchedo atthis	LC	1	
Total Number of individuals		**10,471**	**4,673**
Number of Species		***21***	**19**

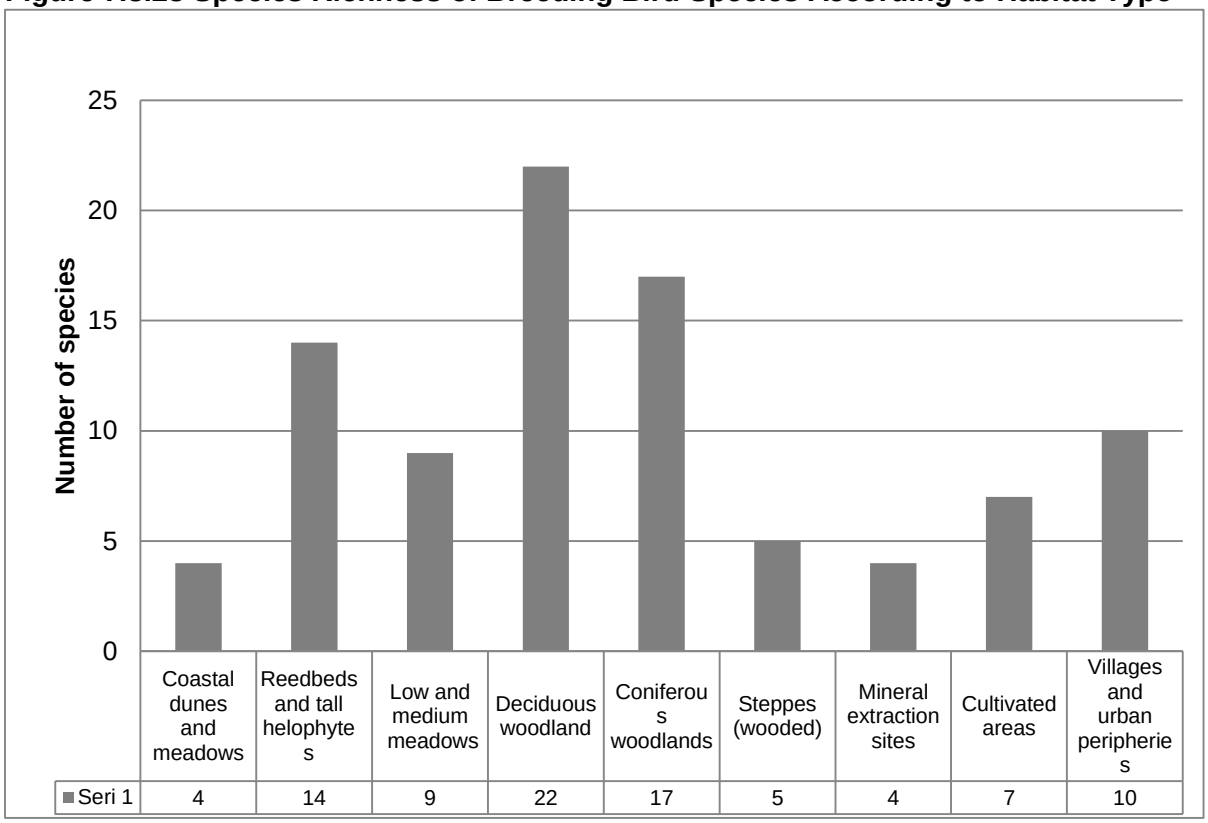
Breeding Birds

A total of 78 bird species were recorded within the Project Area and its close vicinity habitats during the breeding bird surveys completed in May and June 2014 (Annex 7.8.F). Of these, 28 species were confirmed to be breeding and 36 species were assessed as either possibly, or probably breeding. No threatened species of bird was confirmed or assessed as either possibly, or probably breeding within the Project Area (all species IUCN Least Concern, LC).

Figure 7.8.28 shows the number of species recorded in each of the broad habitat types present within the Project Area. Deciduous woodland supported the greatest number of species,

followed by coniferous woodland and reedbeds. The breeding bird community in the deciduous woodland is dominated by small migrant species such as nightingale *Luscinia megarynchos*, eastern olivaceous warbler *Hippolais pallida* and common whitethroat *Sylvia communis*. Chaffinch *Fringilla coelebs* was the most common breeding species in the coniferous woodland, which also supports high densities of red-backed shrike *Lanius collurio*, great tit *Parus major* and blue tit *Parus caeruleus*. The most common species in the reedbeds was the habitat specialist great reed warbler *Acrocephalus arundinaceus*. The breeding bird communities of open meadows tended to be dominated by red-backed shrike, corn bunting *Miliaria calandra*, ortolan bunting *Emberiza hortulana*, cirl bunting *Emberiza cirlus* and black-headed bunting *Emberiza melanocephala*.

Figure 7.8.28 Species Richness of Breeding Bird Species According to Habitat Type



Terrestrial Mammals

During the field studies carried out in the Project Area, 17 mammal species have been identified. The identified species, their systematic categories, threat categories, the EUNIS habitat codes where the species have been detected and their relative abundance is given in Table 7.8.31 and photographs belongs these species and their habitats are presented in Annex 7.8.I.

Table 7.8.31 List of the Mammalia Species Identified in the Project Area

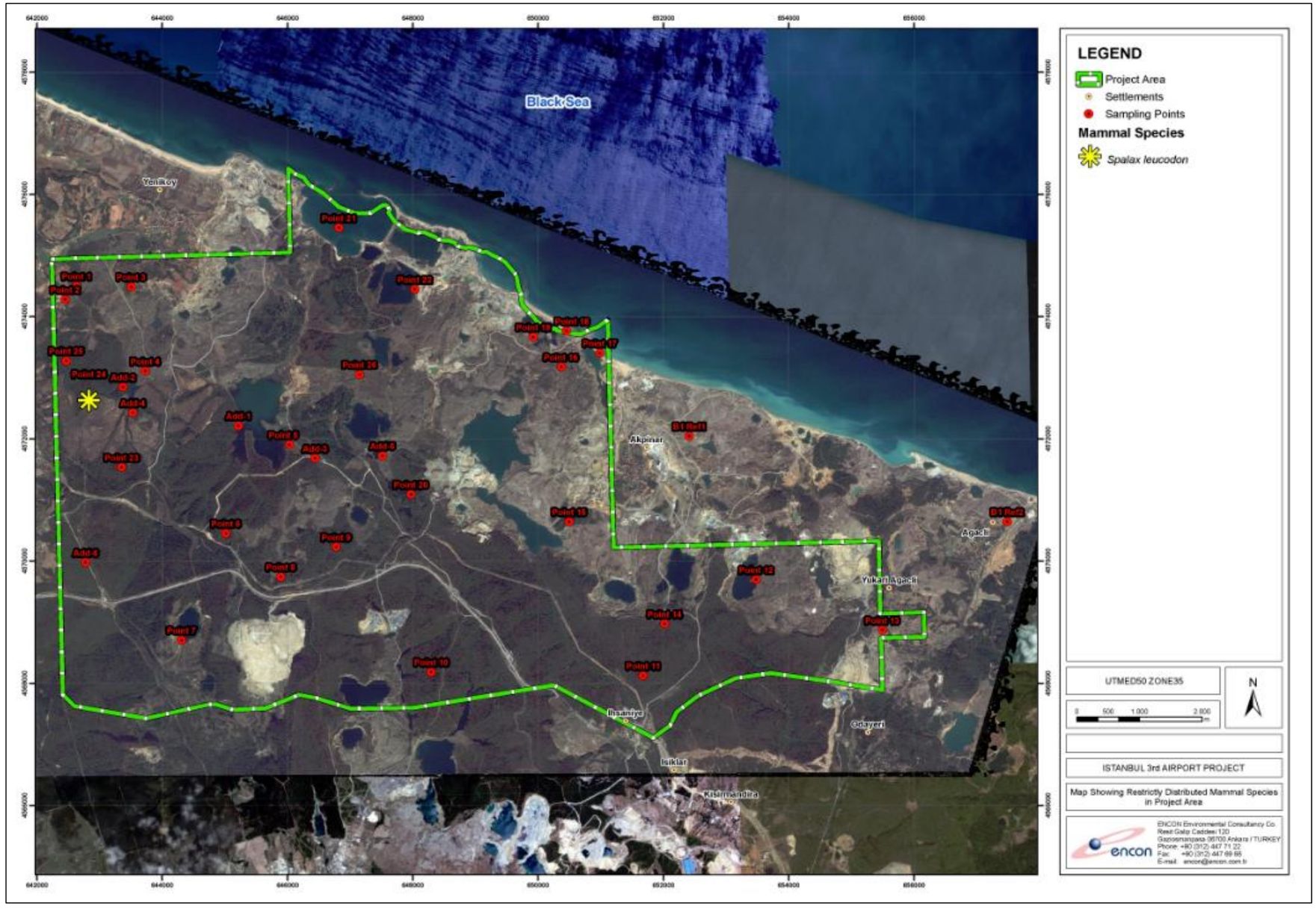
Order	Family	Taxon	English Name	END	International Threat Categories		National Threat Categories	EUNIS Habitat Class	Relative Abundance (*)
					IUCN RL	BERN	CHC		
Lagomorpha	Leporidae	*Lepus europaeus*	European hare	-	LC	-	App II	G1.7 E3.4	Very rare
Rodentia	Muridae	*Apodemus mystacinus*	Eastern broad-toothed field mouse	-	LC	-	-	E3.4	Rare
Rodentia	Muridae	*Apodemus flavicollis*	Yellow-necked mouse	-	LC	-	-	E3.4	Moderate
Rodentia	Muridae	*Mus macedonicus*	Macedonian mouse	-	LC	-	-	E3.4	Moderate
Rodentia	Spalacidae	*Spalax leucodon*	Lesser mole rat	-	DD	-	-	C3.2	Very rare
Rodentia	Sciuridae	*Sciurus vulgaris*	Eurasian red squirrel	-	LC	App III	-	G1.7	Rare
Erinaceomorpha	Erinaceidae	*Erinaceus roumanicus*	Northern white-breasted hedgehog	-	LC	-	-	G1.7, G3.F	Very rare
Soricomorpha	Talpidae	*Talpa europaea*	European mole	-	LC	-	-	G1.7	Moderate
Chiroptera	Vespertilionidae	*Myotis mystacinus*	Whiskered bat	-	LC	App II	-	G3.7 G1.A	A few individuals (there is not relative abundance)
Artiodactyla	Suidae	*Sus scrofa*	Wild boar	-	LC	App III	App II	G1.7	Moderate

Order	Family	Taxon	English Name	END	International Threat Categories		National Threat Categories	EUNIS Habitat Class	Relative Abundance (*)
					IUCN RL	BERN	CHC		
Artiodactyla	Cervidae	*Capreolus capreolus*	European roe deer	-	LC	App III	-	G1.7	Very rare
Carnivora	Felidae	*Felis silvestris*	Wild cat	-	LC	App II	-	G1.7	Very rare
Carnivora	Canidae	*Canis aureus*	Golden jackal	-	LC	-	App II	E3.4 G3.F G1.7 G1.A	Moderate
Carnivora	Canidae	*Canis lupus*	Gray wolf	-	LC	App II	-	G1.7	Rare
Carnivora	Canidae	*Vulpes vulpes*	Red fox	-	LC	-	App II	E3.4 G3.F G1.7 E3.4 G1.A	Moderate
Carnivora	Mustelidae	*Martes foinea*	Beech marten	-	LC	App III	App II	E3.4 G3.F G1.7 E3.4	Moderate
Carnivora	Mustelidae	*Meles meles*	European badger	-	LC	App III	App I	G3.F G1.7	Rare

(*) For the species *Erinaceus roumanicus* “Moderate” is 11-50 individiuals,
For the species *Canis aureus, Vulpes vulpes, Felis silvestris, Capreolus capreolus, Sus scrofa, Martes foinea, Meles meles, Canis lupus* “Moderate” is 11-20 individiuals, “Rare” is 6-10 individuals and “Very rare” is 1-5 individiuals.
For the rest of the species in the table, “Moderate” is 51-100 individiuals, “Rare” is 11-50 individuals and “Very rare” is 1-10 individiuals.

No mammal species currently assessed as threatened were recorded during the surveys completed within the Project Area. However, lesser mole rat *Spalax leucodon* is currently assessed by the IUCN as Data Deficient (DD) due to uncertainty over taxonomic status of this species. Lesser mole rat is regarded as a super-species that contains a number of forms that are well-differentiated at both a genotypic and phenotypic level, although their taxonomy remains unresolved. Some of these forms have very restricted ranges and may be assessed as threatened once the taxonomy is resolved (Ref. 7.8.65). The entire range of lesser mole rat occurs within south-east Europe and southern Ukraine. Within Turkey, the species is limited to the European part. Within the Project Area, lesser mole rat was found at a single location close to the western boundary (Figure 7.8.29), close to the boundary of the Terkos Basin KBA. Lesser mole rat is listed as a designated criterion for the Terkos Basin KBA. All other mammal species recorded within the Project Area have been assessed by the IUCN as Least Concern (LC).

Figure 7.8.29 Location of *Spalax leucodon* within the Project Area



Three mammal species recorded in the Project Area are listed in Appendix II (Strictly protected fauna species) of the Bern Convention: wild cat *Felis silvestris*, gray wolf *Canis lupus* and whiskered bat *Myotis mystacinus.* These species are widespread in Turkey. While wild cat prefers wooded areas, gray wolf can be found in all kind of terrestrial habitats.

Whiskered bat is a widely distributed bat species in northern Turkey that generally prefers woodland habitats. Individuals of this species roost in tree cavities as well as buildings during the summer, and hibernate in caves and basements in winter. The geology of the Project Area is not suitable for cave formation and therefore unlikely to support significant concentrations of hibernating bats. The woodland within the Project Area is formed by relatively small trees, between 2-4 m in height and a girth of less than 15 cm at breast height. Therefore, trees with features suitable for supporting roosting bats (e.g. cracks and rot holes) are rare. Buildings are rare in the Project Area, and none with high bat roost potential were identified. The geology of the Project Area and surrounding area is not conducive to cave formation and it is unlikely that there are any major hibernation roosts in the Project Area.

A total of six mammal species are listed in Appendix III (Protected fauna species) of the Bern Convention: Eurasian red squirrel *Sciurus vulgaris*, European roe deer *Capreolus capreolus*, *w*ild boar *Sus scrofa*, golden jackal *Canis aureus*, beech marten *Martes foinea* and European badger *Meles meles*. Among these species, Eurasian red squirrel, wild boar, golden jackal, beech marten and European badger are quite widespread in Turkey. Although European roe deer are found in suitable habitats in Turkey, they usually have low population density.

Specific survey techniques were employed to survey arboreal small mammal species such as nest tubes and live traps with the aim of recording forest dormouse *Dryomys nitedula,* fat dormouse *Glis glis* and hazel dormouse *Muscardinus avellanarlus.* None of these species were recorded within the Project Area.

When the records for each species were evaluated according to the habitat types as summarised in Table 7.8.32, it was observed that most of the species were identified in the G1.7 thermophilous deciduous woodland habitat which is the main natural habitat type in the Project Area.

Table 7.8.32 List of Mammalia Species Identified in Each Habitat Type

EUNIS Habitat Class	Species
C3.2	*Spalax leucodon*
E3.4	*Apodemus mystacinus* *Apodemus flavicollis* *Mus macedonicus* *Vulpes vulpes* *Martes foinea*
E3.4	*Lepus europaeus* *Canis aureus* *Vulpes vulpes* *Martes foinea*
G1.3	*Myotis mystacinus*

EUNIS Habitat Class	Species
	Canis aureus *Vulpes vulpes*
G1.7	*Lepus europaeus* *Sciurus vulgaris* *Erinaceus roumanicus* *Talpa europaea* *Sus scrofa* *Capreolus capreolus* *Felis silvestris* *Canis aureus* *Canis lupus* *Vulpes vulpes* *Martes foinea* *Meles meles*
G3.F	*Erinaceus roumanicus* *Myotis mystacinus* *Canis aureus* *Vulpes vulpes* *Martes foinea* *Meles meles*

Marine Mammals

Three species of cetacean inhabit the Black sea; the short beaked common dolphin *Delphinus delphis ponticus*, the harbour porpoise *Phocoena phocoena relicta* and the common bottlenose dolphin *Tursipos truncates ponticus*. All three are recognised sub-species, which have evolved due to the near genetic separation of the Black Sea from Mediterranean populations. The status of these sub-species has been recently reviewed within an ACCOBAMS Report, for adoption by the IUCN (Ref. 7.8.66).

The short-beaked common dolphin has been assessed as Vulnerable (and Data Deficient by the Black Sea RDB). The population size in the Black Sea is unknown, although recent estimates suggest that it may be in the 10,000s or possibly 100,000s or more (Ref. 7.8.67). The habitat range of the short-beaked common dolphin encompasses nearly the entire Black Sea although it has never been recorded in the Sea of Azov. The species is distributed predominantly offshore, but also visits coastal waters following on the seasonal aggregations and mass migrations of small pelagic fishes.

The common bottlenose dolphin is assessed as Endangered (and Data Deficient by the Black Sea RDB). The total population size in the Black Sea is unknown. However, there are recent abundance estimates for parts of the range suggesting that population size is at least several thousands (Ref. 7.8.68). The species predominantly occurs in coastal waters, including in the vicinity of the Project Area.

The harbour porpoise is assessed as Endangered (and Data Deficient by the Black Sea RDB). There are no accurate population records, however estimates range from a least several thousands to possibly 10,000 to 12,000 (Ref. 7.8.69). The range of this species includes nearly all of the Black Sea. The species is predominately found in coastal areas, including in the vicinity of the Project Area.

7.8.5 Potential Impacts

The construction and operation of the Project will involve a wide range of activities that have the potential to affect ecology. The relevant activities of the Project likely to give rise to impacts on receptors are summarised in Table 7.8.33, along with the likely pathway of the impacts.

Table 7.8.33 Project Activities and Likely Pathways of Potential Impact

Phase	Activity	Pathway of Potential Impact
Construction / pre-commissioning	Vegetation clearance and topsoil strip	Habitat loss Direct mortality Fragmentation of habitats Disturbance Introduction of invasive species Impacts to air quality Runoff into surrounding water courses and the sea
	De-watering of lakes and ponds	Habitat loss Direct mortality Freshwater release into the sea Introduction of invasive species
	Creation of construction access roads and upgrades to junctions of existing roads	Habitat Loss Direct Mortality Fragmentation of habitats Disturbance Impacts to air quality Runoff into surrounding water courses and the sea Introduction of invasive species
	Earthworks, including changes to topography	Disturbance Impacts to air quality Changes to hydrology Runoff into surrounding water courses and the sea Introduction of invasive species

Phase	Activity	Pathway of Potential Impact
	Construction of airport facilities	Disturbance Impacts to air quality Introduction of invasive species
Operation	Movement of aircraft (planes and helicopters)	Direct mortality (bird strike) Disturbance Impacts to air quality
	Movement of people and ground vehicles	Disturbance Impacts to air quality
	Physical effects of infrastructure	Changes to hydrology and drainage Runoff of pollutants Changes to micro-climates
	Increase in lighting	Direct mortality Disturbance

7.8.5.1 Receptors

The sensitivity of the ecological receptors is assessed in the following section according to criteria described in **ESIA Chapter 6 Impact Assessment Methodology** and section 7.8.3.4 of this Chapter. The sensitivity of receptors has taken into account IFC PS6 criteria for critical habitat. The detailed determination of features that confer critical habitat status is provided in Annex 7.8.G. Table 7.8.34 provides a summary of the critical habitat relevant to this assessment.

Table 7.8.34 Critical Habitat Determination Summary

Feature	IFC PS6 Criterion	Rationale	Critical Habitat
Lathyrus undulates	2	>1% of global population of endemic species	Yes - Tier 2
Centaurea hermannii	1 and 2	Nationally/regionally important concentration of an EN species >1% of global population of endemic species	Yes - Tier 2
Cirsium polycephalum	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population of endemic species	Yes - Tier 2
Euphorbia amygdaloides subsp. Robbiae	2	>1% of global population of endemic species	Yes - Tier 2
Galanthus x valentiei	2	>1% of global population of endemic species	Yes - Tier 2

Feature	IFC PS6 Criterion	Rationale	Critical Habitat
Red mullet *Mullus barbatus ponticus*	2	>1% of global population of endemic species	Yes - Tier 2
Long-snouted seahorse *Hippocampus guttulatus microstephanus*	2	>1% of global population of endemic species	Yes - Tier 2
Common bottlenose dolphin *Tursipos truncates ponticus*	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population of endemic species	Yes - Tier 1
Short beaked common dolphin *Delphinus delphis ponticus*	2	Nationally/regionally important concentration of an CE sub-species >1% of global population of endemic species	Yes - Tier 1
Harbour porpoise *Phocoena phocoena relicta*	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population of endemic species	Yes - Tier 1
Large soaring migratory birds: • white stork; • steppe buzzard; • honey buzzard; • lesser spotted eagle; • black stork; • short-toed snake eagle; • greater spotted eagle; and • eastern imperial eagle.	3	>1% of global population of a migratory species	Yes - Tier 2
Yelkouan shearwater *Puffinus yelkouan*	3	>1% of global population of a migratory species	Yes - Tier 2
Yellow-legged gull *Larus michahellis*	3	>1% of global population of a migratory species	Yes - Tier 2
Wintering Bird Assemblage	3	IBA criteria A4. Congregations: iii	Yes - Tier 2
Thermophilous deciduous woodland	4	Short-term decline in distribution or function (over 50 years)	Yes
Shifting coastal dunes	4	Short-term decline in distribution or function (over 50 years) Small geographical extent	Yes
Terkos Basin KBA, IBA and IPA	6	Internationally and/or nationally recognised areas	Yes

Feature	IFC PS6 Criterion	Rationale	Critical Habitat
Agacli Sand Dunes KBA and IPA	6	Internationally and/or nationally recognised areas	Yes
Bosphorus Region KBA, IBA and IPA	6	Internationally and/or nationally recognised areas	Yes
West Istanbul Pasture KBA and IPA	6	Internationally and/or nationally recognised areas	Yes
Kucukcekmece Basin IBA and IPA	6	Internationally and/or nationally recognised areas	Yes

Internationally Recognised Areas

The sensitivity of Internationally Recognised Areas is provided in Table 7.8.35. IFC PS6 states that internationally and/or nationally recognised areas of high biodiversity value will likely qualify as critical habitat. These include KBAs, IBAs and IPAs. Therefore, all of the KBA within and in the vicinity of the Project Area are considered to be of high sensitivity.

Table 7.8.35 Sensitivity Appraisal of Internationally Recognised Areas

Site	Rationale	Sensitivity
Terkos Basin KBA, IBA and IPA	IFC PS6: Internationally recognised area	High
Agacli Sand Dunes KBA and IPA	IFC PS6: Internationally recognised area	High
Bosphorus Region KBA, IBA and IPA	IFC PS6: Internationally recognised area	High
West Istanbul Pasture KBA and IPA	IFC PS6: Internationally recognised area	High
Kucukcekmece Basin KBA, IBA and IPA	IFC PS6: Internationally recognised area	High

Marine and Terrestrial Habitats

An appraisal of the sensitivity of habitats within the Project Area is provided in Table 7.8.36. Two habitats qualify as critical habitat under IFC PS6 Criterion 4 Highly threatened and/or unique ecosystems: shifting coastal dunes and thermophilous deciduous woodland. These habitats are assessed as High sensitivity, along with four other habitats that are known to support species with high sensitivity.

Table 7.8.36 Habitat Sensitivity Appraisal

Habitat	Rationale	Sensitivity
B1.3 - Shifting coastal dunes	IFC PS6 Criterion 4: Highly threatened and/or unique ecosystems	High

Habitat	Rationale	Sensitivity
	Habitat that support species of High sensitivity	
C1.3 - Permanent eutrophic lakes, pond and pools	Habitat that support species of High sensitivity	High
C2.5 - Temporary running waters	Habitat that support species of Low sensitivity	Low
C3.2 - Water-fringing reedbeds and tall heleohytes other than canes	Habitat that support species of Low sensitivity	Low
E3.4 - Moist or wet eutrophic and mesotrophic grassland	Habitat that support species of Low sensitivity	Low
F5.4 - S*partium junceum* fields	Habitat that support species of Low sensitivity	Low
G1.3 - Mediterranean riparian woodland	Habitat that support species of High sensitivity	High
G1.7 - Thermophilous deciduous woodland	IFC PS6 Criterion 4: Highly threatened and/or unique ecosystems Habitat that support species of High sensitivity	High
G3.F - Highly artificial coniferous woodland	Habitat that support species of High sensitivity	High
I1 - Regularly or recently cultivated agricultural, horticultural and domestic habitats	Does not meet the criteria listed for Low-High sensitivity	Negligible
J1.2 - Residential buildings of villages and urban peripheries	Does not meet the criteria listed for Low-High sensitivity	Negligible
J3.2 - Active opencast mineral extraction sites, including quarries	Does not meet the criteria listed for Low-High sensitivity	Negligible
J4.2 - Road networks	Does not meet the criteria listed for Low-High sensitivity	Negligible
Marine habitats	Habitat that support species of High sensitivity	High

Threatened and Red List Plant Species

An appraisal of the sensitivity of threatened and endemic plant species within the Project Area is provided in Table 7.8.37. Five species are assessed as High sensitivity due to them meeting either IFC PS6 criterion 1: Critically Endangered (CR) and/or Endangered (EN) species, and / or criterion 2: Endemic and/or restricted-range species for critical habitat.

Table 7.8.37 Plant Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Lathyrus undulates	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
Centaurea hermannii	IFC PS6 Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species Criterion 2: Endemic and/or restricted-range species	High
Cirsium polycephalum	IFC PS6 Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species Criterion 2: Endemic and/or restricted-range species	High
Euphorbia amygdaloides subsp. Robbiae	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
Galanthus x valentiei	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
Ferulago confuse	Locally important populations of Vulnerable (VU) species	Low
Symphytum tuberosum subsp. Nodosum	Locally important populations of Vulnerable (VU) species	Low
Convolvulus persicus	Locally important concentrations of Endangered (EN) species	Medium
Lilium martagon	Locally important populations of Vulnerable (VU) species	Low

Invertebrates

An appraisal of the sensitivity of terrestrial invertebrate species within the Project Area is provided in Table 7.8.38 and marine invertebrates in Table 7.8.39. All invertebrates are considered to be either of low or negligible sensitivity.

Table 7.8.38 Terrestrial Invertebrate Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Cerambyx dux	Locally important population of Near Threatened (NT) species	Low
Stag beetle	Locally important population of Near Threatened (NT) species,	Low

Species	Rationale	Sensitivity
	listed on Annexes to the Bern Convention.	
Other terrestrial invertebrate species	No other species assessed as Threatened, Near-threatened, endemic or listed on Bern Convention Annexes.	Negligible

Table 7.8.39 Marine Invertebrate Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Marine invertebrate species assemblage	No species assessed as Threatened, Near-threatened, endemic or listed on Bern Convention Annexes.	Negligible

Fish

An appraisal of the sensitivity of freshwater species within the Project Area is provided in Table 7.8.40 and marine species in Table 7.8.41. All freshwater fish species are considered to be either of low or negligible sensitivity. Although wild common carp is IUCN VU, the population in the Project Area derive from introduced stock for recreational fishing purposes.

Table 7.8.40 Freshwater Fish Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Wild common carp	Locally important population of Vulnerable (VU) species	Low
Monkey goby	Locally important population of species listed on Annexes to the Bern Convention.	Low
Other freshwater fish species	No other species assessed as Threatened, Near-threatened, endemic or listed on Bern Convention Annexes.	Negligible

Table 7.8.41 Marine Fish Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Red mullet *Mullus barbatus*	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
European *conger Conger conger*	Locally important population of Vulnerable (VU) species	Low
long-snouted seahorse *Hippocampus guttulatus*	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
Other marine fish species	No other species assessed as Threatened, Near-threatened, endemic or range restricted.	Negligible

Herptiles

An appraisal of the sensitivity of herptile species within the Project Area is provided in Table 7.8.42. With the exception of spur-thighed tortoise and European pond turtle, all amphibian and reptile species are low sensitivity. Both spur-thighed tortoise and European pond turtle are qualifying features of the Terkos Basin KBA and therefore are assessed as high sensitivity.

Table 7.8.42 Herptile Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Green toad	Locally important populations of species listed on Annexes to the Bern Convention.	Low
Eastern tree frog		
Eurasian marsh frog		
Agile frog		
Southern crested newt		
Smooth newt		
Spur-thighed tortoise	Population forms part of internationally recognised area (Terkos Basin KBA)	High
European pond turtle	Population forms part of internationally recognised area (Terkos Basin KBA)	High
Balkan green lizard	Locally important populations of species listed on Annexes to the Bern Convention.	Low
Green lizard		
Italian wall lizard		
Balkan wall lizard		
European legless lizard		
Slow-worm		
European copper skink		
Grass snake		
Tessellated water snake		
Eastern Four-Lined Ratsnake		
Caspian whip snake		

Birds

An appraisal of the sensitivity of bird species within the Project Area is provided in Table 7.8.43. At least eight species of large-soaring migratory bird occur in numbers exceeding 1 % of their global populations (a further two species may also qualify, but there is uncertainity over the size of the global population). These species qualify as Tier 2 critical habitat under criterion 3: migratory and congregatory species and assessed as high sensitivity.

Table 7.8.43 Bird Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Large soaring migratory birds	IFC PS6 Tier 2 critical habitat is confirmed under Criterion 3 (migratory and congregatory species) for the following eight species of large soaring migratory birds: white stork; steppe buzzard; honey buzzard; lesser spotted eagle; black stork; short-toed snake eagle; greater spotted eagle; and eastern imperial eagle.	High
Yelkouan shearwater	IFC PS6 Tier 2 critical habitat confirmed under Criterion 3 (migratory and congregatory species) for yelkouan shearwater.	High
Yellow-legged gull	IFC PS6 Tier 2 critical habitat confirmed under Criterion 3 (migratory and congregatory species) for yellow-legged gull	High
Wintering bird assemblage	IFC PS6 Tier 2 critical habitat under Criterion 3 for habitat that meets Birdlife International's Criterion A4 for congregations	High
Breeding birds assemblage	Locally important populations of species listed on Annexes to the Bern Convention	Low

Mammals

An appraisal of the sensitivity of terrestrial mammal species within the Project Area is provided in Table 7.8.44 and marine mammals is Table 7.8.45. With the exception of lesser mole rat, terrestrial mammals are assessed as either negligible or low sensitivity. The Project Area supports a very small population of lesser mole rat that forms part of the qualifying features of the Terkos Basin KBA and is assessed as moderate sensitivity. All three cetacean species occurring in the Black Sea qualify as critical habitat and are assessed as high sensitivity.

Table 7.8.44 Terrestrial Mammal Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Lesser mole rat	Population forms limited part of internationally recognised area (Terkos Basin KBA)	Medium
Eurasian red squirrel	Locally important populations of species listed on Annexes to the Bern Convention.	Low
Whiskered bat		
Wild boar		
European roe deer		
Wild cat		
Gray wolf		
Beech marten		
European badger		
Other mammal species	No other species assessed as Threatened, Near-threatened, endemic or listed on Bern Convention Annexes.	Negligible

Table 7.8.45 Marine Mammal Species Sensitivity Appraisal

Species	Rationale	Sensitivity
Short-beaked common dolphin	IFC PS6 Criterion 2: Endemic and/or restricted-range species	High
Common bottlenose dolphin	IFC PS6 Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species Criterion 2: Endemic and/or restricted-range species	High
Harbour porpoise	IFC PS6 Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species Criterion 2: Endemic and/or restricted-range species	High

7.8.5.2 Earthworks and Construction

Internationally Recognised Areas

Terkos Basin KBA, IBA and IPA

The vegetation clearance and top-soil strip within the Project Area will cause a direct adverse impact to parts of the Terkos Basin KBA, IBA and IPA, totalling 350 ha in extent. This will cause a permanent loss of habitat that is known to support threatened and endemic species

that form part of the qualifying features of the site, including *Centaurea hermanii*, spur-thighed tortoise, European pond turtle and lesser mole rat.

The vegetation clearance and top-soil strip have the potential to cause direct mortality to the plants and animals present within the Project Area (including those parts located within the Terkos Basin KBA, IBA and IPA). The loss of vegetation may also cause fragmentation to the remaining populations. In particular, the Project Area forms a habitat corridor for spur-thighed tortoise, linking three KBAs where the species forms part of the designations (Terkos Basin KBA, Bosphorus Region KBA and West Istanbul KBA). Construction activities including vegetation clearance and top-soil strip, creation of construction access roads, earthworks, and the construction of airport facilities has the potential to disturb adjacent areas of the Terkos Basin, both through noise and visual disturbance. The types of plant and machinery that are likely to be used on-site during the earthworks/construction phases (stored at the relevant construction camp) and have the potential to result in noise impacts on ecological receptors are detailed in Section 3.2.6 of **Chapter 3 Proposed Project and Project Description.** Operation of this plant has the potential to result in noise impacts on sensitive ecological receptors within Terkos Basin KBA, IBA and IPA, although disturbance effects are unlikely to extend 2 km, as far as Lake Terkos. The majority of water bodies within the Project Area, occur outside of the Terkos Basin KBA, IBA and IPA boundary. Therefore, there will be minimal direct loss of wintering bird habitat within the designated area. However, the de-watering of water bodies will remove approximately 550 ha habitat outside of the designated area, which represents supporting habitat to the wintering waterbird assemblage that forms the basis of the IBA designation.

A proportion of the water onsite will be retained for use during construction. Water from the water bodies excess to construction requirements will be discharged to the sea, and therefore will not enter the Terkos Basin catchment (see **Chapter 7.5 Water Resources**).

A number of non-native freshwater fish species (Eastern mosquitofish Prussian carp and tench) have been recorded within the Project Area. The spread of these species into the Terkos Basin from the Project Area as a result of dewatering should not occur. However, runoff during construction has the potential to introduce silt, nutrients and chemical contaminants, non-native species and disease into Lake Terkos prior to the implementation of mitigation measures.

According to **Chapter 7.2 Air Quality**, as excavation and land clearing works within the Project Area will result in the generation of the dust as well as exhaust emissions, this will potentially have an adverse impact on the local air quality. However, this impact will mainly concern the Project Area, and can be considered as low for the receptor points located beyond the Project boundaries.

The large change in land surface area could alter the hydrology of the Terkos Basin. Construction activities, the importation of fill and the movement of people and vehicles have the potential to introduce invasive species impacting the habitats and species of the Terkos Basin Internationally Recognised Area.

Agacli Sand Dunes KBA and IPA

A small part of the Agacli Sand Dunes KBA and IPA overlaps with the Project Area. However, none of the threatened and endemic plant species that form part of the designation of the Internationally Recognised Area occur within the Project Area. The fixed dune habitat that supports these important species occurs approximately 1 km from the Project Area. Therefore,

it is unlikely that direct habitat loss, or mortality will take place that would impact the qualifying features of the KBA or IPA.

Indirect adverse impacts may arise from disturbance, introduction of invasive species and impacts to air quality. Whilst construction noise and activity has the potential to cause disturbance, especially to birds and mammals, it will not disturb plants species that are the qualifying features of interest in the KBA or IPA. A range of non-native plant species are known to be invasive in Turkey, including *Ailanthus altissima, Ambrosia tenuifolia, Ambrosia artemisifolia, Ambrosia elatior, Polygonum perfoliatum, Sicyos angulatus, Tagetes minuta, Physalis pubescens, Bidens bipinnata, Bidens frondosa, Bidens cernua*, and *Bidens tripartita.* None of these species have been recorded in the Project Area. However, many invasive species can colonise sites via wind-blown seeds over large distances. If left uncontrolled, species such as these can be spread by construction activity, or become established on the bare ground created during construction; from where they can spread into surrounding areas.

The Agacli Sand Dunes KBA and IPA occur downwind from the prevailing north-westerly wind direction from the Project Area. Fixed dune habitats are vulnerable to a range of airborne pollutants, such as nitrogen. However, according to **Chapter 7.2 Air Quality** effects from construction activity are likely to be low. It is unlikely that the Project will increase fragmentation to the habitats and species that form part of the Agacli Sand Dunes KBA and IPA as there no similar habitats currently present within the Project Area.

Bosphorus Region KBA, IBA and IPA and West Istanbul Pasture KBA and IPA

Bosphorus Region KBA, IBA and IPA is situated 2.3 km to the south-east of the Project Area and the West Istanbul Pasture KBA and IPA is 6 km to the south. There will be no direct loss of habitat within either Internationally Recognised Area (i.e. Bosphorus Region KBA, IBA and IPA and West Istanbul Pasture KBA and IPA). Due to the distance involved, there are unlikely to be any adverse indirect impacts from changes in air quality, release of invasive species or disturbance during the construction phase. However, the loss of habitat from within the Project Area has the potential to cause an indirect adverse impact through fragmentation of habitats linking the designated sites. The Project Area supports a number of species that form part of the designations (e.g. *Centaurea hermannii* and spur-thighed tortoise) and it provides a habitat link between Bosphorus Region KBA, IBA and IPA and West Istanbul Pasture KBA and IPA to the east and the Terkos Basin KBA, IBA and IPA to the west.

Kucukcekmece Basin KBA, IBA and IPA

The Kucukcekmece Basin IBA and IPA is situated 6.5 km to the south of the Project Area. There will be no direct loss of habitat within the Internationally Recognised Area. In addition, due to the distance involved, any adverse indirect impacts from changes in air quality, the release of invasive species or disturbance during construction are unlikely. It is unlikely that construction works will cause runoff and pollution to enter the catchment of Kucukcekmece Basin. It is also unlikely that the changes in topography could alter the hydrology of the Kucukcekmece Basin. There are unlikely to be indirect impacts from fragmentation as the Project Area does not support the species for which the KBA is designated.

Table 7.8.46 Significance of Construction Impacts to Internationally Recognised Areas Prior to Mitigation

Site	Severity	Likelihood of Impact	Significance
Terkos Basin KBA, IBA and IPA	**Duration:** Permanent / long-term **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Agacli Sand Dunes KBA and IPA	**Duration:** Short-term **Extent:** Local **Reversibility:** reversible **Sensitivity of the receptor:** High **Severity:** High	Possible	Moderate (Adverse)
Bosphorus Region KBA, IBA and IPA	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
West Istanbul Pasture KBA and IPA	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Kucukcekmece Basin KBA, IBA and IPA	No discernible impacts **Sensitivity of the receptor:** High **Severity:** Negligible	Improbable	Negligible

Habitats Within the Project Area

The construction phase of the Project will require the removal of the majority of vegetation and freshwater habitats within the Project Area. This is a direct adverse impact that is permanent and irreversible. The area of each habitat affected is set out in Table 7.8.22. The loss of vegetation will also cause fragmentation to the remaining areas of habitats in the vicinity of the Project Area. In particular, it will remove a 10 km stretch of woodland habitat. Construction activities including vegetation clearance and topsoil stripping, creation of construction access roads, earthworks, and the construction of airport facilities has the potential to cause indirect adverse impact to surrounding habitats from runoff and dust. Without mitigation, runoff has the potential to introduce silt, nutrients and chemical contaminants, non-native species and disease into adjacent wetlands. Construction activities, the importation of fill and the

movement of people and vehicles can introduce invasive species that may impact the remaining adjacent habitats prior to the implementation of mitigation measures.

There will be no direct loss of marine offshore habitats as a result of the Project, although the immediate shoreline will likely be altered. The shoreline is already significantly modified and degraded as a result of mining activities and therefore these direct impacts are not significant. The de-watering of the water bodies will introduce large quantities of fresh water into the sea. Changes in salinity could cause local impacts to the marine species close to the discharge points, albeit these impacts will likely be temporary. More significant impacts to marine habitats will likely result from the large quantities of sediments and potential pollutants carried in water running off the construction site into the sea.

Table 7.8.47 Significance of Construction Impacts to Habitats Prior to Mitigation

Habitat	Severity	Likelihood of Impact	Significance
B1.3 - Shifting coastal dunes	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
C1.3 - Permanent eutrophic lakes, pond and pools	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
C2.5 - Temporary running waters	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
C3.2 - Water-fringing reedbeds and tall heleohytes other than canes	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
E3.4 - Moist or wet eutrophic and mesotrophic grassland	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
F5.4 - S*partium junceum* fields	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
G1.3 - Mediterranean riparian woodland	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High	Probable	High (Adverse)

Habitat	Severity	Likelihood of Impact	Significance
	Severity: High		
G1.7 - Thermophilous deciduous woodland	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
G3.F - Highly artificial coniferous woodland	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Marine habitats	**Duration:** Short-term **Extent:** Regional **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Probable	(High Adverse)

Threatened and Red List Plant Species

The construction phase of the Project will require the removal of the majority of vegetation within the Project Area which is known to support the populations of nine threatened and endemic plant species. Unless mitigated for, the removal of vegetation will cause direct mortality of individuals present . These are direct adverse impacts that have the potential to be permanent and irreversible. The removal of vegetation will also cause fragmentation to the remaining areas of habitats in the vicinity of the Project Area. In particular, as discussed above, it will cause a 10 km break in the band of woodland habitats that currently runs from the Bosphorus to the Bulgarian border and currently provides the habitat for eight of the threatened and endemic species. For several threatened and endemic plant species, this distance is sufficient to prevent seed dispersal and reduce pollination between sub-populations. This is likely to cause a long-term significant impact to these species. Unless mitigated for, the loss of the small area of shifting coastal dunes has the potential to increase the distance between the remaining populations of *Convolvulus persicus*, the nearest of which is 15 km to the east of the Project Area.

Construction activities across the Project Area, including vegetation clearance and top-soil stripping, creation of construction access roads, earthworks, and the construction of the airport facilities have the potential to cause indirect adverse impact to surrounding plant populations from runoff and dust. Construction activities, the importation of fill and the movement of people and vehicles can introduce invasive species and disease that may impact the remaining adjacent plant populations.

Table 7.8.48 Significance of Construction Impacts to Threatened and Red List Plant Species Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Lathyrus undulates	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Centaurea hermannii	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Cirsium polycephalum	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Euphorbia amygdaloides subsp. robbiae	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Galanthus x valentiei	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Ferulago confusa	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
Symphytum tuberosum subsp. Nodosum	**Duration:** Permanent **Extent:** Local	Probable	Low (Adverse)

Species	Impact Severity	Likelihood of Impact	Impact Significance
	Reversibility: Irreversible **Sensitivity of the receptor:** Low **Severity:** Low		
Convolvulus persicus	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Medium **Severity:** Low	Probable	Moderate (Adverse)
Lilium martagon	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)

Terrestrial Invertebrates

The construction phase of the Project will remove of the majority of vegetation within the Project Area including all of the woodland that supports saprophilic beetle species. The removal of vegetation has the potential to cause direct mortality of individuals present. These are direct adverse impacts that have the potential to be permanent and irreversible. The removal of vegetation will also cause fragmentation to the remaining areas of habitats in the vicinity of the Project Area. In particular, as discussed above, it will cause a 10 km break in the band of woodland habitats that currently runs from the Bosphorus to the Bulgarian border and is likely to support both *Cerambyx dux* and *Lucanus cervus*. Indirect adverse impacts such as runoff, impacts to air quality and disturbance are unlikely to significantly affect invertebrates.

Table 7.8.49 Significance of Construction Impacts to Invertebrates Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Cerambyx dux	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
Stag beetle	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)

Freshwater Fish

All of the existing water bodies within the Project Area will be dewatered and in filled. This will remove the entire available habitat within the Project area for freshwater fish. This direct adverse impact will be irreversible and permanent. Runoff from the Project Area has the potential to introduce silt, nutrients and chemical contaminants, non-native species and disease into adjacent watercourses, impacting their fish communities. The large change in land surface area could alter the hydrology of the surrounding catchments. Construction activities, the importation of fill and the movement of people and vehicles have the potential to introduce invasive species that may impact the habitats and species of the surrounding catchments.

Table 7.8.50 Significance of Construction Impacts to Freshwater Fish Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Wild common carp	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
Monkey goby	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)

Marine Fish

The de-watering of lakes and ponds will introduce large quantities of fresh water into the sea. Changes in salinity could cause local impacts to the marine fish species close to the discharge points. Unless controlled, more significant impacts to marine fish would result from the large quantities of sediments and potential pollutants carried in water running off the construction site into the sea. The increases in turbidity are unlikely to significantly affect adults of larger fish species, but they may smother their spawning grounds. Long-snouted seahorse is a small fish species that may be affected by sedimentation. Due to their low rates of reproduction and recolonisation, any impacts to its population and distribution has the potential to cause a long-term impact. There are unlikely to be significant noise disturbance effects to marine fish during the construction phase as works are not taking place in the sea.

Table 7.8.51 Significance of Construction Impacts to Marine Fish Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Red mullet	**Duration: S**hort-term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** Moderate	Possible	Low (Adverse)
European conger	**Duration: S**hort-term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** Low **Severity:** Low	Possible	Negligible
Long-snouted seahorse	**Duration:** Long-term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Possible	Moderate (Adverse)

Herptiles

The construction phase of the Project will remove of the majority of vegetation within the Project Area including the entire habitat that supports herptile species. The removal of vegetation will cause direct mortality of individuals present. These are direct adverse impacts that are permanent and irreversible. The removal of vegetation will also cause fragmentation to the remaining areas of habitats in the vicinity of the Project Area. In particular, it will cause a 10 km break in the band of woodland habitats. This will fragment the habitats that link together a number of Internationally Recognised Sites for reptiles. Indirect adverse impacts such as runoff, impacts to air quality and disturbance are unlikely to significantly affect herptiles.

Table 7.8.52 Significance of Construction Impacts to Herptiles Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Green toad	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
Eastern tree frog			
Eurasian marsh frog			
Agile frog			
Southern crested newt			

Species	Impact Severity	Likelihood of Impact	Impact Significance
Smooth newt			
Spur-thighed tortoise	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High Severity**:** High	Probable	High (Adverse)
European pond turtle	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity**: High	Probable	High (Adverse)
Balkan green lizard	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)
Green lizard			
Italian wall lizard			
Balkan wall lizard			
European legless lizard			
Slow-worm			
European copper skink			
Grass snake			
Tessellated water snake			
Eastern Four-Lined Ratsnake			
Caspian whip snake			

Birds

Large Soaring Migratory Birds

The construction period will dramatically change the topography within the Project Area. During the spring, large soaring migratory bird species currently cross the Bosphorus north of Istanbul and follow the line of hills westwards and across the Project Area. The line of hills is likely to provide navigational features for migratory birds. The removal of the hills is likely to significantly alter the pattern of thermals currently used by the birds. The creation of large areas of concrete may provide new surfaces from which thermals will be generated possibly increasing the attractiveness of the airport to large soaring migratory birds. The construction

activity and associated noise may cause disturbance to migrating birds. The combined impacts of these changes are difficult to predict and are likely to differ between species. However, these factors have the potential to cause indirect mortality due to increases in energy expenditure for flight, and decreased fecundity on breeding grounds due to birds arriving with poorer body condition having increased energetic expenditure and stress during migration.

Yelkouan Shearwater

The construction period is unlikely to cause any impacts to Yelkouan shearwater. There will be no direct impacts from construction to offshore flyways. Disturbance effects from construction activity is unlikely to extend much beyond 250 m offshore, which will not cause a significant impact to migrating Yelkouan shearwater.

Yellow-legged Gull

The construction phase of the Project will remove the larger water bodies from the Project Area, which are currently used to some extent by yellow-legged gulls for roosting. It will also lead to the closure of the municipal waste facilities at which the birds feed, as well as disturbance to the large roosts area along the shoreline. However, it is likely that this adaptable species will find some alternative sources of food and roost sites, especially if replacement municipal waste facilities are opened. However, a temporary impact is probable.

Wintering Bird Assemblage

All of the lakes and ponds will be dewatered and in filled during the construction phase of the Project. This will remove the entire suitable habitat for wintering waterbirds. This will be a permanent adverse impact that is irreversible.

Breeding Bird Assemblage

The construction phase of the Project will remove of the majority of vegetation within the Project Area including the entire breeding bird habitat. This will be a permanent adverse impact that is irreversible. This will be a permanent adverse impact that is irreversible.

Table 7.8.53 Significance of Construction Impacts to Birds Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Large soaring migratory birds	**Duration:** Permanent **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Possible	Moderate (Adverse)
Yelkouan shearwater	No discernible impact	Improbable	Negligible
Yellow-legged gull	**Duration:** Short-term **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** Moderate	Probable	Moderate (Adverse)

Species	Impact Severity	Likelihood of Impact	Impact Significance
Wintering bird assemblage	**Duration:** Permanent **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Breeding birds assemblage	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)

Terrestrial Mammals

The construction phase of the Project will remove of the majority of vegetation within the Project Area including the entire habitat that supports mammal species. This includes a small population of lesser mole rat within the Terkos Basin KBA. The removal of vegetation will cause direct mortality of individuals present. This has the potential to result in direct adverse impacts that are permanent and irreversible. The removal of vegetation will also cause fragmentation to the remaining areas of habitats in the vicinity of the Project Area. In particular, it will cause a 10 km break in the band of woodland habitats. This will fragment the habitats utilised by wide ranging species such as gray wolf and wild cat. Disturbance from construction noise and activity is likely to increase the fragmentation effects from habitat loss as many larger terrestrial mammals avoid humans. This could in turn affect the viability of large and medium sized mammal species over a much wider area than the Project Area. Indirect adverse impacts such as runoff and impacts to air quality are unlikely to significantly affect mammals.

Table 7.8.54 Significance of Construction Impacts to Terrestrial Mammals Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Lesser mole rat	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Medium **Severity:** Moderate	Probable	Moderate (Adverse)
Eurasian red squirrel	**Duration:** Permanent **Extent:** Regional	Probable	Moderate (Adverse)
Whiskered bat			
Wild boar			

Species	Impact Severity	Likelihood of Impact	Impact Significance
European roe deer	**Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Moderate		
Wild cat			
Gray wolf			
Beech marten			
European badger			

Marine Mammals

The de-watering of water bodies will introduce large quantities of fresh water into the sea, although this is unlikely to cause more than a temporary impact to cetaceans. Runoff from the Project Area during construction has the potential to introduce large quantities of sediment and potential pollutants into the sea. The increases in turbidity are unlikely to significantly affect cetaceans directly, but may indirectly affect the availability of fish prey populations in the short term. There are unlikely to be significant disturbance effects to cetaceans during the construction phase as works are not taking place in the sea.

Table 7.8.55 Significance of Construction Impacts to Marine Mammals Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Cetaceans: Short-beaked common dolphin Common bottlenose dolphin Harbour porpoise	**Duration:** Short term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** Moderate	Possible	Low (Adverse)

7.8.5.3 Airport Operation

Internationally Recognised Areas

Terkos Basin KBA, IBA and IPA

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to the Terkos Basin KBA, IBA and IPA from habitat loss or direct mortality. Once the wetland habitats from within the Project Area are removed, it will dissuade wintering waterbirds from the Terkos Basin entering the site where they will be at risk of bird strike.

Many studies have shown that aircraft can cause disturbance to wildlife and especially birds (Ref. 7.8.70). The disturbance is caused both by the noise generated by the aircraft and visual cues, which are thought likely to stimulate an anti-predator response. Predicting the disturbance impact on birds from aircraft is very difficult as the level of disturbance is known to vary according to a wide range of factors including: bird species, flock size, type of aircraft,

proximity and frequency of aircraft, the landscape setting, and interaction with other sources of disturbance.

There are no international guidelines on the noise disturbance thresholds for wildlife, and the evidence from studies into noise thresholds for effects on birds is complicated by the different units of measurement cited. **Chapter 7.3 Noise** describes noise modelling undertaken for the Project with respect to human receptors. Whilst it is acknowledged that noise limits for humans are not necessarily directly applicable to wildlife receptors, it provides a useful indication of the potential zone of influence. Noise contour plots in the annexes to **Chapter 7.3 Noise** show the greatest noise effects to the Terkos Basin KBA, IBA and IPA will occur in earlier phases of the Project, reducing as additional runways move air traffic further eastwards. For all of the scenarios, Lake Terkos is situated beyond the >55 dBA contour boundary (>55 dBA night is the most stringent noise standard for human receptors under the Turkish Environmental Noise Regulation). There is evidence that noise levels over >55 dBA can cause disturbance in birds (Ref. 7.8.71). During the early phases of the Project, a small portion of the Terkos Basin KBA, IBA and IPA will be affected by noise. However, Lake Terkos is over 2 km from the boundary of the Project Area, and does not occur under the flight paths of the aircraft. Therefore, it is considered unlikely that disturbance from aircraft will significantly affect birds utilising the lake.

An increase in night time lighting is unlikely to affect receptors beyond 2 km, although this will impact those areas within the Terkos Basin KBA, IBA and IPA adjacent to the Project Area.

According to **Chapter 7.2 Air Quality**, due to the prevailing winds, the dispersion of airbourne pollutants is mainly to the north-west and the south-east of the Project Area. By 2042, raised levels of NO_2 and SO_2 will affect significant parts of the Terkos Basin KBA, IBA and IPA, including Lake Terkos. .

The airport will create a large impermeable surface area and a drainage network that will affect the local hydrology. It is possible that these changes in hydrology may adversely affect the Terkos Basin Catchment.

Agacli Sand Dunes KBA and IPA

The fixed dune habitat that supports threatened and endemic plant species occurs approximately 1 km from the Project Area. Indirect adverse impacts are possible from impacts to noise, air quality and increases in artificial lighting during the operation of the airport. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that the Agacli Sand Dunes KBA and IPA is situated within the >55 dBA night contour boundary for Phase 4 of the Project. Whilst this has the potential to disturb birds and mammals, it will not disturb plants species that are the qualifying features of interest in the KBA/IPA. Fixed dune habitats are vulnerable to a range of air-borne pollutants, especially nitrogen. **Chapter 7.2 Air Quality** provides the results from modelling to changes in air quality as a result of the Project. Based on the modelling results, it is unlikely that Agacli Sand Dunes KBA and IPA will suffer from elevated levels of NO_2 and SO_2.

It is unlikely that changes in hydrology will affect the Agacli Sand Dunes KBA and IPA.

Bosphorus Region KBA, IBA and IPA

The Bosphorus Region KBA, IBA and IPA is situated 2.3 km to the south-east of the Project Area, outwith the main flightpaths of aircraft. Due to the distances involved, there are unlikely to be any adverse indirect impacts during the operational phase from changes in air quality, the release of invasive species or disturbance. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that the Bosphorus Region KBA, IBA and IPA is situated beyond the >55 dBA

night contour boundary and therefore, it is unlikely that noise impacts will be significant. **Chapter 7.2 Air Quality** provides the results from modelling to changes in air quality as a result of the Project and shows that the Bosphorus Region KBA, IBA and IPA will not suffer from elevated levels of airbourne pollutants.

West Istanbul Pasture KBA and IPA

West Istanbul Pasture KBA and IPA is 6 km to the south from the Project Area, outwith the main flightpaths of the aircraft. Due to the distances involved, there are unlikely to be any adverse indirect impacts during the operational phase from changes in air quality or release of invasive species. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that a small portion of the West Istanbul Pasture KBA and IPA may be situated within the >55 dBA night contour boundary. Whilst this has the potential to disturb birds and mammals, it will not disturb plants, invertebrates or reptiles which are the qualifying features of interest in the IPA. **Chapter 7.2 Air Quality** provides the results from modelling to changes in air quality as a result of the Project and shows that the West Istanbul Pasture KBA and IPA will not suffer from elevated levels of airbourne pollutants.

Kucukcekmece Basin KBA, IBA and IPA

The Kucukcekmece Basin KBA, IBA and IPA is situated 6.5 km to the south-east of the Project Area. Although the Kucukcekmece Basin KBA, IBA and IPA is at a quite a distance, the site is situated on the southerly flight paths from the airport. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that a small part of the Kucukcekmece Basin KBA, IBA and IPA is situated within >55 dBA night contour boundary. However, the >55 dBA night contour boundary does not extend as far as the main water bodies within the Kucukcekmece Basin KBA, IBA and IPA. Therefore, it is unlikely that noise and visual disturbance impacts may be significant on the internationally important bird populations supported by the site. Due to the distance involved, there are unlikely to be any adverse indirect impacts from changes in air quality or release of invasive species. **Chapter 7.2 Air Quality** provides the results from modelling to changes in air quality as a result of the Project and shows that the Kucukcekmece Basin KBA, IBA and IPA will not suffer from elevated levels of airbourne pollutants.

Table 7.8.56 Significance of Operational Impacts to Internationally Recognised Areas Prior to Mitigation

Site	Severity	Likelihood of Impact	Significance
Terkos Basin KBA, IBA and IPA	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Possible	Moderate (Adverse)
Agacli Sand Dunes KBA and IPA	**Duration**: Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Unlikely	Low (Adverse)
Bosphorus Region KBA, IBA and IPA	**Duration:** Long-term **Extent:** Local	Unlikely	Low (Adverse)

Site	Severity	Likelihood of Impact	Significance
	Reversibility: Irreversible **Sensitivity of the receptor:** High **Severity:** High		
West Istanbul Pasture KBA and IPA	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Unlikely	Low (Adverse)
Kucukcekmece Basin KBA, IBA and IPA	**Duration:** Long-term **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Unlikely	Low (Adverse)

Habitats

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts from habitat loss. There will be localised indirect impacts to the remaining habitats surrounding the Project Area from disturbance, changes in air quality and to the hydrology and the potential introduction of invasive species. It is not possible to quantify the area of different habitat types that will be affected by these indirect impacts. However, these impacts will affect habitats such as thermophilous deciduous woodland and the adjacent marine areas, both of which are of high sensitivity. The impacts will be long-term and irreversible. Therefore, the significance of the impacts to habitats during the operational phase is assessed as being high adverse prior to any mitigation.

Invertebrates

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to invertebrates from habitat loss. Invertebrates are unlikely to be significantly affected by indirect impacts. Therefore, the significance of the impacts to invertebrates during the operational phase is assessed as being negligible.

Fish

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to fish from habitat loss. Changes to hydrology in nearby watercourses could possibly impact their fish populations. The impact to fish is assessed as being of negligible significance.

Herptiles

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to herptiles from habitat loss. Herptiles are unlikely to be significantly affected by indirect impacts during the operational phase. Therefore, the significance of the impacts to herptiles during the operational phase is assessed as being negligible.

Birds

Large Soaring Migratory Birds

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to birds from habitat loss. However, the operational airport will pose a risk of direct mortality or injury in the event of bird strikes with aircraft and airport infrastructure (e.g. collisions with control tower, aerials, power lines, etc.).

The operational airport may also cause indirect mortality due to increases in the birds' energy expenditure caused by birds having to fly further to avoid the airport and associated aircraft activity. The large soaring birds will not fly over the Black Sea (as there are no thermals over the sea) and therefore birds may be forced to the south and into the urban areas of Istanbul). Noise contour plots in the annexes to **Chapter 7.3 Noise** show that the >65 dBA daytime contour boundary extends for approximately 5 km south of the Site boundary. This is modelled at ground level, and therefore noise levels experienced by birds flying at altitudes of several hundred metres (and therefore closer to aeroplanes taking off) will extend well beyond this. Many field studies have shown that birds are significantly more sensitive to disturbance from aircraft than surface based disturbance (i.e. cars, boats and people). In attempt to avoid aeroplane noise and movement, birds may also get lost or disorientated. This has the potential to increase their energetic expenditure or cause higher indirect mortality from increased collisions with non-airport infrastructure and buildings. Birds may also become more vulnerable to predation and hunting as a result. Birds may suffer decreased fecundity on breeding grounds due to birds arriving with poorer body condition having increased energetic expenditure and stress during migration.

Yelkouan Shearwater

The flightpaths of aircraft extend out over the Black Sea to the north of the Project Area, directly across the main migratory routes used by yelkouan shearwater. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that the >65 dBA daytime contour boundary extends for approximately 5 km north of the airport boundary. During the night, this more than doubles to beyond 10 km from the shore. Over 100 km^2 of sea area will be affected by noise levels exceeding >55 dBA during the night. This has the potential to cause a significant barrier for the migratory movements of this species.

Yellow-Legged Gull

Once the existing habitat has been removed during the construction phase, a large proportion of the current population of yellow-legged gulls is likely to no longer frequent the vicinity of the Project. Whilst those birds that remain will be at risk of bird strike with aircraft and disturbance, this is unlikely to cause a significant effect to the population of birds.

Wintering Bird Assemblage

Following the removal of wetland habitats during the construction phase, the Project Area will no longer support wintering waterbirds. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that Lake Terkos is situated beyond the >55 dBA night contour boundary and therefore unlikely to be affected by noise disturbance. Although the noise contour plots show that small part of the Kucukcekmece Basin KBA, IBA and IPA is situated within >55 dBA night contour boundary, no significant waterbodies will be affected. Therefore, noise impacts are unlikely to be significant on the internationally important wintering bird populations supported by this site.

Breeding Bird Assemblage

Noise contour plots show that a large area of terrestrial habitats will be affected by noise disturbance, particularly to the south of the airport. Many studies have suggested that chronic noise pollution adversely impact breeding bird communities and their breeding success (e.g. Ref. 7.8.72 and Ref. 7.8.73). Therefore, it is probable that disturbance will significantly impact breeding birds surrounding the airport.

Table 7.8.57 Significance of Operational Impacts to Bird Species Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Large soaring migratory birds	**Duration:** Long-term **Extent:** International **Reversibility:** Irreversible (with migration) **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)
Yelkouan shearwater	**Duration:** Long-term **Extent:** International **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Possible	Moderate (Adverse)
Wintering bird assemblage	**Duration:** Long-term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Unlikely	Low (Adverse)
Breeding birds assemblage	**Duration:** Long-term **Extent:** Local **Reversibility:** irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Probable	Low (Adverse)

Terrestrial Mammals

Once construction has been completed, the operational phase of the airport is unlikely to cause any additional direct impacts to mammals from habitat loss. Noise contour plots in the annexes to **Chapter 7.3 Noise** show that a large area of terrestrial habitats will be affected by noise disturbance, particularly to the south of the airport. Whilst smaller species of mammal may not be significantly affected by disturbance, larger and more reclusive species such as grey wolf and wild cat are likely to avoid the vicinity of the airport. This will increase the barrier effect caused by the habitat loss and has the potential to isolate populations that currently span the Project Area. Therefore, the significance of the impacts to terrestrial mammals during the operational phase is assessed as being low adverse prior to mitigation.

Marine Mammals

The flightpaths of aircraft extend out over the Black Sea to the north of the Project Area. Aircraft produce noise at frequencies that are within the hearing frequency range of cetaceans and also produce visual disturbance cues, both from the aircraft itself and from its shadow. Disturbance to cetaceans caused by aircraft have been recorded in a number of studies (e.g. Ref. 7.8.74). The effects of disturbance from aircraft are known to vary according to species, group size, life stage (e.g. mothers with calves) water depth, behaviour prior disturbance, aircraft type and flight altitude. With respect to noise disturbance, marine mammals are known to be affected not only by the instantaneous levels of sound at various frequencies, but also by longer term cumulative exposure. Therefore, predicting impacts of disturbance is complex. Whilst it is acknowledged that noise limits for humans are not necessarily directly applicable to wildlife receptors, it provides a useful indication of the potential zone of influence.

Noise contour plots show that the >55 dBA daytime contour boundary extends for approximately 5 km north of the airport boundary. During the night, this more than doubles to beyond 10 km from the shore. Over 100 km^2 of sea area will be affected by noise levels exceeding >55 dBA during the night. These noise levels are those likely to occur at the sea surface. However, noise is able to transfer from the air into the water column through four principal pathways:

- Direct path – Where the sound path is refracted sharply toward the horizontal because of the rapid increase in the speed of sound in the more dense water medium. Sound then travels as a longitudinal wave though the water column;
- Reflected path – In shallow water the direct path for steeper angles of propagation is likely to be interrupted by the sea bed which may act as a reflective surface (depending on sediment type and frequency);
- Sediment refracted path - sound can penetrate the sea bed sediment and follow a refracted path through that sediment; and
- Surface path - Energy propagates in the form of Evanescent waves along the sea surface where the incident in-air wave arrives at any angle.

This has the potential to cause a significant barrier for the movements of cetaceans and reduce the access of the marine habitats by these species. The most likely impacted species are short-beaked common dolphin and harbour porpoise as these tend to utilise coastal waters.

Table 7.8.58 Significance of Operational Impacts to Marine Mammals Prior to Mitigation

Species	Impact Severity	Likelihood of Impact	Impact Significance
Cetaceans: Short-beaked common dolphin Common bottlenose dolphin Harbour porpoise	**Duration:** Long term **Extent:** Regional **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Probable	High (Adverse)

7.8.6 Mitigation and Residual Impacts

The following section details the mitigation strategy to avoid, reduce and offset potential impacts from the Project. Residual impacts following the implementation of the mitigation strategy are assessed. In addition, a summary is provided on the extent to which the Project meets these IFC PS6 requirements in relation to natural and critical habitats. Central to the mitigation measures will be the development and implementation of a Biodiversity Action Plan (BAP). The Project BAP will be developed to describe how the Project will meet IFC PS requirements for no net loss of biodiversity within natural habitats, and net gain requirements for features that confer critical habitat. The BAP will also include the necessary offset strategies, and will provide a framework for a long-term biodiversity monitoring and evaluation programme. Development of the BAP will follow relevant internationally-recognised practices, in particular the Principles on Biodiversity Offsets (Ref. 7.8.75) developed by the Business and Biodiversity Offset Programme (BBOP). The BAP will utilise adaptive management processes and consultation with stakeholders on topics of conservation related to the Project's biodiversity interests. This emphasises the fact that a BAP is a long term live process that will be initiated during the Construction Phase, but likely continue for the lifetime of the Project. In accordance with an independent report on offsets, the Project offset strategy will conform to the following principles:

1. *Additionality - requires that offset gains are caused by offset actions and not by other factors. In other words, the offset gains will not have happened in business-as-usual scenarios.*
2. *Equivalency - requires that the balance of losses and gains represents a fair exchange. This requires quantitative measurement of losses and gains to biodiversity and the scaling of compensatory gains. This includes consideration of trading systems such as like-for-like and like for better/"trading up".*
3. *Permanence (or longevity) - refers to ensuring that gains last at least as long as impacts.*

For each habitat or species included in the offset programme, a suitable metric will be selected to quantify the losses and gains. Once the relevant metric is selected, adjustments will be made to ensure a fair exchange or equivalency is achieved including equivalency in space, equivalency in time, and measures to address uncertainty and risk.

7.8.6.1 Earthworks and Construction

General Measures

A set of general mitigation measures will be implemented during the construction phase to protect ecological receptors. These include:

- Strict limitation of construction workers, materials and machinery to the defined construction areas to avoid impacts to surrounding habitats;
- Project workers will not be allowed to bring any live animals or plants into the construction site to avoid the risk of pest/invasive species establishing in the Project Area;
- An invasive species risk assessment will be undertaken. If the findings indicate there is a significant risk of introducing alien invasive species then appropriate mitigation will be implemented;
- In-line with GIIP, all construction sites will have appropriate sediment and erosion control practices applied. This will minimise the runoff associated with disturbance at

construction areas and limit the likelihood of any effects on receptors remote from the immediate vicinity of the works;

- Project workers will be trained in litter/waste control procedures and fire emergency response procedures. This will reduce the risk of accidental fires in surrounding vegetation. Suitable firefighting equipment will be made available on site. Emergency response plans will be developed and coordinated with the relevant national authorities;
- The lighting of fires and open burning will be strictly prohibited at all times during construction;
- Project workers will be forbidden from hunting or collecting wild plants and animals;
- The use of herbicides will be forbidden on-site;
- Any artificial lighting will be carefully located and directed to avoid light spill into adjacent vegetation areas;
- Measures to reduce the potential for soil runoff and scouring of bare soil following vegetation clearance;
- Measures to reduce noise (see **Chapter 7.3 Noise** for details on specific mitigation measures);
- Measures to reduce dust and air pollution (see **Chapter 7.2 Air Quality** for details on specific mitigation measures); and
- Only the designated access roads will be used to access the construction areas. Machinery shall not be allowed to move outside these access roads and construction areas. Traffic during the Operational Phase shall travel along designated routes, marked with clear and lasting markings.

Environmental and Social Management Plan (ESMP)

A framework ESMP has been developed for the Project and explains how environmental and social commitments have been captured from the ESIA to ensure they are implemented during the construction and operational phases. This framework will form the basis for subsequent, more detailed management plans or programmes (including a Pollution Prevention Plan) that will be prepared and/or implemented by IGA and/or the EPC contractor. The detailed management plans will be developed to detail mitigation measures to be applied for the Project.

Ecological Clerk of Works (ECoW)

A suitably qualified ECoW will be appointed by the Project, independent of the construction site contractors, for the entire duration of the Construction phase of the Project. The ECoW will be tasked with overseeing construction activity and with ensuring that all mitigation measures are implemented in accordance with the framework ESMP and associated documentation. Furthermore, the ECoW will be given the responsibility of compiling weekly / monthly reports on issues such as non-compliance and on modification or supplementation of the framework ESMP, and these reports will be submitted to the Project management and to the construction contractor.

Due to the large scale of the Project, the ECoW should be supported by a team of specialists (e.g. botanists and zoologists) as necessary to assist him/her in monitoring the implementation of the framework ESMP by contractors and assisting with mitigation where necessary.

In addition, the ECoW will monitor for the presence of alien invasive species.

Site Personnel Training

Information on the ecological sensitivity of the habitats and species surrounding the Project Area will be included within a site induction package for all site personnel. This will ensure that all personnel working on site are aware of the sensitivities of the protected sites, habitats and species and are aware of the mitigation measures that need to be employed to minimise adverse effects of the Project.

Internationally Recognised Areas

Terkos Basin KBA, IBA and IPA

The habitat loss from the Terkos Basin KBA, IBA and IPA will be offset through the creation of compensatory habitats elsewhere within the designated site area to be delivered through the Project BAP. Where possible, these will be made suitable for the Threatened and endemic species affected by the Project:

- *Centaurea hermanii;*
- *Cirsium polycephalum*;
- spur-thighed tortoise;
- European pond turtle; and
- lesser mole rat.

If net gains in these species are not possible through habitat creation, other conservation mechanisms will be developed as part of the BAP.

The offset scheme will also need to compensate for the losses of wintering waterbird habitat that currently provide supporting habitat to the IBA. To meet IFC PS6, the offset scheme will need to be developed to ensure that a net gain in the features that confer critical habitat status.

The following monitoring will be implemented within the Terkos Basin KBA, IBA and IPA*:*

- monitoring of potential construction generated impacts within the Internationally Recognised Area (e.g. dust, runoff, siltation);
- monitoring of the water levels within Lake Terkos and tributary streams for signs of impacts to hydrology; and
- monitoring of wintering bird populations throughout construction period, including observations of any potential disturbance.

An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

Agacli Sand Dunes KBA and IPA

The following monitoring will be implemented within the Agacli Sand Dunes KBA and IPA*:*

- monitoring of potential construction generated impacts within the Internationally Recognised Area (e.g. dust, air quality); and
- monitoring of rare plant populations throughout construction period.

An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

Bosphorus Region KBA, IBA and IPA and West Istanbul Pasture IPA

A research programme will be implemented through the Project BAP to investigate the potential for loss of habitat from within the Project Area to cause an indirect adverse impact through fragmentation on spur-thighed tortoise and European pond turtle. This will include a survey of the current distribution of spur-thighed tortoise and European pond turtle, both within the KBAs and the intervening habitats. In addition, a survey will be made of the existing barriers to movements between these sites such as roads, urban areas, watercourses. Genetic testing might be carried out to investigate the current levels of gene flow between populations. The results of these investigations will inform the development of an offset strategy to re-establish links between the KBAs.

Habitats

The Master Plan will be reviewed to assess whether it is possible to avoid loss of natural habitat around the edge of the Project Area. In particular, it may be possible to avoid and protect an area of thermophilous deciduous woodland on the western boundary of the Project Area. It may also be possible to avoid and protect the area of shifting coastal dunes, close to the northern boundary of the Project Area. If any habitats are retained, these will be clearly demarcated and protected from construction activity.

The habitat loss from the Project Area will be offset through the creation of compensatory habitats, delivered through the Project BAP. The offset strategy will be devised to achieve no net loss of natural habitats and a net gain of critical habitats. Three natural habitats will require offsetting: thermophilous deciduous woodland, Mediterranean riparian woodland and shifting coastal dunes.

Chapter 7.6 Forestry details some woodland planting likely to take undertaken by the Government. However, at the current time it is not clear whether this planting will create new forests or will just constitute replanting of recently harvested areas as part of normal forestry practice. It is likely that the forest planting undertaken by the government will comprise non-native conifer plantations that do not constitute natural habitat suitable as an offset. It is also not clear whether this planting will take place anyway, in the absence of the Project and that the Government will not double fund planting from other projects. At the current time it is assumed that the Project offset strategy will be independently devised and implemented by the Project

The landscaping within the INA will only use native species of plants. Where possible, the landscaping will be used for the creation of high value habitats (within constraints of air safety). In particular, the surface soil layer between run-ways will be established using sand of a similar physical nature to that found within the Agacli Sand Dunes. Seeds will be collected from the Agacli Sand Dunes, with the aim of creating large areas of similar habitat capable of supporting the rare and endemic plants found within the IPA.

The Project BAP will include a detailed monitoring plan to cover the establishment of compensatory habitat to ensure that the desired results are achieved. An adaptive management system will be used to review the results of the monitoring and determine if additional habitat management or creation measures are required to adequately offset impacts.

Prior to construction, a comprehensive survey of marine habitats will be undertaken to provide a baseline for monitoring of impacts through the construction period. The water quality offshore will also be monitored. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation to reduce impacts is required.

Threatened and Endemic Plant Species

A number of mitigation measures for threatened and endemic plant species will be implemented pre-construction:

- Seeds (and other reproductive parts) of threatened and endemic plant species will be collected and given to National Gene Bank in Ankara for long-term storage and potential future use in habitat creation;
- Bulbs of endemic species *Galanthus x valentinei*, which has economic potential and bulbs of non-endemic plants *Lilium martagon* and *Nectaroscodum siculum subsp. Bulgaricum*, which are used as ornamental collection will be collected and transferred to similar habitats outside the Project Area; and
- Coastal sand dune area where *Convolvulus persicus* is located will be protected during construction by fencing and the long-term avoidance of this habitat will be investigated.

Additional measures will be developed as part of the Project offset strategy, devised to achieve a net gain of species that confer critical habitats:

- *Lathyrus undulates;*
- *Centaurea hermannii;*
- *Cirsium polycephalum;*
- *Euphorbia amygdaloides subsp. Robbiae; and*
- *Galanthus x valentiei.*

Where possible, the landscaping within the airport will be used for the creation of high value habitats (within constraints of air safety). In particular, the surface soil layer between run-ways will be established using sand of a similar physical nature to that found within the Agacli Sand Dunes. Seeds will be collected from the Agacli Sand Dunes, with the aim of creating large areas of similar habitat capable of supporting the rare and endemic plants found within the IPA.

The Project BAP will include a detailed monitoring plan to cover the establishment of compensatory habitat creation for threatened and endemic plant species to ensure that the desired results are achieved. An adaptive management system will be used to review the results of the monitoring and determine if additional habitat management or creation measures are required to adequately offset impacts and deliver a net gain for species that confer critical habitat status.

Invertebrates

The impacts to invertebrates, including saprophilic beetle species from habitat loss will addressed through the creation of compensatory habitats through the offset strategy for thermophilous deciduous woodland. If possible, compensatory planting will take place in suitable areas to replace habitat corridors lost due to vegetation clearance.

Freshwater Fish

The Project Pollution Prevention Plan will detail measures to prevent runoff from the Project Area. In particular, measures will be employed to avoid silt, nutrients and chemical contaminants, non-native species and disease into adjacent watercourses.

Marine Fish

The water quality offshore will be monitored throughout construction, as will sedimentation effects on the seabed. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation to reduce impacts to marine fish are required. Any impacts on red mullet and long-snouted seahorse will need to be addressed through the Project BAP.

Herptiles

The direct impacts to herptiles from habitat loss will be addressed through the creation of compensatory habitats through the offset strategy for natural habitats.

To reduce direct mortality of herptiles vegetation clearance will be avoided during the hibernation period (October-March inclusive). Prior to vegetation clearance, a detailed search will be made of the area by a team of ecologists for spur-thighed tortoise. The dewatering of lakes and ponds will also be supervised by a team of ecologists to rescue European pond turtles. Any animals found will be removed to a pre-established long-term captive housing facility. The aim of the facility will be to maintain the captured animals in a good state of health, until such a time that sufficient compensatory habitat has been created through the offset strategy, into which the animals can be re-introduced into the wild.

Fragmentation effects will be addressed through the research programme described above in relation to the current distribution of spur-thighed tortoise and European pond turtle, both within the surrounding KBAs and the intervening habitats. The results of these investigations will inform the development of an offset strategy to re-establish links between the reptile populations of the KBAs.

Birds

Large Soaring Migratory Birds

Bird migration across the Project Area will be monitored in detail throughout the construction period. The monitoring will include the whole of the spring and autumn migration periods (spring: 1 March - 31 May, autumn: 1 August - 31 October). The methodology will build upon that employed during 2014. Sufficient observation points will be established to provide robust coverage of the entire width of the migration corridor that could be affected by the operational airport (including noise disturbance). The monitoring will be completed by experienced ornithologists. These observations will be supplemented through the use of radar that will aim to provide detailed data (e.g. flight height and direction) within the zone of potential bird strike by aircraft. This data will be used in collision models to quantify the probability of direct mortality of bird populations from bird strike. The data will also be used to monitor for signs of changes in bird migration patterns that could be attributed to construction disturbance.

The migrating populations of white stork; steppe buzzard; honey buzzard; lesser spotted eagle; black stork; short-toed snake eagle; greater spotted eagle; and eastern imperial eagle (and potentially booted eagle and Levant sparrowhawk) all confer critical habitat status. The migration ecology of these species are only partially known (e.g. breeding grounds, migration routes and timing, as well as wintering areas). A long-term research programme will be completed to investigate the migration ecology of these species to underpin the design of offset strategy and the Project BAP.

A net gain in these populations needs to be achieved. There is no precedent for such a scheme that will likely need to deliver conservation action for migratory species, located in multiple

regions across Europe and Africa. Appropriate conservation programmes will be explored and implemented through the Project BAP.

Yelkouan Shearwater

The coastal movements of yelkouan shearwater will be recorded in detail each year during the construction period to provide a robust baseline against which to monitor potential disturbance effects during the operational phase of the Project. The surveys will be completed predominantly by shore based observers, who will record the passage of birds on a daily basis. To investigate the potential links between birds passing the site, and onward movement through the Bosphorus a second daily observation point will be maintained at suitable location in the Bosphorus. The potential disturbance impacts to yelkouan shearwater may extend beyond 10 km offshore, well beyond the area visible from shore based observers. Therefore, a series of ship-based transects will be completed each month to provide information on the current width of the migration corridor.

The migrating population of yelkouan shearwater confers critical habitat status and therefore a net gain needs to be achieved. Mechanisms to achieve a net gain will be developed as part of the Project BAP. Suitable mechanisms could be the establishment of additional research programmes into this poorly understood species. Priorities should include investigating the location of potential yelkouan shearwater breeding locations around the Turkish coastline and investigating the link between non-breeding movements and fish prey populations in the Black Sea, through the use of satellite tracking.

Yellow-Legged Gull

The potential impacts to yellow-legged gull will be monitored throughout construction. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation to reduce impacts to this species are required. Any impacts on yellow-legged gull will need to be addressed through the Project BAP, including consideration of offsets.

Wintering Bird Assemblage

The Project offset strategy will develop measures to compensate for the losses of wintering waterbird habitat that currently provide supporting habitat to the Terkos Basin IBA and to deliver a net gain. Appropriate measures will be developed as part of the Project BAP.

The wintering bird populations within the Terkos Basin IBA will be monitored monthly throughout construction period, including observations of any potential disturbance. The annual monitoring period for wintering birds will cover October-March inclusive. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

Breeding Bird Assemblage

The direct impacts to breeding birds from habitat loss will be addressed through the creation of compensatory habitats through the offset strategy for natural habitats.

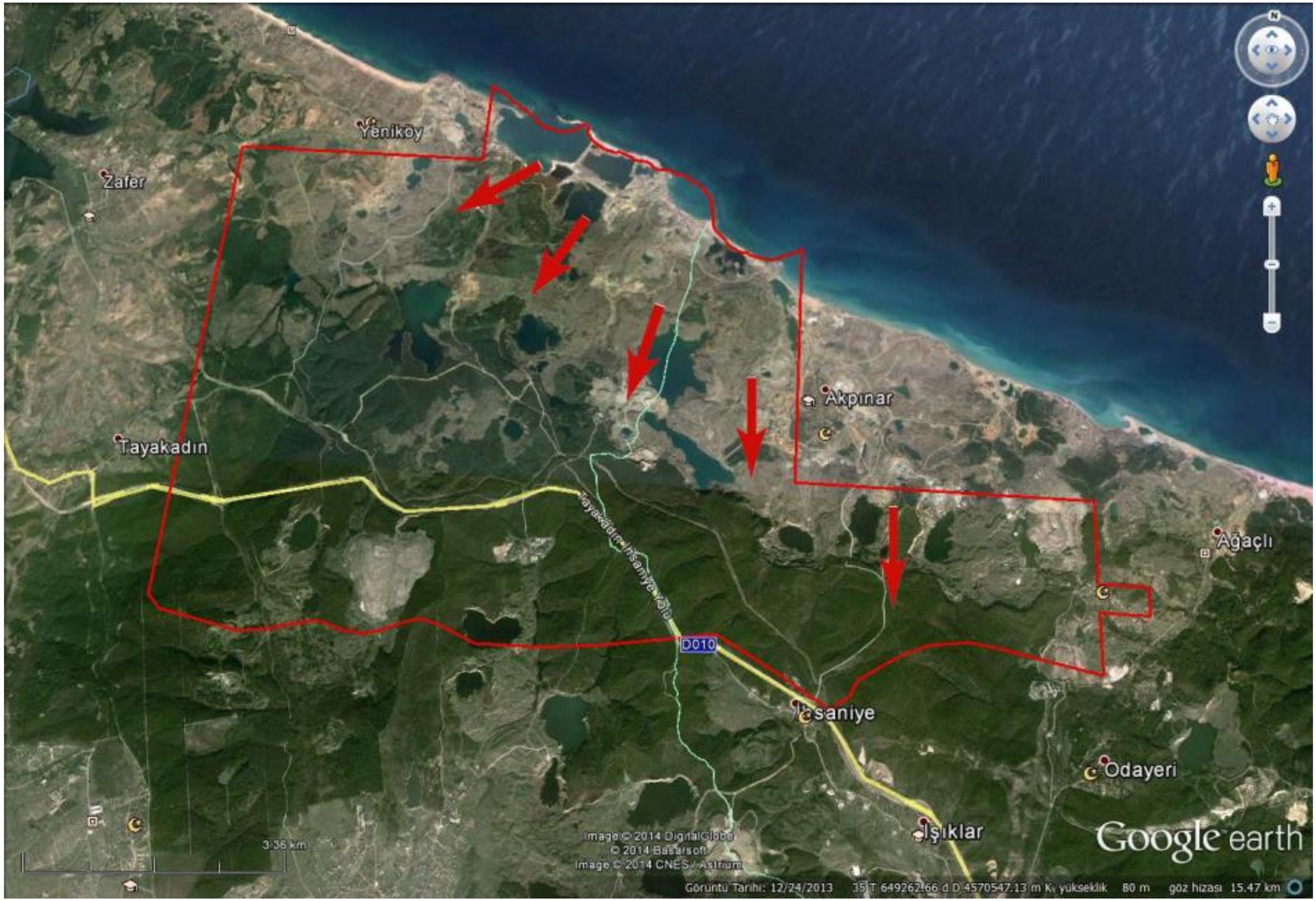
To reduce direct mortality of breeding birds, vegetation clearance will be avoided during the main breeding bird season (beginning of March until the end of June).

Terrestrial Mammals

To avoid large mammal species from being trapped during vegetation clearance, works will start at the seaward side of the Project Area and progress inland (Figure 7.8.30). This will

allow for the larger mammal species to move away from the area of vegetation works, into the surrounding habitats.

Figure 7.8.30 Directions of Vegetation Clearance Works



During the construction phase, a survey of the Terkos Basin will be completed to map the distribution of lesser mole rat to inform conservation programmes to be included in the Project BAP. The loss of the small population of lesser mole rat from the Terkos Basin KBA will be offset through the creation of compensatory habitats elsewhere within the designated site area. If net gains in this species are not possible through habitat creation, other conservation mechanisms will be developed as part of the Project BAP.

The Project offset strategy will aim to provide compensatory habitats to re-establish habitat links removed by vegetation clearance. This will likely benefit a range of species including mammals.

Marine Mammals

Prior to construction, a comprehensive survey of cetaceans will be undertaken to provide a baseline for monitoring of impacts throughout the construction period and for long-term monitoring through the operational phase. The survey will follow international guidelines for cetacean baseline surveys such as that produced by SNH and Marine Scotland (Ref. 7.8.76). The survey will focus on establishing the current population of these species and their use of the Project Area, including the entire sea area potentially affected by noise disturbance originating from the Project. As these species trigger critical habitat, a net gain in these populations needs to be achieved through the Project BAP. The water quality offshore will be monitored throughout construction as will sedimentation effects on the seabed. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation to reduce impacts are required. Any impacts on cetaceans will need to be addressed through the Project BAP.

7.8.6.2 Airport Operation

A range of mitigation measures to reduce effects from noise and air quality during the operational phase are detailed in the relevant chapters (**Chapter 7.2 Air Quality** and **Chapter 7.3 Noise**). Many of these are designed to reduce impacts to human receptors; however, many will also reduce impacts to ecological receptors as well. Specific additional mitigation measures to reduce impacts to ecological receptors are detailed in this section.

Internationally Recognised Areas

Terkos Basin KBA, IBA and IPA

Long-term monitoring of potential disturbance to wintering bird populations of the Terkos Basin KBA, IBA will be completed during operation, at least until the airport is running at full capacity. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

The offset strategy for features conferring critical habitat status initiated during the construction phase will continue to the implemented and monitored as part of the Project BAP throughout the operational phase. To deliver a net gain to this internationally recognised area the Project BAP will investigate potential measures that could be implemented to improve the conservation status of this site. Engagement with proponents of future developments will be completed with the aim of ensuring the area is maintained intact.

Agacli Sand Dunes KBA and IPA

Long-term monitoring of air-borne pollutants, especially nitrogen and changes in vegetation structure will be completed within the Agacli Sand Dunes KBA and IPA. An adaptive

management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

To deliver a net gain to this internationally recognised area the Project BAP will investigate potential measures that could be implemented to improve the conservation status of this unprotected site. Engagement with proponents of future developments will be completed with the aim of ensuring the area is maintained intact.

Bosphorus Region KBA, IBA and IPA, West Istanbul Pasture KBA and IPA and Kucukcekmece Basin KBA, IBA and IPA

To deliver a net gain to these internationally recognised areas, the Project BAP will investigate potential measures that could be implemented to improve the conservation status of these sites. Engagement with proponents of future developments will be completed with the aim of ensuring the areas are maintained intact.

Habitats

The Project offset strategy will take into account potential indirect impacts from disturbance, changes in air quality, changes to hydrology and the potential introduction of invasive species to deliver no net loss of natural habitats and a net gain in critical habitats.

Birds

Large Soaring Migratory Birds

The detailed monitoring and research programme into spring and autumn migration initiated during the construction phase will continue throughout the operational phase at least until the airport is at full capacity. The monitoring at the airport will include the recording of any visual signs of avoidance behaviour or disturbance caused by the operational airport. If changes in migratory routes are detected or suspected, the monitoring and research programme will be expanded to quantify these changes.

Within the airport, any instances of direct mortality from bird strikes with aircraft and airport infrastructure (e.g. collisions with control tower, aerials, power lines etc.) will be closely monitored through a robust reporting framework to include the facility maintenance staff, aircrews and aircraft maintenance teams. The numbers of birds involved, their species and nature of incident will be recorded (with the aid of genetic testing of body remains, if necessary). The impacts to the conservation status of the global populations of the species involved will be assessed and compensated for through the Project BAP.

A range of measures are employed at other airports to reduce bird strikes. Table 7.8.59 summarises these techniques and assesses their applicability for the Project. However, it must be noted that the aim of these measures are primarily to reduce risk to aircraft and not reduce impacts to bird populations. Therefore, Table 7.8.59 also details where the measure sits on the mitigation hierarchy of avoid, reduce or offset (if at all), in relation to ecological impacts. Some of the measures employed at other airports to reduce bird strike have a negative impact to bird populations and therefore cannot be considered to represent mitigation in accordance with IFC PS6.

Table 7.8.59 Review of Possible Measures to Reduce Birdstrike

Broad Technique	Methodology	Example Airports	Applicability to Migratory Birds / INA	Potential Efficacy	Mitigation Hierarchy
Habitat management	Long-grass policy. Removes short grass favoured by grazing geese and ducks	Numerous examples internationally	Very low numbers of geese and ducks in the vicinity of INA Project. Long grass can increase small rodent populations, attracting raptors.	Negligible – possibly will increase numbers of birds	Reduce
Habitat management	Use of grass varieties with low digestibility to deter grazing by grazing geese and ducks	Christchurch International, New Zealand Auckland International, New Zealand	Very low numbers of geese and ducks in the vicinity of the Project.	Negligible	Reduce
Habitat management	Removal of water bodies surrounding airport	Jamestown regional airport, North Dakota, US	Large migratory birds largely unaffected by presence of water bodies surrounding the Project. Will cause secondary negative impacts to ecology.	Low – negative impact to birds	Reduce
Habitat management	Removal of landfill sites	JFK, US	May slightly reduce effect of white storks being attracted to the vicinity of the Project to forage. However, will remove food source for migratory birds causing a secondary negative impact.	Low – negative impact to birds	Reduce
Bird Unfriendly Design	Worm-proof gutter design, concrete verges and anti-perch devices	RNLAF Twenthe, The Netherlands	Large migratory birds largely unaffected by airport design, but may be effective for smaller species.	Low / Moderate	Reduce
Catch and Release	Catch problem individuals and remove from the vicinity of the airport	Baltimore, US Logan, US	Completely unfeasible for 750,000 birds, mostly flying over site. Not suitable for migratory birds.	Negligible	Reduce

Broad Technique	Methodology	Example Airports	Applicability to Migratory Birds / INA	Potential Efficacy	Mitigation Hierarchy
Bird scaring	Use of raptors such as peregrine falcon.	Vancouver, Canada	Only effective on smaller bird species such as pigeons and starlings. Ineffective against other large raptors and storks.	Low	Reduce
Bird scaring	Acoustic hazing /bird alarm calls	Salt Lake City, US Sofia International Airport, Bulgaria	Likely to be unfeasible for 750,000 birds. Not suitable for migratory birds overflying airport. May be useful for gulls	Low	Reduce
Bird scaring	Dogs	Durban, Australia	Not suitable for migratory birds not stopping at airport	Negligible	Reduce
Bird scaring	Laser	Southampton, UK Schiphol, The Netherlands	Likely to be unfeasible for 750,000 birds	Low - Impact on birds unknown.	Reduce
Lethal Control	Removal of specific problem individuals after non-lethal techniques fail	Gatwick, UK Salt Lake City, US JFK, US (feral Canada geese)	Completely unfeasible for 750,000 birds. Cause highly negative impact to bird populations of international importance	Negligible – highly negative impact to birds	Not appropriate to be described as mitigation
Radar	Quantify problem (e.g. number of birds, direction and height)	JFK, US	Quantification of problem does not remove problem. Linking radar technology to action on the ground in development stage	Negligible	In isolation, not appropriate to be described as mitigation
Flight Management	Time flights to avoid migratory birds	Military bases in US and Israel	Between beginning March-May, this will place significant restrictions on flights between 9am-6pm	Highly effective	Avoidance
Flight Management	Alter flight paths to avoid migratory birds	Military bases in US and Israel	Unlikely to be feasible in large	Low/ Moderate	Avoidance

Broad Technique	Methodology	Example Airports	Applicability to Migratory Birds / INA	Potential Efficacy	Mitigation Hierarchy
			multi-runway commercial airport		

In summary, the majority of measures currently employed around the world to avoid bird strike address relatively small numbers of birds that are attracted either to the airport itself or habitats in the vicinity. In the case of large soaring migratory birds overflying the Project, the presence of large numbers is largely due to the geographic position of the Black Sea and the Mediterranean creating a bottleneck that funnels their movements into an area that is only 10-12 km in width. In the absence of being able to move the location of the airport out of this small area, the options to avoid impacts are limited. Shutting down the airport during daylight hours between March and May inclusive will be very effective in avoiding many of the potential negative impacts. With the use of radar, a reduced number of daylight flights during may be operated during the migration season. This may require the possible altering of flight paths to avoid flying birds. However, this will not affect the physical impacts of removing the line of hills along which the birds are currently following (due to the thermals and updrafts created by the hills). The new large expanse of concrete provided by the airport may replace the necessary thermals. However, if birds continue to migrate across the site during operation, birds will still be subject to the other potential impacts such as bird strike.

Unless effective avoidance mitigation such as partial airport closure during migration is undertaken, the residual impacts to large soaring migratory birds are likely to remain high. It will be unlikely that the requirements of IFC PS6 to cause no net loss could be met without the implementation of an appropriately designed offset scheme. There is no precedent for such a scheme that targets such a large number of threatened species with differing habitat requirements. It will also need to deliver research and conservation action located in multiple regions across Europe and Africa.

Yelkouan Shearwater

The detailed monitoring of Yelkouan shearwater migration, initiated during the construction phase will continue throughout the operational phase at least until the airport is at full capacity. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

Wintering Bird Assemblage

Long-term monitoring of potential disturbance to wintering bird populations of the Terkos Basin KBA and IBA will be completed during operation, at least until the airport is running at full capacity. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

Marine Mammals

The detailed monitoring of cetaceans, initiated during the construction phase, will continue throughout the operational phase at least until the airport is at full capacity. An adaptive management system will be used to review the results of the monitoring and determine if additional mitigation measures are required to avoid, reduce or offset impacts.

7.8.7 Summary of Residual Impacts

Due to the nature of the Project, its large land take, combined with minimal avoidance and mitigation options, the Project is heavily reliant on developing multiple offsetting strategies as part of a BAP. Offsets do not reduce the significance of the initial impacts, but instead attempt to compensate for the losses. According to IFC PS6, offsetting can be used to achieve no net loss of biodiversity (or a net gain in respect of critical habitat). Due to the large number and differing nature of the different receptors, as well as the large geographic scope over which offsets will need to operate (possibly including both Eurasia and Africa), there is uncertainty over their likely effectiveness. Also, the delivery of offsets is likely to be dependent on factors outside the control of the Project, such as the availability of suitable land on which to create new habitats. Until the offset strategies have been more fully developed and committed to, any assessment of residual impacts cannot take into account these strategies. Therefore, the significance of residual impacts do not include the compensatory actions that would be delivered through offsets. Table 7.8.60 summarises the residual impacts to ecological receptors.

Table 7.8.60 Summary of Residual Impacts

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Terkos Basin KBA, IBA and IPA	Construction	**Duration:** Permanent / long-term **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Review Master Plan to avoid and protect natural habitats within Terkos Basin. Offset Strategy Construction phase monitoring Adaptive environmental management system	Environmental and Social Management Plan (ESMP) Biodiversity Action Plan (BAP)	**High (Adverse)**
Ecology	Agacli Sand Dunes KBA and IPA	Construction	**Duration:** short-term **Extent:** Local **Reversibility:** reversible **Sensitivity of the receptor:** High **Severity:** High	Moderate Adverse	Construction phase monitoring Adaptive environmental management system	ESMP BAP	**Low (Adverse)**
Ecology	Bosphorus Region KBA, IBA and IPA	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High	High Adverse	Research Programme Offset Strategy	BAP	**High (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
			Severity: High				
Ecology	West Istanbul Pasture IPA	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Research Programme Offset Strategy	BAP	**High (Adverse)**
Ecology	Kucukcekmece Basin KBA, IBA and IPA	Construction	**No discernible impacts** **Sensitivity of the receptor:** High **Severity:** Negligible	Negligible	n/a	n/a	**Negligible**
Ecology	Natural Habitats: B1.3 - Shifting coastal dunes; G1.3 - Mediterranean riparian woodland; G1.7 - Thermophilous deciduous woodland	Construction	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Review Master Plan to avoid and protect natural habitats, especially thermophilous deciduous woodland and shifting coastal dunes. Offset Strategy Native Landscaping within airport Construction phase monitoring Adaptive environmental management system	ESMP BAP	**High (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Modified Habitats: C1.3 - Permanent eutrophic lakes, pond and pools; C2.5 - Temporary running waters; C3.2 - Water-fringing reedbeds and tall heleohytes other than canes; E3.4 - Moist or wet eutrophic and mesotrophic grassland; F5.4 - S*partium junceum* fields G3.F - Highly artificial coniferous woodland	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Low-High **Severity:** High	Low - High Adverse	Offset Strategy Native landscaping within airport Construction phase monitoring Adaptive environmental management system	ESMP BAP	**Low - High (Adverse)**
Ecology	Marine Habitats	Construction	**Duration:** Short-term **Extent:** Regional	High Adverse	Construction phase monitoring Adaptive environmental management system	ESMP BAP	**Low (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
			Reversibility: Reversible **Sensitivity of the receptor:** High **Severity:** High				
Ecology	Threatened and Endemic Plant Species	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Review Master Plan to avoid and protect natural habitats, especially thermophilous deciduous woodland and shifting coastal dunes. Offset Strategy Native Landscaping within airport Seed Collection and translocation Construction phase monitoring Adaptive environmental management system	ESMP BAP	**High (Adverse)**
Ecology	Invertebrates	Construction	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Low Adverse	Offset Strategy Adaptive environmental management system	BAP	**Low (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Freshwater Fish	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Low Adverse	ESMP to reduce runoff	ESMP	**Low (Adverse)**
Ecology	Marine Fish	Construction	**Duration:** Long-term **Extent:** Local **Reversibility:** Reversible **Sensitivity of the receptor:** High **Severity:** High	Low-Moderate Adverse	ESMP to reduce runoff Construction phase monitoring Adaptive environmental management system Offset Strategy (if required)	ESMP BAP	**Low (Adverse)**
Ecology	Spur-thighed tortoise	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High Severity: **High**	High Adverse	Vegetation clearance completed outside hibernation period Offset Strategy Adaptive environmental management system Capture, temporary housing and re-release into newly created habitat Research Programme	BAP	**Moderate (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	European pond turtle	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High Severity: **High**	High Adverse	Vegetation clearance completed outside hibernation period Offset Strategy Adaptive environmental management system Capture, temporary housing and re-release into newly created habitat Research Programme	BAP	**Moderate (Adverse)**
Ecology	Other Amphibian and Reptiles	Construction	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Low Adverse	Vegetation clearance completed outside hibernation period Offset Strategy Adaptive environmental management system	ESMP BAP	**Low (Adverse)**
Ecology	Large soaring migratory birds	Construction	**Duration:** Permanent **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Moderate Adverse	Construction Phase Monitoring Global conservation programmes Offset Strategy Adaptive environmental management system	BAP	**Moderate (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Yelkouan shearwater	Construction	**No discernible impact**	High Adverse	Construction Phase Monitoring Regional conservation programmes Offset Strategy Adaptive environmental management system	BAP	**Negligible**
Ecology	Yellow-legged gull	Construction	**Duration:** Short-term **Extent:** International **Reversibility:** Irreversible **Sensitivity:** High **Severity**: Moderate	High Adverse	Construction Phase MonitoringAdaptive environmental management system Offset Strategy (if required)	BAP	**Low-Moderate (Adverse)**
Ecology	Wintering bird assemblage	Construction	**Duration:** Permanent **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Construction Phase Monitoring Regional conservation programmes Offset Strategy Adaptive environmental management system	BAP	**High (Adverse)**
Ecology	Breeding birds assemblage	Construction	**Duration:** Permanent **Extent:** Local	Low Adverse	Vegetation clearance completed outside breeding season Offset Strategy	ESMP BAP	**Low (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
			Reversibility: Irreversible **Sensitivity of the receptor:** Low **Severity:** Low		Adaptive environmental management system		
Ecology	Lesser mole rat	Construction	**Duration:** Permanent **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Medium **Severity:** Moderate	Moderate Adverse	Survey of the Terkos Basin KBA Offset Strategy Adaptive environmental management system	BAP	**Moderate (Adverse)**
Ecology	Other terrestrial mammal Species	Construction	**Duration:** Permanent **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Moderate	Moderate Adverse	Phased vegetation clearance	ESMP	**Moderate (Adverse)**
Ecology	Cetaceans	Construction	**Duration:** Short term **Extent:** Local **Reversibility:** Reversible	Low Adverse	Construction Phase Monitoring Adaptive environmental management system Offset Strategy	BAP	**Low (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
			Sensitivity of the receptor: High **Severity:** Moderate				
Ecology	Terkos Basin KBA, IBA and IPA	Operational	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Moderate Adverse	Long-term monitoring Offset Strategy Adaptive environmental management system Engagement with proponents of future developments	BAP ESMP	**Low (Adverse)**
Ecology	Agacli Sand Dunes KBA and IPA	Operational	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Low Adverse	Long-term monitoring Adaptive environmental management system Engagement with proponents of future developments	BAP	**L Negligible**
Ecology	Bosphorus Region KBA, IBA and IPA	Operational	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Low Adverse	Engagement with proponents of future developments	BAP	**Negligible**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	West Istanbul Pasture IPA	Operational	**Duration:** Long term **Extent:** Regional **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Low Adverse	Engagement with proponents of future developments	BAP	**Negligible**
Ecology	Kucukcekmece Basin IBA and IPA	Operational	**Duration:** Long-term **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Low Adverse	Engagement with proponents of future developments Mitigation measures to reduce noise effects as set out in (Chapter 7.3 Noise)	BAP	**Negligible**
Ecology	Habitats	Operational	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Long-term monitoring Offset Strategy Adaptive environmental management	BAP	**High (Adverse)**
Ecology	Marine Fish	Operational	**Unlikely to cause additional impacts**	Negligible	n/a	BAP	**Negligible**
Ecology	Amphibians and Reptiles	Operational	**Unlikely to cause additional impacts**	Negligible	n/a	BAP	**Negligible**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Large soaring migratory birds	Operational	**Duration:** Long term **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	High Adverse	Adjusting airport operations to avoid daytime periods during migration Alter aircraft flight paths to avoid migrating birds Long term Population Monitoring Global conservation programmes Offset Strategy Adaptive environmental management system	Airport Operation Plan BAP	**High (Adverse)**
Ecology	Yelkouan shearwater	Operation	**Duration:** Long term **Extent:** International **Reversibility:** Irreversible **Sensitivity:** High **Severity:** High	High Adverse	Long term Population Monitoring Regional conservation programmes Offset Strategy Adaptive environmental management system	BAP	**High (Adverse)**

Topic	Receptor/ Beneficiary	Phase	Impact Categorisation	Potential Significance Prior to Mitigation	Design, Enhancement or Mitigation Measures	Management Plan	Residual Significance
Ecology	Wintering bird assemblage	Operational	**Duration:** Long term **Extent:** International **Reversibility:** Irreversible **Sensitivity of the receptor:** High **Severity:** High	Low Adverse	Long term Population Monitoring Adaptive environmental management system Mitigation measures to reduce noise effects as set out in (Chapter 7.3 Noise)	BAP	**Negligible**
Ecology	Breeding Bird Assemblage	Operational	**Duration:** Long-term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Low Adverse	n/a	n/a	**Low (Adverse)**
Ecology	Terrestrial Mammals	Operational	**Duration:** Long term **Extent:** Local **Reversibility:** Irreversible **Sensitivity of the receptor:** Low **Severity:** Low	Low Adverse	n/a	n/a	**Low (Adverse)**
Ecology	Cetaceans	Operational	**Duration:** Long term **Extent:** Regional **Reversibility:** Reversible	High Adverse	Long term Population Monitoring Regional conservation programmes Offset Strategy	BAP	**High (Adverse)**

			Sensitivity of the receptor: High **Severity:** High		Adaptive environmental management system		

7.8.8 Conclusions

The Project Area is situated in a region that supports a number of Internationally Recognised Areas, designated for their importance for biodiversity, especially for plants and birds. The Project Area has a number of Key Biodiversity Areas, Important Plant Areas and Important Bird Areas in the surrounding area, including the Terkos Basin KBA, IPA, IBA that overlap with the Project Area. The Project Area supports three natural habitats, of which thermophilous deciduous woodland is the most extensive in area. Thermophilous deciduous woodland and shifting coastal dunes have been assessed as critical habitat according to IFC PS6. The Project Area supports a diverse flora, including several threatened and endemic species that also meet critical habitat criteria. The Project Area is situated on one of the world's most important flyways for migratory birds between Eurasia and Africa. It is located in a 'bottleneck' for large soaring migratory birds and up to 10 species occur in numbers that constitute equal or greater than 1% of the species' global population. The marine habitats of the adjacent Black Sea support a number of threatened and endemic species including three cetacean species.

A number of mitigation measures have been devised to avoid and reduce Project effects on biodiversity. However, due to the nature of the Project, its large land-take, combined with minimal avoidance and mitigation options, the Project is heavily reliant on developing multiple offsetting strategies as part of a Biodiversity Action Plan. Until the offset strategies have been more fully developed and committed to, the residual impacts on many of the biodiversity features of high sensitivity remain **Moderate to High Adverse**. This includes a number of receptors that are natural and critical habitats as defined by IFC PS6.

References

Ref. 7.8.1	IFC, Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, 01 January 2012
Ref. 7.8.2	AK-TEL Engineering Co. Istanbul Region 3rd Airport Final EIA Report, Ankara, 2013
Ref. 7.8.3	United Nations (UN) Convention on Biological Diversity (CBD): http://www.cbd.int/convention/text/
Ref. 7.8.4	Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention): http://www.ramsar.org/cda/en/ramsar-documents-texts/main/ramsar/1-31-38_4000_0__
Ref. 7.8.5	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): http://www.cites.org/eng/disc/text.php
Ref. 7.8.6	Convention for the Protection of World Cultural and Natural Heritage: http://whc.unesco.org/archive/convention-en.pdf
Ref. 7.8.7	Convention for the Conservation of European Wildlife and Natural Habitats (Bern Convention): http://conventions.coe.int/Treaty/en/Treaties/Html/104.htm
Ref. 7.8.8	The Convention for the Protection of Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention): http://195.97.36.231/dbases/webdocs/BCP/BC76_Eng.pdf
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Annex 7.8.A: Plant Species Recorded In the Project Area

Family	NO	Taxon	English Name	Phytogeographic Region	ENDEMIC	National Threat Categories	International Threat Categories		EUNIS Habitat Class	Relative Abundance
						RDBTP	IUCN RL	BERN		
PTERIDOPHYTA										
EQUISETACEAE	**1**	*Equisetum telmateia* Ehrh.	Great horsetail	Widespread	-	-	LC	-	C3.2, B1.3	Rare
HYPOLEPIDACEAE	2	*Pteridium aquilinum* (L.) Kuhn	Common bracken	Widespread	-	-	-	-	G1.7, G3.F	Rare
ASPIDIACEAE	3	*Dryopteris pallida* (Bory) Fomin	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
GYMNOSPERMAE										
PINACEAE	4	*Pinus pinea* L.	Stone pine	Plantation	-	-	LC	-	G3.F	Abundant
	5	*Pinus pinaster* Ait.	Maritime pine	Plantation	-	-	LC	-	G3.F	Abundant
CUPRESSACEAE	6	*Juniperus oxycedrus* L. subsp. *oxycedrus*	Prickly Juniper	Widespread	-	-	LC	-	G1.7	Rare
ANGIOSPERMAE										
DICOTYLEDONES										
RANUNCULACEAE	7	*Ranunculus arvensis* L	Corn buttercup	Mediterranean	-	-	-	-	G1.7, E3.4	Very rare
	8	*Ranunculus ficaria* L. subsp. *ficariiformis* Rouy & Fouc	Lesser celandine	Widespread	-	-	-	-	G1.7, G3.F, G1.A	Rare
	9	*Ranunculus constantinopoliatanus* (DC.) d'Urv.	-	Widespread	-	-	-	-	E3.4, G1.A	Rare
	10	*Ranunculus repens* L.	Creeping buttercup	Widespread	-	-	-	-	E3.4, G1.A	Rare
	11	*Ranunculus muricatus* L.	Spinyfruit buttercup	Widespread	-	-	-	-	E3.4, G1.A	Rare
	12	*Ranunculus saniculifolius* Viv.	Sanicle-leaved Water Crowfoot	Widespread	-	-	LC	-	C1.3	Rare
	13	*Ranunculus gracilis* Clarke	-	Widespread	-	-	-	-	G1.7	Rare
	14	*Anemone pavonia* Lam.	-	Widespread	-	-	-	-	G1.7, G3.F	Very rare
	15	*Ceratocephalus falcatus* (L.) Pers.	-	Widespread	-	-	-	-	G3.F	Rare
	16	*Helleborus orientalis* Lam.	Lenten rose	Widespread	-	-	-	-	G1.7, G3.F	Rare
	17	*Clematis vitalba* L.	Old man's beard	Widespread	-	-	-	-	G1.7, G3.F G1.A	Rare
NYMPHAEACEAE	18	*Nymphaea alba* L.	White Waterlily	Widespread	-	-	LC	-	C1.3	Moderate
BERBERIDACEAE	19	*Epimedium pubigerum*(DC.) Moren&Decaisne	-	European-Siberian	-	-	-	-	G1.7, G3.F	Moderate
PAPAVERACEAE	20	*Hypecoum procumbens* L.	-	Mediterranean	-	-	-	-	G1.7, G3.F, E3.4	Rare
	21	*Glaucium flavum* Crantz	Yellow hornpoppy	Widespread	-	-	-	-	B1.3	Rare
	22	*Papaver rhoeas* L.	Corn poppy	Widespread	-	-	-	-	E3.4	Rare
CRUCIFERAE	23	*Descurainia sophia* (L.)	Flixweed	Widespread	-	-	-	-	E3.4	Rare
	24	*Thlaspi perfoliatum* L.	Cotswold pennycress	Widespread	-	-	-	-	G1.7, E3.4	Very rare
	25	*Cardamine uliginosa* Bieb.	-	Widespread	-	-	LC	-	C3.2	Rare
	26	*Alyssum minutum* (L.)Rothm.var. *minutum*	-	Widespread	-	-	-	-	E3.4	Rare
	27	*Arabis verna* (L.) DC.	Spring rockcress	Mediterranean	-	-	-	-	G1.7	Rare
	28	*Neslia apiculata* Fisch.	-	Widespread	-	-	-	-	E3.4	Rare
	29	*Capsella bursa-pastoris* (L.) Medik.	Shepherd's-purse	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	30	*Sisymbrium officinale* (L.) Scop.	Hedge mustard	Widespread	-	-	-	-	E3.4	Rare
	31	*Erysimum cuspidatum* (Bieb.) DC.	-	Widespread	-	-	-	-	G1.7, E3.4	Very rare
	32	*Erysimum diffusum* Ehrh.	Wallflower	European-Siberian	-	-	-	-	B1.3	Rare
	33	*Hirschfeldia incana* (L.) Lag.-Foss.	Shortpod mustard	Widespread	-	-	-	-	E3.4, B1.3	Rare
	34	*Aurinia uechtritziana* (Bornm.) Cullen & Dudley	-	Widespread	-	VU	-	App-1	B1.4	Rare
	35	*Cakile maritima* Scop.	European searocket	Widespread	-	-	-	-	B1.3, B1.4	Rare
	36	*Matthiola fruticulosa* (L.) Maire	-	Mediterranean	-	-	-	-	B1.4	Rare

Family	NO	Taxon	English Name	Phytogeographic Region	ENDEMIC	National Threat Categories	International Threat Categories		EUNIS Habitat Class	Relative Abundance
						RDBTP	IUCN RL	BERN		
CISTACEAE	37	*Cistus creticus* L.	Pink Rock-Rose	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	38	*Cistus salviifolius* L.	Sage-leaved rock rose	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	39	*Tuberaria guttata* (L.) Fourr. var. *guttata*	Spotted rockrose	Widespread	-	-	-	-	G1.7, G3.F	Rare
VIOLACEAE	40	*Viola odorata* L.	-	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	41	*Viola sieheana* Becker	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	42	*Polygala anatolica* Boiss. & Heldr	-	Widespread	-	-	-	-	G3.F	Rare
CARYOPHYLLACEAE	43	*Minuartia hamata* (Hausskn.) Mattf.	-	Widespread	-	-	-	-	G1.7, E3.4	Very rare
	44	*Cerastium gracile* Dufour	Slender chickweed	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	45	*Moenchia mantica* (L.) Bartl. Subsp. *mantica*	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	46	*Petrorhagia velutina* (Guss.) Ball &Heywood.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	47	*Holosteum umbellatum* L. var. *umbellatum*	Jagged chickweed	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	48	*Silene vulgaris* (Moenc) Garcke var. *vulgaris*	Bladder campion	Widespread	-	-	-	-	G1.A	Rare
	49	*Silene dichotoma* Ehrh. subsp. *dichotoma*	Forked catchfly	Mediterranean	-	-	-	-	B1.4	Very rare
	50	*Silene sangaria* Coode & Cullen	_	European-Siberian	Regional End.	VU	-	App-1	B1.4	Rare
	51	*Silene gallica* L.	Common catchfly	Widespread	-	-	-	-	E3.4, F5.4	Rare
	52	*Stellaria holostea* L.	Greater stitchwort	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
ILLECEBRACEAE	53	*Herniaria incana* Lam.	-	Widespread	-	-	-	-	G1.7, G3.F	Very rare
CHENOPODIACEAE	54	*Salsola ruthenica* Iljin	-	Widespread	-	-	-	-	B1.3	Rare
GUTTIFERAE	55	*Hypericum triquetrifolium* Turra	Curled-leaved St. John's-wort	Widespread	-	-	-	-	E3.4	Rare
	56	*Hypericum calycinum* L.	Creeping St. John's wort	European-Siberian	-	-	-	-	G1.7, G3.F	Abundant
LINACEAE	57	*Linum nodiflorum* L.	-	Widespread	-	-	-	-	G3.F	Rare
	58	*Linum hirsutum* L. subsp. *byzantinum Azn.*	-	Widespread	-	-	-	-	G1.7, G3.F, B1.3	Rare
	59	*Linum bienne* Miller	Pale Flax	Widespread	-	-	-	-	G1.7, G3.F	Rare
RHAMNACEAE	60	*Frangula alnus* Miller subsp. *alnus*	Alder buckthorn	European-Siberian	-	-	-	-	G1.7	Rare
MALVACEAE	61	*Malva sylvestris* L.	Common Mallow	Widespread	-	-	-	-	E3.4	Rare
TILIACEAE	62	*Tilia cordata* Miller	Small-leaved Lime	Widespread	-	-	-	-	G1.7	Rare
	63	*Tilia argentea* Desf. ex DC	-	European-Siberian	-	-	-	-	G1.7, G1.A	Rare
ACERACEAE	64	*Acer campestre* L. subsp. *campestre*	Maple	Widespread	-	-	-	-	G1.7, G3.F	Moderate
ANACARDIACEAE	65	*Rhus coriaria* L.	Elm-leaved sumach	Widespread	-	-	VU	-	F5.4	Rare
CELASTRACEAE	66	*Euonymus europaeus* L.	Spindle	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
GERANIACEAE	67	*Erodium cicutarium* (L.) L. Herit subsp. *cicutarium*	Redstem filaree	Widespread	-	-	-	-	E3.4	Very rare
	68	*Geranium asphodeloides* Burm. fil.. subsp. *asphodeloides .*	-	European-Siberian	-	-	-	-	G1.7, G3.F	Moderate
	69	*Geranium dissectum* L.	Cut-leaved Cranesbil	Widespread	-	-	-	-	G1.7, G3.F, F5.4	Rare
	70	*Geranium rotundifolium* L.	-	Widespread	-	-	-	-	G3.F, F5.4	Rare
POLYGONACEAE	71	*Rumex scutatus* L.	French sorre	Widespread	-	-	-	-	G1.7	Very rare
	72	*Rumex tuberosus* L. subsp. *tuberosus*	-	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Very rare
	73	*Polygonum maritimum L.*	-	Widespread	-	-	-	-	B1.3	Rare
	74	*Rumex pulcher* L.	Fiddle dock	Widespread	-	-	-	-	E3.4	Rare

Family	NO	Taxon	English Name	Phytogeographic Region	ENDEMIC	National Threat Categories	International Threat Categories		EUNIS Habitat Class	Relative Abundance
						RDBTP	IUCN RL	BERN		
LEGUMINOSAE	75	*Medicago lupulina* L.	Black medick	Widespread	-	-	-	-	E3.4	Rare
	76	*Medicago minima* (L.) L. var. *minima*	Bur medick	Widespread	-	-	-	-	G3.F, E3.4	Rare
	77	*Medicago sativa* L.	Lucerne	Widespread	-	-	VU	-	G1.7, E3.4	Rare
	78	*Genista tinctoria* L.	Dyer's broom	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	79	*Galega officinalis* L.	French lilac	European-Siberian	-	-	-	-	G1.A	Rare
	80	*Chamaecytisus austriacus* (L.) Link	-	European-Siberian	-	-	-	-	G1.7, G3.F	Moderate
	81	*Chamaecytisus hirsutus* (L.) Link	-	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	82	*Vicia cracca* L. subsp. *stenophylla* Vel.	Tufted vetch	Widespread	-	-	LC	-	G1.7, G3.F	Rare
	83	*Vicia sativa* L. subsp. *sativa*	Common vetch	Widespread	-	-	-	-	F5.4	Rare
	84	*Vicia bithynica* L.	-	Widespread	-	-	-	-	F5.4	Rare
	85	*Trifolium angustifolium* L. var. *angustifolium* L.	Narrow clover	Widespread	-	-	LC	-	G1.7, G3.F F5.4	Rare
	86	*Trifolium stellatum* L. var. *stellatum*	-	Widespread	-	-	-	-	G1.7, G3.F F5.4	Rare
	87	*Trifolium campestre* Schreb.	Hop Trefoil	Widespread	-	-	-	-	G1.7, G3.F	Rare
	88	*Trifolium arvense* L. subsp. *arvense*	Haresfoot clover	Widespread	-	-	-	-	G1.7, G3.F E3.4	Rare
	89	*Trifolium repens* L. var. *repens*	White clover	Widespread	-	-	-	-	E3.4	Rare
	90	*Trifolium resupinatum* L. var. *resupinatum*	Persian clover	Widespread	-	-	LC	-	E3.4	Rare
	91	*Trifolium ochroleucum* Huds.	-	Widespread	-	-	-	-	E3.4	Rare
	92	*Coronilla varia* L. subsp. *varia*	-	Widespread	-	-	-	-	G1.7	Rare
	93	*Lathyrus undulatus* Boiss.	-	European-Siberian	Regional End.	VU	-	-	G1.7, G3.F	Rare
	94	*Lathyrus ochrus* (L.) DC.	Cyprus-vetch	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	95	*Lathyrus laxiflorus* (Desf.) O.Kuntze subsp. *laxiflorus*	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	96	*Lens nigricans* (Bieb.) Godr.	-	Mediterranean	-	-	-	-	G3.F	Rare
	97	*Dorycnium pentaphyllum* Scop. subsp. *herbaceum*(Vill.)Rouy.	Prostrate Canary Clover	Widespread	-	-	-	-	G1.7, G3.F	Rare
	98	*Spartium junceum* L.	Spanish broom	Mediterranean	-	-	-	-	F5.4	Rare
	99	*Teline monspessulana* (L.) C. Koch	_	Mediterranean	-	-	-	-	G3.F, F5.4	Rare
ROSACEAE	100	*Pyrus elaeagnifolia* Pallas subsp. *elaeagnifolia*	Oleaster-leaved Pear	Widespread	-	-	-	-	G1.7, G3.F	Rare
	101	*Pyrus amygdaliformis* Vill. Var. *amygdaliformis*	Almond-leaved pear	Widespread	-	-	-	-	G1.7, G3.F	Rare
	102	*Geum urbanum* L.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	103	*Mespilus germanica* L.	Common medlar	European-Siberian	-	-	-	-	G1.7, G3.F	Moderate
	104	*Sorbus aucuparia* L.	Rowan	European-Siberian	-	-	-	-	G1.7, G3.F G1.A	Rare
	105	*Potentilla recta* L.	Sulphur Cinquefoil	Widespread	-	-	-	-	G1.7, G3.F	Very rare
	106	*Sanguisorba minor Scop. Subsp. muricata (Spach)Brig*	Salad burnet	Widespread	-	-	-	-	G1.7, G3.F	Very rare
	107	*Filipendula vulgaris* Moench.	Dropwort	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	108	*Crataegus monogyna* Jacq. Subsp. *monogyna*	Common hawthorn	Widespread	-	-	-	-	G1.7, G3.F G1.A	Rare
	109	*Sorbus torminalis* (L.) Crantz var. *torminalis*	Chequer tree	European-Siberian	-	-	-	-	G1.7, G3.F	Moderate

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						RDBTP	IUCN RL	BERN		
	110	*Prunus divaricata* Ledeb. Subsp. *divaricata*	Cherry plum	Widespread	-	-	LR/LC	-	G1.7, G3.F	Rare
	111	*Prunus spinosa* L. subsp. *dasyphylla* (Schur) Domin	Blackthorn	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	112	*Malus sylvestris* Mill. subsp. *orientalis* (Uglitzk.) Browicz var. *orientalis*	European crab apple	Widespread	-	-	DD	-	G1.7, G3.F	Rare
	113	*Fragaria vesca* L.	Wild strawberry	Widespread	-	-	-	-	G1.7, G3.F	Rare
	114	*Rubus sanctus* Schreber	Holy bramble	Widespread	-	-	-	-	G1.7, G3.F G1.A	Rare
	115	*Rubus hirtus* Waldst.&Kit.	-	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	116	*Rosa gallica* L.	Gallic rose	Widespread	-	-	-	-	G1.7	Rare
	117	*Rosa canina* L.	Dog rose	Widespread	-	-	-	-	G1.7, G3.F	Very rare
LYTHRACEAE	118	*Lythrum salicaria* L.	Purple loosestrife	European-Siberian	-	-	LC	-	E3.4, G1.A	Rare
	119	*Lythrum junceum* Banks & Sol.	False grass-poly	Mediterranean	-	-	LC	-	E3.4	Rare
UMBELLIFERAE	120	*Torilis leptophylla* (L.) Reichb.	Bristlefruit hedge parsley	Widespread	-	-	-	-	G1.7, G3.F G1.A	Very rare
	121	*Eryngium campestre* L. var. *virens* (Link) Weins	-	Widespread	-	-	-	-	B1.3, B1.4	Very rare
	122	*Eryngium maritimum* L.	Sea holly	Widespread	-	-	-	-	B1.3	Moderate
	123	*Scandix iberica* Bieb.	-	Widespread	-	-	-	-	G1.7, G3.F	Very rare
	124	*Daucus carota* L.	Wild carrot	Widespread	-	-	DD	-	G1.7, G3.F, E3.4, F5.4	Rare
	125	*Oenanthe silaifolia* Bieb.	-	Widespread	-	-	LC	-	G1.7, G3.F, E3.4	Moderate
	126	*Oenanthe pimpinelloides* L.	Corky-fruited water-dropwort	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Moderate
	127	*Oenanthe fistulosa* L.	-	Widespread	-	-	LC	-	E3.4	Moderate
	128	*Ferulago confusa* Velen	-	European-Siberian	-	VU	-	-	G1.7, G3.F	Moderate
	129	*Laser trilobum* (L.) Borkh.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	130	*Peucedanum obtusifolium* Sm.	-	European-Siberian	-	VU	-	-	B1.4	Rare
ARALIACEAE	131	*Hedera helix* L.	Common ivy	Widespread	-	-	-	-	G1.7, G3.F, G1.A	Moderate
CRASSULACEAE	132	*Sedum album L*	White stonecrop	Widespread	-	-	-	-	G1.7	Rare
	133	*Sedum pallidum* Bieb. Var. *pallidum*	-	Widespread	-	-	-	-	G1.7	Rare
CAPRIFOLIACEAE	134	*Sambucus ebulus L.*	Danewort	European-Siberian	-	-	-	-	G1.7, E3.4	Rare
	135	*Sambucus nigra* L.	Elderberry	European-Siberian	-	-	-	-	G1.A	Rare
	136	*Viburnum opulus* L.	Guelder rose	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	137	*Lonicera etrusca* Santi var. *etrusca*	Etruscan honeysuckle	Mediterranean	-	-	-	-	G1.7	Rare
CORNACEAE	138	*Cornus mas* L.	Cornelian cherry	European-Siberian	-	-	-	-	G1.7, G1.A	Rare
	139	*Cornus sanguinea* L. subsp. *australis*(C.A.Mey) Jáv.	Common dogwood	Widespread	-	-	-	-	G1.7, G1.A	Rare
DIPSACACEAE	140	*Scabiosa argentea* L.	-	Widespread	-	-	-	-	G1.7	Rare
COMPOSITAE	141	*Senecio vernalis* Waldst. et Kit	Eastern groundsel	Widespread	-	-	-	-	E3.4	Rare
	142	*Tussilago farfara* L.	Coltsfoot	European-Siberian	-	-	-	-	B1.3	Rare

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	143	*Doronicum orientale* Hoffm.	Leopard's bane	Widespread	-	-	-	-	G1.7, G3.F	Rare
	144	*Centaurea kilaea* Boiss.	-	European-Siberian	Regional End.	EN	-	-	B1.4	Rare
	145	*Centaurea hermannii* F.Hermann	-	European-Siberian	Regional End.	EN	-	-	G1.7, G3.F	Rare
	146	*Hyoseris radiata* L.	-	Mediterranean	-	-	-	-	G1.7, G3.F, E3.4	Moderate
	147	*Jurinea kilaea* Azn.	-	European-Siberian	-	VU	-	-	B1.4	Rare
	148	*Silybum marianum* (L.) Gaertner	Cardus marianus	Mediterranean	-	-	-	-	G1.7, E3.4	Rare
	149	*Cnicus benedictus* L.	Blessed thistle	Widespread	-	-	-	-	E3.4	Rare
	150	*Carthamus dentatus Vahl*	-	Widespread	-	-	-	-	E3.4	Rare
	151	*Anthemis cretica* L. subsp. *pontica* (Willd.) Grierson	-	Widespread	-	-	-	-	G1.7	Rare
	152	*Bellis perennis* L.	Common daisy	European-Siberian	-	-	-	-	G1.7, G3.F, E3.4, G1.A	Rare
	153	*Achillea setacea* Waldst. & Kit	-	European-Siberian	-	-	-	-	E3.4	Rare
	154	*Carduus pycnocephalus* L. subsp. *albidus* (M.Bieb) Kazmi	Italian thistle	Widespread	-	-	-	-	G1.7, E3.4	Rare
	155	*Carduus nutans* L. sensu lato	Musk thistle	Widespread	-	-	-	-	G1.7, E3.4	Rare
	156	*Hypochoeris radiata* L.	Catsear	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	157	*Logfia arvensis* (L.) Holub.	Field cottonrose	Widespread	-	-	-	-	E3.4	Very rare
	158	*Lapsana communis* L. subsp. *intermedia* (Bieb.) Hayek	Nipplewort	Widespread	-	-	-	-	G1.7, G3.F, E3.4, G1.A	Very rare
	159	*Cirsium vulgare* (Savi) Ten.	Bull thistle	Widespread	-	-	-	-	E3.4	Very rare
	160	*Cirsium hypoleucum* DC.	-	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	161	*Cirsium polycephalum* DC.	-	Mediterranean	Regional End.	CR	-	-	G3.F, E3.4	Rare
	162	*Chondrilla juncea* L . var. *juncea*	Rush skeletonweed	Widespread	-	-	-	-	E3.4	Very rare
	163	*Lactuca serriola* L.	Prickly lettuce	Widespread	-	-	-	-	E3.4	Very rare
	164	*Sonchus asper* (L.) Hill subsp. *glaucescens* (Jordon) Ball	Sharp-fringed sow thistle	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	165	*Crepis sancta* (L.) Babcock	-	Widespread	-	-	-	-	E3.4	Very rare
	166	*Crepis foetida* L. subsp. *foetida*	Stinking hawksbeard	Widespread	-	-	-	-	E3.4	Rare
	167	*Crepis alpina* L.	-	Widespread	-	-	-	-	E3.4	Rare
	168	*Pilosella hoppeana* (Schultes) C.H.& F.W Schultz subsp. *pilisquama* (Nägeli&Peter) P.D. Sell & C.West	-	Widespread	-	-	-	-	G1.7, E3.4	Rare
	169	*Pilosella piloselloides* (Vill.) Soják subsp. *megalomastix* (NP.) Sell &West	-	Widespread	-	-	-	-	G1.7, E3.4	Rare
	170	*Scorzonera cana* (C.A.Meyer) Hoffm. var. *cana*	-	Widespread	-	-	-	-	G1.7	Rare
	171	*Inula montbretiana* DC.	-	Iranian-Turan	-	-	-	-	G1.7	Rare
	172	*Inula ensifolia* L.	-	European-Siberian	-	-	-	-	G1.7	Rare
	173	*Inula salicina* L.	Willowleaf yellowhead	European-Siberian	-	-	-	-	G1.7	Rare
	174	*Pulicaria dysenterica* (L.) Gaertn.	-	Widespread	-	-	-	-	E3.4, C3.2	Rare
	175	*Pulicaria odora* (L.) Reichb.	-	Mediterranean	-	-	-	-	E3.4, C3.2	Rare

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CAMPANULACEAE	176	*Campanula rapunculus* L. var. *rapunculus* L.	Rampion bellflower	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
ERICACEAE	177	*Erica arborea* L.	Tree heath	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	178	*Erica manipuliflora* Salisb.	Heather	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	179	*Arbutus unedo* L.	Strawberry tree	Widespread	-	-	-	-	G1.7, G3.F	Moderate
PRIMULACEAE	180	*Androsace maxima* L.	Greater Rock-jasmine	Widespread	-	-	-	-	G1.7, G3.F	Rare
	181	*Primula vulgaris* Huds. Subsp. *sibthorpii* (Hoffmans) W.W.Sm & Forrest	Primrose	European-Siberian	-	-	-	-	G1.7, G3.F, G1.A	Moderate
	182	*Anagallis arvensis* L. var. *caerulea* (L.) Gouan	Blue pimpernel	Widespread	-	-	-	-	G1.7, G1.A	Rare
OLEACEAE	183	*Jasminum fruticans* L.	Shrubby Jasmine,	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	184	*Fraxinus angustifolia* Vahl subsp. *syriaca* (Boiss.) Yalt.	Narrow-leafed Ash	Iranian-Turan	-	-	-	-	G1.A	
	185	*Fraxinus ornus* L. subsp. *ornus*	Manna ash	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	186	*Phillyrea latifolia* L.	-	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
GENTIANACEAE	187	*Blackstonia perfoliata* (L.) Hudson subsp. *perfoliata*	Yellow-wort	Widespread	-	-	-	-	G3.F	Rare
BORAGINACEAE	188	*Echium italicum L.*	Italian viper's bugloss	Mediterranean	-	-	-	-	E3.4	Rare
	189	*Echium vulgare* L.	Viper's Bugloss	European-Siberian	-	-	-	-	E3.4	Rare
	190	*Cynoglossum montanum* L.	-	European-Siberian	-	-	-	-	E3.4	Rare
	191	*Symphytum tuberosum* L. subsp. *nodosum*(Schur)Soo	Tuberous comfrey	European-Siberian	-	VU	-	-	G1.7, G3.F	Moderate
	192	*Lithospermum purpurocaeruleum* L.	Purple Gromwell	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	193	*Myosotis lithospermifolia* (Willd.) Hornem.	-	Widespread	-	-	-	-	B1.3	Rare
	194	*Buglossoides arvensis* (L.) Johnston	-	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
SCROPHULARIACEAE	195	*Linaria odora*(Bieb.) Fischer	-	European-Siberian	-	VU	NT	-	B1.4	Rare
	196	*Verbascum blattaria*L.	Moth mullein	Widespread	-	-	-	-	G1.7, G3.F	Rare
	197	*Verbascum degenii* Hal.	-	European-Siberian	Regional End.	CR	-	App-1	B1.4	Rare
	198	*Verbascum bugulifolium* Lam.	Mullein	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	199	*Parentucellia latifolia* (L.) Caruel subsp. *latifolia*	Southern red bartsia	Mediterranean	-	-	-	-	E3.4	Rare
	200	*Bellardia trixago* (L.) All	-	Widespread	-	-	-	-	E3.4	Rare
	201	*Digitalis ferruginea* L. subsp. *ferruginea*	Mediterranean lineseed	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	202	*Veronica chamaedrys* L.	Germander speedwell	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	203	*Veronica turrilliana* Stoj.&Stef.	-	European-Siberian	-	-	DD	-	G1.7, G3.F	Rare
CONVOLVULACEAE	204	*Convolvulus arvensis L.*	Field bindweed	Widespread	-	-	-	-	E3.4	Rare
	205	*Convolvulus persicus* L.	-	Widespread	-	EN	-	-	B1.3	Rare
APOCYNACEAE	206	*Vinca herbacea Waldst.& Kit*	Herbaceous periwinkle	Widespread	-	-	-	-	G1.7	Rare
OROBANCHACEAE	207	*Orobanche anatolica* Boiss. & Reut.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	208	*Orobanche cernua* Loefl.	Nodding broomrape	Widespread	-	-	-	-	G1.7, G3.F	Rare
LABIATAE	209	*Lamium amplexicaule* L.	Henbit deadnettle	Widespread	-	-	-	-	G1.7, G3.F, E3.4	Rare
	210	*Lamium purpureum* L. var. *purpureum*	Purple deadnettle	Widespread	-	-	-	-	G1.7, G3.F	Rare

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	211	*Acinos rotundifolius* Pers.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	212	*Ajuga reptans* L.	Bugle	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	213	*Prunella laciniata* (L.) L.	Cutleaf self-heal	European-Siberian	-	-	-	-	G1.7, G3.F, E3.4	Rare
	214	*Prunella vulgaris* L.	Common self-heal	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	215	*Clinopodium vulgare* L. subsp. *vulgare*	Wild basil	Widespread	-	-	-	-	G1.7, G3.F	Rare
	216	*Salvia virgata* Jacq.	Wand sage	Iran-Turan	-	-	-	-	G1.7, E3.4	Rare
	217	*Salvia glutinosa* L.	glutinous sage	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	218	*Salvia viridis* L.	Clary Sage	Mediterranean	-	-	-	-	E3.4	Rare
	219	*Stachys maritima* Gouan	-	Mediterranean	-	-	-	-	B1.4	Rare
PLANTAGINACEAE	220	*Plantago lanceolata* L.	English plantain	Widespread	-	-	VU	-	G1.7, G3.F, E3.4, G1.A	Rare
THYMELAEACEAE	221	*Daphne pontica* L.	-	Öksin	-	-	-	-	G1.7, G3.F	Rare
SANTALACEAE	222	*Osyris alba* L.	Osyris	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
RAFFLESIACEAE	223	*Cytinus hypocistis* L. subsp. *orientalis* Wettst.	-	Mediterranean	-	-	-	-	G1.7	Rare
EUPHORBIACEAE	224	*Euphorbia amygdaloides* L. subsp. *robbiae* (Turrill) Stace	Wood spurge	European-Siberian	Regional End.	NT	-	-	G1.7, G3.F	
	225	*Euphorbia paralias* L.	Sea spurge	Mediterranean	-	-	-	-	B1.3, B1.4	Rare
CORYLACEAE	226	*Corylus avellana* L.var. *avellana*	Common hazel	European-Siberian	-	-	LC	-	G1.7, G3.F	Rare
	227	*Carpinus betulus* L.	Common hornbeam	European-Siberian	-	-	-	-	G1.7, G3.F, G1.A	Moderate
	228	*Ostrya carpinifolia* Scop	Hop Hornbeam	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
ULMACEAE	229	*Ulmus minor* Miller. subsp. *minor*	Field Elm	Doğu Mediterranean	-	-	-	-	G1.A	Rare
	230	*Ulmus glabra* Hudson	Wych elm	European-Siberian	-	-	-	-	G1.A	Rare
URTICACEAE	231	*Urtica dioica* L.	Nettle	European-Siberian	-	-	-	-	E3.4, G1.A	Rare
FAGACEAE	232	*Quercus frainetto* Ten.	Hungarian oak	European-Siberian	-	-	-	-	G1.7, G3.F	Abundant
	233	*Quercus cerris* L. var. *cerris*	Turkey oak	Widespread	-	-	-	-	G1.7, G3.F	Abundant
	234	*Quercus petraea* (Mattuschka) Liebl. Var. *iberica* (Steven ex Bieb.) Krassiln	Sessile oak	Widespread	-	-	-	-	G1.7, G3.F	Abundant
	235	*Quercus infectoria* Olivier subsp. *infectoria*	Aleppo oak	European-Siberian	-	-		-	G1.7, G3.F	Moderate
	236	*Quercus robur* L. subsp. *robur*	English oak	European-Siberian	-	-	LC	-	G1.A	Rare
	237	*Quercus hartwissiana* Steven	-	Widespread	-	-	-	-	G1.7, G3.F	Moderate
	238	*Fagus orientalis* Lipsky	Oriental Beech	European-Siberian	-	-	-	-	G1.7	Rare
LORANTHACEAE	239	*Viscum album* L. subsp. album	European mistletoe	Widespread	-	-	-	-	G1.7	Rare
RUBIACEAE	240	*Galium fissurense* Ehrend.& Schönb. -Tem.	-	Iran-Turan	-	-	-	-	G1.7, G3.F	Rare
	241	*Galium verum* L. subsp. *verum*	Lady's Bedstraw	European-Siberian	-	-	-	-	G1.7, E3.4, G1.A	Rare
	242	*Rubia peregrina* L.	Common wild madder	Mediterranean	-	-	-	-	G1.7, G1.A	Rare
	243	*Asperula involucrata* Wahlenb.	-	European-Siberian	-	-	-	-	G1.7, G3.F	Very rare

Family	NO	Taxon	English Name	Phytogeographic Region	ENDEMIC	National Threat Categories	International Threat Categories		EUNIS Habitat Class	Relative Abundance
						RDBTP	IUCN RL	BERN		
	244	*Asperula littoralis* Sm.	-	European-Siberian	Regional End.	VU	-	-	B1.4	Rare
MONOCOTYLEDONES										
ALISMATACEAE	245	*Alisma plantago-aquatica* L.	European water-plantain	European-Siberian	-	-	LC	-	C3.2, C1.3	Rare
LILIACEAE	246	*Ruscus hypoglossum* L.	Butcher's broom	European-Siberian	-	-	-	-	G1.7, G3.F, G1.A	Rare
	247	*Ruscus aculeatus* L. subsp. *angustifolius* Boiss.	Eurasian shrub	Widespread	-	-	-	-	G1.7, G3.F, G1.A	Abundant
	248	*Smilax aspera* L.	Rough bindweed	Widespread	-	-	-	-	G1.7, G3.F	Rare
	249	*Smilax excelsa* L.	-	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	250	*Nectaroscordum siculum* (Ucria) Lindl. susp. *Bulgaricum* (Janka) Stearn	-	Widespread	-	-	-	-	G1.7, G3.F, G1.A	Moderate
	251	*Lilium martagon* L.	Turk's cap lily	European-Siberian	-	VU	-	-	G1.7, G3.F, G1.A	Moderate
	252	*Muscari armeniacum* Leichtlin ex Baker	Grape hyacinth	Widespread	-	-	-	-	G1.7	Rare
	253	*Asparagus acutifolius* L.	Wild asparagus	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	254	*Colchicum turcicum* Janko	-	Mediterranean	-	-	-	-	E3.4	Rare
	255	*Ornithogalum wiedemannii* Boiss. var. *wiedemannii*	-	Widespread	-	-	-	-	E3.4	Rare
	256	*Ornithogalum orthophyllum* Ten.	-	Widespread	-	-	-	-	E3.4	Rare
AMARYLLIDACEAE	257	*Scilla bifolia* L.	Two-leaf squill	Mediterranean	-	-	-	-	G1.7, E3.4	Rare
	258	*Leucojum aestivum L.*	Spring Snowflake	European-Siberian	-	-	LC	-	E3.4	Rare
	259	*Galanthus x valentinei* Beck	-	European-Siberian	Regional End.	VU	-	-	G1.7, G3.F	Moderate
IRIDACEAE	260	*Pancratium maritimum* L.	Sea daffodil	Mediterranean	-	VU	-	-	B1.4	Rare
ORCHIDACEAE	261	*Iris sintenisii* Janka	Spuria iris	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	262	*Orchis laxiflora* Lam.	Lax-flowered Orchid	Mediterranean	-	-	-	-	G1.7, G3.F, G1.A	Rare
	263	*Orchis purpurea* Hudson	Lady orchid	European-Siberian	-	-	-	-	G1.7, G3.F	Rare
	264	*Orchis tridentata* Scop.	Three toothed orchid	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	265	*Ophrys apifera* Hudson	Bee orchid	Widespread	-	-	-	-	F5.4	Rare
	266	*Anacamptis pyramidalis* (L.) Rich.	Pyramidal orchid	Widespread	-	-	-	-	G1.7, G3.F	Rare
	267	*Limodorum abortivum* (L.) Swartz var. *abortivum*	Violet limodore	Widespread	-	-	-	-	G1.7, G3.F	Rare
SPARGANIACEAE	268	*Serapias vomeracea* (Burm. fil.) Briq. subsp. *orientalis* Greuter	Long lipped serapias	Mediterranean	-	-	-	-	G1.7, E3.4	Rare
TYPHACEAE	269	*Sparganium erectum* L. subsp. *neglectum* (Beeby) K. Richter	Simplestem bur-reed	Widespread	-	-	LC	-	C1.3	Rare
JUNCACEAE	270	*Typha latifolia* L.	Bulrush	Widespread	-	-	LC	-	C3.2	Moderate
CYPERACEAE	271	*Juncus heldreichianus* Marsson ex Parl. subsp. *heldreichianus*	-	Doğu Mediterranean	-	-	LC	-	C3.2	Moderate
	272	*Carex distachya* Desf. var. *distachya*	-	Mediterranean	-	-	LC	-	G1.7, G3.F	Rare
	273	*Carex pendula* Hudson	Pendulous sedge	European-Siberian	-	-	-	-	G1.A, C3.2, C1.3	Rare
	274	*Bolboschoenus maritimus* (L.) Palla var. *maritimus*	Sea clubrush	Widespread	-	-	LC	-	E3.4, C3.2, B1.4	Rare
	275	*Cyperus capitatus* Vandelli	-	Widespread	-	-	-	-	B1.4	Rare

Family	NO	Taxon	English Name	Phytogeographic Region	ENDEMIC	National Threat Categories	International Threat Categories		EUNIS Habitat Class	Relative Abundance
						RDBTP	IUCN RL	BERN		
GRAMINEAE	276	*Schoenoplectus lacustris* (L.) Palla subsp. *lacustris*	Club-rush	Widespread	-	-	LC	-	C3.2, C1.3	Rare
	277	*Poa bulbosa* L.	Bulbous bluegrass	Widespread	-	-	-	-	G1.7, G3.F	Rare
	278	*Poa trivialis* L.	Rough bluegrass	Widespread	-	-	-	-	E3.4	Rare
	279	*Festuca pratensis* Hudson	Meadow fescue	Widespread	-	-	-	-	E3.4	Rare
	280	*Festuca arundinacea* Schreber subsp. *arundinacea*	Tall fescue	Widespread	-	-	-	-	E3.4	Rare
	281	*Bromus japonicus* Thunb. subsp. *japonicus*	Japanese Brome	Widespread	-	-	-	-	G1.7, G3.F	Rare
	282	*Bromus scorparius* L.	Broom brome	Widespread	-	-	-	-	E3.4	Rare
	283	*Bromus hordeaceus L.* subsp. *hordeaceus*	Soft brome	Widespread	-	-	-	-	E3.4	Rare
	284	*Aegilops biuncialis* Vis.	-	Iran-Turan	-	-	-	-	G3.F	Rare
	285	*Avena wiestii* Steudel.	-	Widespread	-	-	-	-	E3.4	Rare
	286	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Cock's-foot	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	287	*Briza minor* L.	Lesser quaking-grass	Mediterranean	-	-	-	-	G1.7, G3.F	Rare
	288	*Hordeum bulbosum* L.	-	Widespread	-	-	-	-	G1.7, G3.F	Rare
	289	*Phleum phleoides* (L.) Karsten	Boehmer's cats-tail	European-Siberian	-	-	LC	-	G1.7	Rare
	290	*Hordeum murinum* L.	False barley	Widespread	-	-	-	-	E3.4	Rare
	291	*Echinaria capitata* (L.) Desf.	-	Widespread	-	-	-	-	G3.F	Rare
	292	*Piptatherum coerulescens* (Desf.) P. Beauv.	Ricegrass	Widespread	-	-	-	-	G3.F	Rare
	293	*Brachypodium sylvaticum* (Hudson) P. Beauv.	False brome	Widespread	-	-	-	-	G1.7, G1.A	Moderate
	294	*Lolium perenne* L.	Perennial ryegrass	Widespread	-	-	-	-	E3.4	Rare
	295	*Leymus racemosus* (Lam.) Tzvelev subsp. *sabulosus* (Bieb.) Tzvelev	-	Widespread	-	-	-	-	B1.3, B1.4	Rare
	296	*Cynodon dactylon* (L.) Pers. var. *dactylon*	Bermuda grass	Widespread	-	-	-	-	E3.4, B1.4	Rare
	297	*Phragmites australis* (Cav.) Trin. ex Steudel	Common reed	European-Siberian	-	-	LC	-	C3.2	Abundant
	298	*Alopecurus rendlei* Eig.	Rendle's meadow foxtail	Mediterranean	-	-	-	-	E3.4	Rare
	299	*Glyceria maxima* (Hartman) Holmberg	Reed sweetgrass	Widespread	-	-	LC	-	C3.2	Rare
	300	*Elymus farctus* (Viv.) Runemark ex Melderis subsp. *bessarabicus* (Savul. &Rayss) Melderis var. *bessarabicus*	Sand couch-grass	Widespread	-	-	-	-	B1.3	Rare
	301	*Eleocharis palustris* (L.) Roemer&Schultes	Spike-rush	Widespread	-	-	LC	-	C3.2	Rare

Annex 7.8.B: Insect Species Recorded In the Project Area

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Coleoptera	Buprestidae	*Agrilus angustulus*	-	-	-		-	E3.4, G1.3, G1.7
Coleoptera	Buprestidae	*Agrilus derasofasciatus*	-	-	-		-	B1.3
Coleoptera	Buprestidae	*Anthaxia bicolor*	-	-	-		-	G1.3, G1.7, E3.4
Coleoptera	Buprestidae	*Anthaxia godeti*	Jewel beetle	-	-		-	E3.4
Coleoptera	Buprestidae	*Anthaxia millefolii*	-	-	-		-	G1.3, G1.7, E3.4
Coleoptera	Buprestidae	*Anthaxia nigricollis*	-	-	-		-	G1.3, G1.7, E3.4
Coleoptera	Buprestidae	*Anthaxia*	-	-	-		-	E3.4
Coleoptera	Buprestidae	*Anthaxia signaticollis*	-	-	-		-	G1.7, G3.F, G3.F, G1.3
Coleoptera	Buprestidae	*Aphanisticus el*	-	-	-		-	G3.F
Coleoptera	Buprestidae	*Capnodis*	-	-	-		-	G1.3
Coleoptera	Buprestidae	*Coroebus rubi*	-	-	-		-	G1.3, E3.4
Coleoptera	Cantharidae	*Cantharis*	-	-	-		-	G1.7
Coleoptera	Cantharidae	*Cantharis lateralis*	-	-	-		-	G3.F, G1.7
Coleoptera	Cantharidae	*Cantharis livida*	-	-	-		-	G1.7
Coleoptera	Cantharidae	*Rhagonycha fulva*	Common red soldier beetle	-	-		-	E3.4, G1.A, B1.3
Coleoptera	Cantharidae	*Rhagonycha lignosa*	-	-	-		-	G1.7, G3.F
Coleoptera	Carabidae	*Calomera*	-	-	-		-	F5.4
Coleoptera	Carabidae	*Chlaenius festivus*	-	-	-		-	G3.F, B1.3
Coleoptera	Carabidae	*Cicindela campestris*	Green tiger beetle	-	-		-	G1.7, E3.4
Coleoptera	Carabidae	*Cicindela*	-	-	-		-	G1.7
Coleoptera	Carabidae	*Dixus obscurus*	-	-	-		-	G1.7

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Coleoptera	Carabidae	*Harpalus*	-	-	-		-	G1.7
Coleoptera	Cerambycidae	*Agapanthia maculicornis*	-	-	-		-	B1.3
Coleoptera	Cerambycidae	*Arhopalus*	-	-	-		-	G1.7
Coleoptera	Cerambycidae	*Cerambyx dux*	-	-	NT (European RL)		-	G1.7, G3.F
Coleoptera	Cerambycidae	*Cortodera flavimana*	-	-	-		-	G1.7, G3.F, G1.3
Coleoptera	Cerambycidae	*Corymbia*	-	-	-		-	B1.3
Coleoptera	Cerambycidae	*Phytoecia coerulescens*	-	-	-		-	G1.7
Coleoptera	Cerambycidae	*Phytoecia*	-	-	-		-	G1.7
Coleoptera	Cerambycidae	*Plagionotus floralis*	Alfalfa longhorn beetle	-	-		-	E3.4
Coleoptera	Cerambycidae	*Pseudovadonia livida*	Fairy-ring longhorn beetle	-	-		-	G3.F, G1.7
Coleoptera	Cerambycidae	*Stenopterus ater*	-	-	-		-	G3.F, G1.7
Coleoptera	Cerambycidae	*Stenopterus*	-	-	-		-	G1.7
Coleoptera	Cerambycidae	*Stenostola*	-	-	-		-	E3.4
Coleoptera	Cerambycidae	*Stenurella bifasciata*	-	-	-		-	G1.7, E3.4, B1.3
Coleoptera	Cerambycidae	*Stenurella nigra*	-	-	-		-	G3.F, G1.7
Coleoptera	Cerambycidae	*Stenurella novercalis*	-	-	-		-	G1.7, E3.4, B1.3
Coleoptera	Cerambycidae	*Stictoleptura*	-	-	-		-	B1.3
Coleoptera	Chrysomelidae	*Clytra*	-	-	-		-	B1.3
Coleoptera	Chrysomelidae	*Cryptocephalus bipunctatus*	Chrysomelid beetle	-	-		-	B1.3
Coleoptera	Chrysomelidae	*Cryptocephalus*	-	-	-		-	B1.3
Coleoptera	Chrysomelidae	*Labidostomis longimana*	-	-	-		-	G1.7

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Coleoptera	Chrysomelidae	*Smaragdina limbata*	-	-	-		-	G1.7, G1.3, G3.F
Coleoptera	Chrysomelidae	*Tituboea*	-	-	-		-	E3.4
Coleoptera	Curculionidae	*Cleonis pigra*	Sluggish weevil	-	-		-	G1.7
Coleoptera	Elateridae	*Cardiophorus cyanipennis*	-	-	-		-	G1.7
Coleoptera	Elateridae	*Drasterius bimaculatus*	-	-	-		-	G1.7
Coleoptera	Lucanidae	*Lucanus cervus*	Stag beetle	-	NT		App III	G1.7
Coleoptera	Meloidae	*Cerocoma*	-	-	-		-	E3.4
Coleoptera	Meloidae	*Epicauta erythrocephala*	-	-	-		-	G1.3
Coleoptera	Meloidae	*Lydus*	-	-	-		-	G1.7
Coleoptera	Meloidae	*Mylabris quadripunctata*	-	-	-		-	G1.3, B1.3
Coleoptera	Meloidae	*Mylabris variabilis*	-	-	-		-	E3.4, G1.3, B1.3
Coleoptera	Oedemeridae	*Oedemera*	-	-	-		-	G1.7
Coleoptera	Oedemeridae	*Oedemera lurida*	-	-	-		-	B1.3, G1.7, E3.4, E3.4,
Coleoptera	Rutelidae	*Chaetopteroplia segetum*	-	-	-		-	G1.7
Coleoptera	Scarabaeidae	*Aphodius erraticus*	-	-	-		-	B1.3, G1.7
Coleoptera	Scarabaeidae	*Aphodius fimetarius*	-	-	-		-	B1.3, G1.7
Coleoptera	Scarabaeidae	*Aphodius haemorrhoidalis*	Dung beetle	-	-		-	G1.7
Coleoptera	Scarabaeidae	*Aphodius*	-	-	-		-	G1.7
Coleoptera	Scarabaeidae	*Aplidia*	-	-	-		-	G1.7
Coleoptera	Scarabaeidae	*Blitopertha lineolata*	-	-	-		-	B1.3, G1.7
Coleoptera	Scarabaeidae	*Copris lunaris*	-	-	-		-	E3.4

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Coleoptera	Scarabaeidae	*Euoniticellus fulvus*	-	-	-		-	G1.7, E3.4
Coleoptera	Scarabaeidae	*Euoniticellus*	-	-	-		-	G1.7
Coleoptera	Scarabaeidae	*Onthophagus furcatus*	-	-	-		-	G1.7, E3.4
Coleoptera	Scarabaeidae	*Oryctes nasicornis*	European rhinoceros beetle	-	-		-	G1.3, G1.7
Coleoptera	Scarabaeidae	*Sisyphus*	-	-	-		-	G1.7
Coleoptera	Silphidae	*Silpha obscura orientalis*	-	-	-		-	G3.F
Coleoptera	Silphidae	*Thanatophilus*	-	-	-		-	G1.3
Coleoptera	Staphylinidae	*Creophilus maxillosus*	Hairy rove beetle	-	-		-	G1.3
Coleoptera	Staphylinidae	*Ocypus curtipe*	Rove	-	-		-	G1.7
Coleoptera	Staphylinidae	*Paederus littoralis*		-	-		-	G1.7
Coleoptera	Staphylinidae	*Philonthus*	-	-	-		-	E3.4
Coleoptera	Staphylinidae	*Scaphium immaculatum*	-	-	-		-	G1.7
Coleoptera	Staphylinidae	*Stenus horioni*	-	-	-		-	G1.7
Diptera	Asilidae	*Dasypogon diadema*	-	-	-		-	G3.F, G1.7, G1.3,
Diptera	Asilidae	*Dysmachus*	-	-	-		-	G3.F
Diptera	Asilidae	*Dysmachus*	-	-	-		-	E3.4
Diptera	Asilidae	*Dysmachus praemorsus*	-	-	-		-	G1.3, G1.7
Diptera	Bombyliidae	*Bombylius analis*	Bee fly	-	-		-	G1.3, G1.7
Diptera	Bombyliidae	*Bombylius*	Bee fly	-	-		-	G3.F
Diptera	Bombyliidae	*Bombylius vulpinus*	Bee fly	-	-		-	G1.7, E3.4
Diptera	Bombyliidae	*Bombylella atra*	Bee fly	-	-		-	G1.7, E3.4, G3.F
Diptera	Bombyliidae	*Bombylius major*	Bee fly	-	-		-	G1.3, G3.F

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Diptera	Bombyliidae	*Bombylius*	Bee fly	-	-		-	G3.F
Diptera	Bombyliidae	*Bombylius*	Bee fly	-	-		-	G3.F
Diptera	Dolichopodidae	*Ortochile*	-	-	-		-	E3.4
Diptera	Empididae	*Empis adusta*	-	-	-		-	G1.3
Diptera	Empididae	*Empis pulchripes*	-	-	-		-	G1.3, G3.F
Diptera	Empididae	*Empis sericans*	-	-	-		-	E3.4, G1.7
Diptera	Empididae	*Empis setosa*	-	-	-		-	G3.F
Diptera	Empididae	*Empis tessellata*	-	-	-		-	G1.7, G3.F
Diptera	Limoniidae	*Dicranoptycha fuscescens*	-	-	-		-	G3.F
Diptera	Limoniidae	*Symplecta stictica stictica*	-	-	-		-	G3.F, E3.4
Diptera	Stratiomyidae	*Chloromyia*	-	-	-		-	E3.4
Diptera	Syrphidae	*Episyrphus balteatus*	Hoverfly	-	-		-	G1.7, E3.4
Diptera	Syrphidae	*Eristalis tenax*	Hoverfly	-	-		-	G1.3, G1.7, E3.4, E3.4,
Diptera	Syrphidae	*Syrphus ribesii*	Hoverfly	-	-		-	E3.4, G3.F, G1.7, E3.4,
Diptera	Syrphidae	*Eristalis*	Hoverfly	-	-		-	E3.4
Diptera	Syrphidae	*Eristalis pertinax*	Hoverfly	-	-		-	G3.F, G1.7
Diptera	Syrphidae	*Eupeodes corollae*	Hoverfly	-	-		-	G3.F, G1.7
Diptera	Syrphidae	*Helophilus*	Hoverfly	-	-		-	G1.7
Diptera	Syrphidae	*Melanostoma mellinum*	Hoverfly	-	-		-	G1.7, E3.4
Diptera	Syrphidae	*Merodon*	Hoverfly	-	-		-	G1.7
Diptera	Syrphidae	*Syritta pipiens*	Hoverfly	-	-		-	E3.4

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Diptera	Tabanidae	*Haematopota subcylindrica*	-	-	-		-	G3.F
Diptera	Tabanidae	*Tabanus*	-	-	-		-	G1.7
Diptera	Tipulidae	*Nephrotoma appendiculata*	-	-	-		-	E3.4
Diptera	Tipulidae	*Nephrotoma quadrifaria*	Crane fly	-	-		-	E3.4, G1.7
Diptera	Tipulidae	*Nephrotoma*	Crane fly	-	-		-	G1.7
Diptera	Tipulidae	*Tipula*	Crane fly	-	-		-	G1.3
Diptera	Tipulidae	*Tipula decolor*	Crane fly	-	-		-	G1.7
Diptera	Tipulidae	*Tipula istriana*	Crane fly	-	-		-	G1.7
Diptera	Tipulidae	*Tipula orientalis*	Crane fly	-	-		-	E3.4, G1.7
Diptera	Ulidiidae	*Dorycera maculipennis*	-	-	-		-	G3.F
Lepidoptera	Hesperiidae	*Ochlodes venatus*	Large skipper	-	-	LC	-	F5.4
Lepidoptera	Lycaenidae	*Aricia agestis*	Brown argus	-	LC	LC	-	C3.2, B1.3
Lepidoptera	Lycaenidae	*Lycaena phlaeas*	Small copper	-	LC (European RL)	LC	-	C3.2, F5.4, G1.7
Lepidoptera	Lycaenidae	*Polyommatus icarus*	Common blue	-	LC (European RL)	LC	-	C3.2, B1.3, F5.4, G1.7
Lepidoptera	Nymphalidae	*Argynnis paphia*	Silver-washed fritillary	-	LC (European RL)	LC	-	G1.7
Lepidoptera	Nymphalidae	*Brenthis hecate*	Twin-spot fritillary	-	LC (European RL)	LC	-	F5.4
Lepidoptera	Nymphalidae	*Brintesia circe*	Great banded grayling	-	LC (European RL)	LC	-	F5.4
Lepidoptera	Nymphalidae	*Lasiommata megera*	Wall brown	-	LC (European RL)	LC	-	C3.2, B1.3, G1.7
Lepidoptera	Nymphalidae	*Maniola jurtina*	Meadow brown	-	LC (European RL)	LC	-	G1.7, B1.3, F5.4

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Lepidoptera	Nymphalidae	*Melanargia galathea*	Marbled white	-	LC (European RL)	LC	-	F5.4
Lepidoptera	Nymphalidae	*Melanargia larissa*	Balkan marbled white	-	LC (European RL)	LC	-	F5.4
Lepidoptera	Nymphalidae	*Melitaea cinxia*	Glanville fritillary	-	LC (European RL)	LC	-	B1.3
Lepidoptera	Nymphalidae	*Melitaea didyma*	Spotted fritillary	-	LC (European RL)	LC	-	G1.7, B1.3, F5.4, G3.F
Lepidoptera	Nymphalidae	*Pararge aegeria*	Speckled wood	-	LC (European RL)	LC	-	B1.3
Lepidoptera	Nymphalidae	*Polygonia c-album*	Comma	-	LC (European RL)	LC	-	B1.3
Lepidoptera	Nymphalidae	*Vanessa atalanta*	Red admiral	-	LC (European RL)	LC	-	G1.7, C3.2, B1.3
Lepidoptera	Nymphalidae	*Vanessa cardui*	Painted lady	-	LC (European RL)	LC	-	B1.3, G1.7
Lepidoptera	Papilionidae	*Iphiclides podalirius*	Scarce swallowtail	-	LC (European RL)	LC	-	G1.7, C3.2
Lepidoptera	Papilionidae	*Papilio machaon*	Old world swallowtail	-	LC (European RL)	LC	-	C3.2
Lepidoptera	Pieridae	*Anthocharis cardamines*	Orange Tip	-	LC (European	LC	-	C3.2, G1.7
Lepidoptera	Pieridae	*Colias crocea*	Clouded yellow	-	LC (European RL)	LC	-	G1.7, B1.3, F5.4,
Lepidoptera	Pieridae	*Leptidea sinapis*	wood white	-	LC (European RL)	LC	-	C3.2, G3.F
Lepidoptera	Pieridae	*Pieris brassicae*	Large white	-	LC (European	LC	-	G1.7
Lepidoptera	Pieridae	*Pieris pseudorapae*	Green-veined white	-	Not assessed	NE	-	B1.3, C3.2

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Lepidoptera	Pieridae	*Pieris rapae*	Small white	-	LC	LC	-	C3.2
Lepidoptera	Pieridae	*Pontia edusa*	Eastern bath white	-	LC (European	LC	-	B1.3
Odonata	Aeshnidae	*Aeshna isosceles*	Green-eyed hawker	-	-		-	C3.2
Odonata	Aeshnidae	*Anax parthenope*	Lesser emperor	-	LC		-	G1.3, G3.F
Odonata	Coenagrionidae	*Coenagrion puella*	Azure damselfly	-	LC		-	G1.3
Odonata	Coenagrionidae	*Coenagrion scitulum*	Dainty damselfly	-	LC		-	C3.2, G1.3
Odonata	Coenagrionidae	*Ischnura elegans*	Common bluetail	-	LC		-	C3.2, G1.3, G3.F
Odonata	Coenagrionidae	*Ischnura pumilio*	Small bluetail	-	LC		-	C3.2, G1.3, G1.7
Odonata	Coenagrionidae	*Enallagma cyathigerum*	Common blue damselfly	-	LC		-	G1.3
Odonata	Coenagrionidae	*Erythromma lindenii*	Goblet-marked damselfly	-	LC		-	G1.3
Odonata	Gomphidae	*Gomphus schneiderii*	Turkish clubtail	-	LC		-	C3.2
Odonata	Lestidae	*Lestes barbarus*	Migrant spreadwing	-	LC		-	C3.2, G1.7
Odonata	Lestidae	*Sympecma fusca*	Common winter damselfly	-	LC		-	C3.2, G1.7
Odonata	Libellulidae	*Crocothemis erythraea*	Scarlet dragonfly	-	LC		-	G3.F
Odonata	Libellulidae	*Libellula depressa*	Broad-bodied chaser	-	LC		-	C3.2, G1.3
Odonata	Libellulidae	*Libellula fulva*	Scarce chaser	-	LC		-	G1.7

Order	Family	Taxon	English Name	END	International Threatened Categories			EUNIS Habitat Class
					IUCN RL	RBBT	BERN	
Odonata	Libellulidae	*Orthetrum albistylum*	-	-	LC		-	G1.3, G1.7
Odonata	Libellulidae	*Orthetrum brunneum*	Southern skimmer	-	LC		-	G1.3, G1.7, G3.F
Odonata	Libellulidae	Orthetrum cancellatum	Black-tailed skimmer	-	LC		-	G3.F, G1.7
Odonata	Libellulidae	Orthetrum coerulescens	Keeled skimmer	-	LC		-	G3.F
Odonata	Libellulidae	Selysiothemis nigra	Black pennant	-	LC		-	G1.7, G3.F
Odonata	Libellulidae	Sympetrum fonscolombii	Red-veined darter	-	LC		-	G1.3
Odonata	Libellulidae	Sympetrum sanguineum	Ruddy darter	-	LC		-	G1.7
Odonata	Libellulidae	Sympetrum striolatum	Common darter	-	LC		-	G3.F
Odonata	Platycnemididae	Platycnemis pennipes	White-legged damselfly	-	LC		-	G1.7

Annex 7.8.C: Marine Fish Species

Species name (latin) – Fishing (F) Observed (O)	Turkish Name	English (Common Name)	IUCN RL	Black Sea Biodiversity and Landscape Conservation Protocol (Annex II) / Black Sea RDB
Hippocampus hippocampus (O)	Deniz atı	Short-snouted sea horse	DD	
Scorpaena scrofa (F)	İskorpit	Largescaled scorpionfish	-	
Chelidonichthys llucernus (F)	Kırlangıç	Sapphirine gurnard	-	
Dicentrarchus labrax (F)	Levrek	European seabass	LC	Annex II listed
Serranus cabrilla (F)	Asıl Hani	Comber	-	Annex II listed
Boops boops (F)	Kupez, Lopa	Bogue	-	Annex II listed
Dentex dentex (F)	Sinarit	Common dentex	-	
Diplodus vulgaris (F)	Karagöz	Common two-banded seabream	-	
Lithognathus mormyrus (F)	Mırmır-Trat	Striped sea bream	-	
Oblada melanura (F)	Melanur	Saddled bream	-	
Pagellus erythrinus (F)	Kırma mercan	Common pandora	-	
Diplodus puntazzo (F)	Sivriburunlu Karagöz	Sharpsnout seabream	-	
Spicara maena (F)	İzmarit-Beyazgöz balığı	Mendole	-	
Sciaena umbra (F)	Eşkina	Brown meagre	-	
Mullus barbatus (F)	Barbun balığı	Red mullet	-	EN, Black Sea RDB
Mullus surmuletus (O)	Tekir	Striped red mullet	-	
Labrus mixtus (F)	Lapin	Cuckoo wrasse	LC	
Symphodus doderleini (F)	Çırçır	Doderlein's wrasse	LC	

Species name (latin) – Fishing (F) Observed (O)	Turkish Name	English (Common Name)	IUCN RL	Black Sea Biodiversity and Landscape Conservation Protocol (Annex II) / Black Sea RDB
Sardinella aurita Valenciennes (F)	Büyük sardalya	Maderian sardinella	LC	
Trachurus trachurus (O)	Karagöz istavriti	Atlantic horse-mackerel	-	
Mugil cephalus (F)	Has kefal	Flat-headed grey mullet	LC	
Argyrosomus regius (F)	Kötek balığı		-	
Pelates quadrilineatus (F)	İspinoz balığı	Terapons	-	
Trachinus draco (F)	Trakonya	Greater weever	-	CE, Black Sea RDB (sub-regional)
Arnoglossus laterna (F)	Küçük pisi balığı	Scaldfish	-	
Bothus podas (F)	Pisi balığı	Wide-eyed flounder	-	
Scophthalmus maximus (O)	Kalkan Balığı	Tourbout	-	
Solea solea (O)	Dil balığı	Sand sole	-	

List of Marine Fish Species identified from published literature[1] with potential to occur in the vicinity of the Project Area.				
Species	**Turkish Name**	**English Name**	**IUCN RL**	**Red Sea biodiversity and landscape Conservation Protocol (Annex II) or Black Sea Red Data Book List**
Scyliorhinus canicula	Kedi balığı	Small-spotted catshark	LC	
Oxynotus centrina	Domuz balığı	Angular roughshark	VU	
Torpedo nobiliana	Elektrik balığı	Atlantic torpedo	DD	
Raja clavata	Dikenli vatoz	Thornback ray	NT	
Raja miraletus	Kahverengi vatoz	Brown ray	LC	
Dasyatis pastinaca	İğneli vatoz	Common stingray	DD	
Gymnura altavela	Kazıkkuyruk	Butterfly ray	VU	

List of Marine Fish Species identified from published literature[1] with potential to occur in the vicinity of the Project Area.				
Species	**Turkish Name**	**English Name**	**IUCN RL**	**Red Sea biodiversity and landscape Conservation Protocol (Annex II) or Black Sea Red Data Book List**
Mureana helena	Müren	Moray eel	-	
Conger conger	Mıgrı	European conger	-	Annex II, VU Black Sea RDB
Ophidion barbarum	Kayış balığı	Snake blenny	-	
Ophidion rochei	Kayış balığı	Blenny	DD	
Diplecogaster bimaculata	Ördek balığı	Two-spotted clingfish	-	
Zeus faber	Dülger balığı	John dory	-	
Syngnathus abaster	Deniz iğnesi	Black-stripped pipefish	LC	
Syngnathus typhle	Geniş burunlu deniz iğnesi	Broad-nosed pipefish	-	VU, Black Sea RDB: Bulgarian coast sub-region only)
Hippocampus guttulatus	Deniz atı	Long-snouted sea horse	DD	Annex II, EN Black Sea RDB
Scorpaena notata	Benekli iskorpit	Small red scorpion fish	-	
Scorpaena porcus	Lipsoz	Blackscorpion fish	-	VU, Black Sea RDB: Bulgarian coast sub-region only)
Dactylopterus volitans	Uçan kırlangıç	Flying gurnard	-	
Chelidonichthys lastoviza	Mazak	Streaked gurnard	-	
Epinephelus aeneus	Lahoz	Golden grouper	NT	
Serranus scriba	Yazılı hani	Painted comber	-	
Serranus hepatus	Benekli hani	Brown comber	-	
Diplodus annularis	Isparoz	Annular seabream	-	VU, Black Sea RDB: Bulgarian coast sub-region only)
Diplodus sargus	Sargoz	White seabream	-	
Spondyliosoma cantharus	İskatari	Blacksea bream	-	
Chromis chromis	Papaz balığı	Demoiselle	-	

List of Marine Fish Species identified from published literature[1] with potential to occur in the vicinity of the Project Area.				
Species	**Turkish Name**	**English Name**	**IUCN RL**	**Red Sea biodiversity and landscape Conservation Protocol (Annex II) or Black Sea Red Data Book List**
Coris julis	Gelin balığı	Rainbow wrasse	LC	
Labrus merula	Kahverengi lapin	Brown wrasse		
Symphodus mediterraneus	Çırçır	Axillary wrasse	LC	
Saurida undosquamis	Zurna balığı	Lizardfish	-	
Synodus saurus	Zurna balığı	Lizardfish	LC	
Apogon imbersis	Kardinal balığı	Cardinalfish	-	
Parablennius gattorugine	Horozbina	Tombot blenny	LC	
Callionymus filamentosus	Üzgün balığı	Dragonet	-	
Alepes djedaba	Çatal balığı	Shrimp scad	-	
Caranx rhonchus	Kral balığı	False scad	-	
Seriola dumerili	Sarıkuyruk-Avcı	Greater amberjack	-	
Gobius niger	Kömürcü kayabalığı	Black goby	-	
Oxyurichthys petersi	Sivrikuyruk kayabalığı	Papuan goby	-	
Pomadasys incisus	Yalancı isparoz	Grunt	LC	
Symphodus tinca	Çırçır-Ot balığı	Long-nosed wrasse	LC	VU, Black Sea RDB: Bulgarian coast sub-region only)
Thalassoma pavo	Gün balığı_Akkuyruk	Sea-peacock	LC	
Leiognathus klunzingeri	Çıtçıt-Eksi balığı	Pony fish	-	
Liza aurata	Kefal-Altınbaş kefal	Golden grey mullet	LC	
Upeneus moluccensis	Paşa barbunu	Golden banded goat-fish	-	
Epinephelus aeneus	Lahoz	Golden grouper	NT	
Mycteroperca rubra	Taş hanisi	Comb grouper	LC	
Siganus rivulatus	Beyaz sokar-Sokkan	Marbled rabbit fish	LC	

List of Marine Fish Species identified from published literature[1] with potential to occur in the vicinity of the Project Area.				
Species	**Turkish Name**	**English Name**	**IUCN RL**	**Red Sea biodiversity and landscape Conservation Protocol (Annex II) or Black Sea Red Data Book List**
Sphyraena chrysoteania	İskarmoz	Obtuse barracuda	-	
Trichiurus lepturus	Kılkuyruk balığı	Hairtail	-	
Uranoscopus scaber	Kurbağa balığı	Stargazer	-	CE, Black Sea RDB: Bulgarian coast sub-region only)
Citharus linguatula	Kancaağız pisi balığı	Spotted-flounder	-	
Balistes carolinensis	Çütre	Grey tiggerfish	-	Annex II
Stephanolepis diaspros	Dikenli çütre balığı	Filefish	-	
Lagocephalus spadiceus	Balon balığı	Pufferfish	-	

1: Sources:

Bilecenoğlu, M., Taşkavak, E., Mater, S. & Kaya, M. (2002). Check list of marine fishes of Turkey. Zootaxa 113, 194p.

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Can, A., Bilecenoglu, M (2005) Türkiye denizlerinin dip balıkları atlası, Arkadaş Yayınevi, 224p.

Keskin, Ç. (2010) A Review of the fish Fauna in the Turkish Black Sea. J. Black Sea/Mediterranean Environment, Vol 16 (2): 195-210.

Annex 7.8.D: Migratory Bird Survey Results (Spring 2014): Excluding Large Soaring Bird Species

no	Bird Species	Number of Individuals	no	Bird Species	Number of Individuals
1	*Larus michahellis*	110,793	26	*Ardea cinerea*	61
2	*Puffinus yelkouan*	33,349	27	*Carduelis chloris*	60
3	*Motacilla alba*	14,357	28	*Lanius collurio*	58
4	*Fringilla coelebs*	9,504	29	*Corvus corax*	55
5	*Hirundo rustica*	5,909	30	*Phalacrocorax pygmaeus*	54
6	*Merops apiaster*	3,567	31	*Carduelis cannabina*	52
7	*Motacilla flava*	2,888	32	*Hirundo daurica*	48
8	*Tachymarptis melba*	2,864	33	*Pica pica*	48
9	*Corvus monedula*	2,265	34	*Corvus cornix*	47
10	*Riparia riparia*	1,232	35	*Emberiza melanocephala*	46
11	*Passer hispaniolensis*	1,211	36	*Sylvia communis*	43
12	*Delichon urbicum*	384	37	*Passer domesticus*	33
13	*Columba palumbus*	297	38	*Upupa epops*	28
14	*Emberiza calandra*	244	39	*Ardea purpurea*	27
15	*Phalacrocorax carbo*	225	40	*Carduelis spinus*	23
16	*Streptopelia turtur*	205	41	*Anthus pratensis*	20
17	*Apus apus*	170	42	*Coracias garrulus*	20
18	*Sturnus vulgaris*	112	43	*Oenanthe oenanthe*	20
19	*Emberiza hortulana*	105	44	*Anas platyrhynchos*	19
20	*Apus pallidus*	100	45	*Acrocephalus arundinaceus*	18
21	*Anthus campestris*	98	46	*Chlidonias niger*	16
22	*Carduelis carduelis*	82	47	*Alauda arvensis*	14
23	*Calandrella brachydactyla*	81	48	*Egretta garzetta*	14
24	*Anthus trivialis*	69	49	*Turdus philomelos*	14
25	*Luscinia megarynchos*	67	50	*Phalacrocorax aristotelis*	13

no	Bird Species	Number of individuals	no	Bird Species	Number of individuals
51	*Coturnix coturnix*	12	75	*Glareola pranticola*	3
52	*Lanius minor*	12	76	*Phylloscopus collybita*	3
53	*Sterna sandvicensis*	12	77	*Saxicola torquatus*	3
54	*Casmerodius albus*	11	78	*Tadorna tadorna*	2
55	*Corvus corene*	10	79	*Crex crex*	2
56	*Emberiza cirlus*	10	80	*Dendrocopus syriacus*	2
57	*Sylvia melanocephala*	10	81	*Garrulus glandarius*	2
58	*Galerida cristata*	9	82	*Streptopelia decaocto*	2
59	*Calidris ferruginea*	8	83	*Tringa ochropus*	2
60	*Ardeola ralloides*	7	84	*Acrocephalus scirpaceus*	1
61	*Cuculus canorus*	7	85	*Athene noctua*	1
62	*Platalea leucorodia*	7	86	*Charadrius morinellus*	1
63	*Sterna hirundo*	7	87	*Gallinago gallinago*	1
64	*Cettia cetti*	6	88	*Lanius senator*	1
65	*Columba livia*	6	89	*Larus fuscus*	1
66	*Hippolais pallida*	6	90	*Larus marinus*	1
67	*Saxicola rubetra*	5	91	*Lymnocryptes minimus*	1
68	*Turdus merula*	5	92	*Motacilla cinerea*	1
69	*Aythya nyroca*	4	93	*Motacilla citreola*	1
70	*Fulica atra*	4	94	*Parusmajor*	1
71	*Gavia arctica*	4	95	*Pluvialis apricaria*	1
72	*Larus melanocephalus*	4	96	*Serinus serinus*	1
73	*Anthus cervinus*	3	97	*Turdus viscivorus*	1
74	*Fringilla montifringilla*	3			

Annex 7.8.E: Migratory Bird Survey Results (Autumn 2014): Excluding Large Soaring Bird Species

no	Bird Species	Number of Individuals	no	Bird Species	Number of Individuals
1	*Apus melba*	25710	58	*Alcedo atthis*	21
2	*Larus michahellis*	17577	59	*Cuculus canorus*	20
3	*Hirundo rustica*	11168	60	*Puffinus yelkouan*	20
4	*Merops apiaster*	3473	61	*Athene noctua*	18
5	*Corvus monedula*	2956	62	*Turdus merula*	17
6	*Passer domesticus*	1057	63	*Anthus cinerea*	16
7	*Fringilla coelebs*	949	64	*Emberiza hortulana*	16
8	*Motacilla flava*	759	65	*Erithacus rubecula*	16
9	*Columba Livia*	726	66	*Coccothraustes Coccothraustes*	15
10	*Larus cachinnans*	680	67	*Gallinula chloropus*	13
11	*Motacilla alba*	659	68	*Sylvia communis*	12
12	*Calandrella brachydactyla*	447	69	*Lanius minor*	10
13	*Corvus Corene*	375	70	*Tachybaptus ruficollis*	10
14	*Corvus Cornix*	375	71	*Acrocephalus arundinaceus*	9
15	*Phylloscopus trochiloides*	355	72	*Larus minitus*	9
16	*Ardea cinerea*	344	73	*Oriolus oriolus*	9
17	*Corvus corax*	332	74	*Sylvia borin*	9
18	*Sturnus vulgaris*	328	75	*Alauda arvensis*	8
19	*Apus apus*	324	76	*Coracias garrulus*	8
20	*Anthus campestris*	281	77	*Larus melanocephalus*	8
21	*Muscicapa striata*	227	78	*Dendrocopus medius*	7
22	*Streptopelia turtur*	209	79	*Sylvia atricapilla*	7
23	*Emberiza cirlus*	202	80	*Regulus ignicapilla*	6
24	*Lanius collurio*	189	81	*Actitis hypoleucos*	4
25	*Saxicola rubetra*	154	82	*Aegithalos Caudatus*	4
26	*Columba palumbus*	149	83	*Anthus pratensis*	4
27	*Riparia riparia*	135	84	*Carduelis chloris*	4
28	*Phylloscopus trochilus*	126	85	*Lullula arborea*	4
29	*Phalacrocorax carbo*	117	86	*Motacilla cinerea*	4

no	Bird Species	Number of Individuals	no	Bird Species	Number of Individuals
30	*Larus fuscus*	112	87	*Picus viridis*	4
31	*Anthus trivialis*	107	88	*Certhia brachydactyla*	3
32	*Pica pica*	107	89	*Dendrocopus minor*	3
33	*Phoenicurus phoenicurus*	105	90	*Ficedula albicollis*	3
34	*Garrulus glandarius*	104	91	*Ficedula hypoleuca*	3
35	*Parus caeruleus*	104	92	*Phoenicurus erythrogastrus*	3
36	*Sylvia melanocephala*	102	93	*Anthus cervinus*	4
37	*Delichon urbicum*	100	94	*Branta ruficollis*	2
38	*Oenanthe oenanthe*	96	95	*Casmerodius albus*	2
39	*Aegithalos caudatus*	93	96	*Emberiza calandra*	2
40	*Ficedula parva*	75	97	*Emberiza melanocephala*	2
41	*Platalea leucorodia*	75	98	*Jynx torguilla*	2
42	*Anas platyrynchos*	73	99	*Larus ridibundus*	2
43	*Streptopelia decaocto*	67	100	*Regulus regulus*	2
44	*Lanius michahellis*	63	101	*Sylvia melanothorax*	4
45	*Parus major*	60	102	*Turdus viscivorus*	2
46	*Luscinia megarynchos*	50	103	Acrocephalus scirpaceus	1
47	*Emberiza cirtrinella*	48	104	Ardea purpurea	1
48	*Tringa ochropus*	38	105	Charadrius alexandrinus	1
49	*Hirundo daurica*	36	106	Charadrius morinellus	1
50	*Coccothraustes coccothraustes*	34	107	Dendrocopus syriacus	1
51	*Anas querrquedula*	30	108	Ixobrychus minutus	1
52	*Apus pallidus*	28	109	Lanius collurio	1
53	*Sylvia rueppeli*	27	110	Oenanthe isabellina	1
54	*Upupa epops*	27	111	Passer hispaniolensis	1
55	*Phylloscopus collybita*	26	112	Philomachus pugnax	1
56	*Egretta garzetta*	24	113	Tringa hypoleucos	1
57	*Sylvia curruca*	22	114	Troglodytes troglodytes	1

Annex 7.8.F: Breeding Bird Survey Results

Breeding Bird Species	MAJOR HABITAT TYPES IN THE PROJECT AREA									TOTAL
	Coastal dunes and meadows	Reedbeds and tall helophytes	Low and medium meadows	Deciduous woodland	Coniferous woodlands	Steppes (wooded)	Mineral extraction sites	Cultivated areas	Villages and urban peripheries	
Corvus monedula				10				85	236	**331**
Passer domesticus								22	157	**179**
Sturnus vulgaris								12	116	**128**
Luscinia megarynchos		115								**115**
Hippolais pallida		17		43	19					**79**
Hirundo rustica		20					5		52	**77**
Passer hispaniolensis									75	**75**
Lanius collurio			34		28	10				**72**
Miliaria calandra			12	9				45		**66**
Fringilla coelebs				11	46					**57**
Acrocephalus arundinaceus		47								**47**
Corvus corene								5	42	**47**
Emberiza hortulana			9	13		18				**40**
Delichon urbicum									39	**39**
Streptopelia turtur				27	11					**38**
Turdus merula				32	6					**38**
Merops apiaster	23						10			**33**
Sylvia communis				33						**33**
Pica pica				12	8				12	**32**
Emberiza cirlus		5	17	9						**31**
Parus major				4	19					**23**
Emberiza melanocephala			12			9				**21**

Breeding Bird Species	MAJOR HABITAT TYPES IN THE PROJECT AREA									TOTAL
	Coastal dunes and meadows	Reedbeds and tall helophytes	Low and medium meadows	Deciduous woodland	Coniferous woodlands	Steppes (wooded)	Mineral extraction sites	Cultivated areas	Villages and urban peripheries	
Parus caeruleus					18					**18**
Garrulus glandarius					14					**14**
Sylvia melanocephala				14						**14**
Sylvia atricapilla				13						**13**
Streptopelia decaocto									13	**13**
Oenanthe oenanthe			9			4				**13**
Anthus campestris			5			7				**12**
Erithacus rubecula				4	6					**10**
Oriolus oriolus				9						**9**
Cuculus canorus				7						**7**
Cettia cetti		7								**7**
Phylloscopus collybita				7						**7**
Coccothraustes coccothraustes					7					**7**
Gallinula chloropus		5								**5**
Riparia riparia	4									**4**
Troglodytes troglodytes		4								**4**
Acrocephalus palustris		4								**4**
Circaetus gallicus					4					**4**
Motacilla flava		4								**4**

Breeding Bird Species	MAJOR HABITAT TYPES IN THE PROJECT AREA									TOTAL
	Coastal dunes and meadows	Reedbeds and tall helophytes	Low and medium meadows	Deciduous woodland	Coniferous woodlands	Steppes (wooded)	Mineral extraction sites	Cultivated areas	Villages and urban peripheries	
Motacilla alba alba		4								**4**
Tachybaptus ruficollis		2								**2**
Falco tinnunculus							2			**2**
Charadrius dubius	2									**2**
Charadrius alexandrinus	2									**2**
Columba palumbus					2					**2**
Turdus philomelos				2						**2**
Lanius minor			2							**2**
Falco subbuteo							2			**2**
Sylvia nisoria				2						**2**
Phalacrocorax pygmaeus		1								**1**
Anas platyrhynchos		1								**1**
Buteo buteo					1					**1**
Aquila pomarina					1					**1**
Athene noctua									1	**1**
Upupa epops				1						**1**
Dendrocopus syriacus					1					**1**
Galerida cristata								1		**1**
Muscicapa striata				1						**1**
Aegithalos caudatus					1					**1**
Corvus corax								1		**1**

Breeding Bird Species	MAJOR HABITAT TYPES IN THE PROJECT AREA									TOTAL
	Coastal dunes and meadows	Reedbeds and tall helophytes	Low and medium meadows	Deciduous woodland	Coniferous woodlands	Steppes (wooded)	Mineral extraction sites	Cultivated areas	Villages and urban peripheries	
Saxicola rubetra			1							**1**
Ficedula semitorquata				1						**1**
TOTAL NUMBERS OF BREEDING INDIVIDUALS	**31**	**236**	**101**	**264**	**192**	**48**	**19**	**171**	**743**	**1805**
TOTAL NUMBERS OF BREEDING BIRD SPECIES	**4**	**14**	**9**	**22**	**17**	**5**	**4**	**7**	**10**	**64**

Annex 7.8.G: Critical Habitat Assessment

ESIA
Istanbul
New Airport

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GA

Annex 7.8.G: Critical Habitat Assessment

1 Introduction

This Critical Habitat Annex provides an assessment of critical habitat applicable to the Istanbul New Airport (INA) Project. This annex is based on the baseline information provided by the Ecology section of the **ESIA Chapter 7 Environmental Baseline and Impact Assessment** for the Project. The ESIA was informed by an extensive literature review and in-field data collection. This process has completed the first two steps of critical habitat determination, as specified in paragraphs GN67 and GN68 of the IFC's Guidance Note 6[1]. Therefore, the scope of this report is limited to step 3 as defined in paragraph GN79 on Critical Habitat Determination.

1.1 Definition of Critical Habitat

Critical habitat is defined in Paragraph 16 of the 2012 version of IFC Performance Standard 6 (PS6)[2] as an area with high biodiversity value. This includes areas that meet one or more of following criteria:

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

However, as specified by GN56 of the IFC's Guidance Note 6, the determination of critical habitat can include other recognised high biodiversity values which are to be evaluated on a case-by-case basis. GN56 provides the following seven examples:

- Areas required for the reintroduction of CR or EN species and refuge sites for these species (habitat used during periods of stress (e.g. flood, drought or fire)).
- Ecosystems of known special significance to EN or CR species for climate adaptation purposes.
- Concentrations of Vulnerable (VU) species in cases where there is uncertainty regarding the listing, and the actual status of the species may be EN or CR.
- Areas of primary/old-growth/pristine forests and/or other areas with especially high levels of species diversity.
- Landscape and ecological processes (e.g. water catchments, areas critical to erosion control, disturbance regimes (e.g. fire, flood)) required for maintaining critical habitat.
- Habitat necessary for the survival of keystone species.
- Areas of high scientific value such as those containing concentrations of species new and/or little known to science.

[1] IFC. 2012. Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

[2] IFC. 2012. Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Furthermore, GN57 states that in general, internationally and/or nationally recognised areas of high biodiversity value will likely qualify as critical habitat, including the following:

- Areas that meet the criteria of the IUCN's Protected Area Management Categories Ia, Ib and II, although areas that meet criteria for Management Categories III-VI may also qualify depending on the biodiversity values inherent to those sites.
- UNESCO Natural World Heritage Sites that are recognised for their Global Outstanding Value.
- The majority of Key Biodiversity Areas (KBAs), which encompass *inter alia* Ramsar Sites, Important Bird Areas (IBA), Important Plant Areas (IPA) and Alliance for Zero Extinction Sites (AZE).
- Areas determined to be irreplaceable or of high priority/significance based on systematic conservation planning techniques carried out at the landscape and/or regional scale by governmental bodies, recognised academic institutions and/or other relevant qualified organisations (including internationally-recognised NGOs).
- Areas identified by the client as High Conservation Value (HCV) using internationally recognised standards, where criteria used to designate such areas is consistent with the high biodiversity values listed in paragraph 16 of Performance Standard 6.

1.2 Gradient of Critical Habitat

IFC Guidance Note 6 recognises that there are gradients of critical habitat based on relative vulnerability (degree of threat) and irreplaceability (rarity or uniqueness). For Criteria 1-3, listed in section 1.1 of this Annex, quantitative thresholds are provided to assign critical habitat into either Tier 1 or Tier 2. Table 7.8.G.1 details the relevant thresholds.

Table 7.8.G.1. Quantitative Thresholds for Tiers 1 and 2 of Critical Habitat Criteria 1 - 3

Criterion	Tier 1	Tier 2
1. Critically Endangered (CR)/ Endangered (EN) Species	(a) Habitat required to sustain ≥ 10 percent of the global population of a CR or EN species/subspecies where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species. (b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.	(c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/ subspecies. (d) Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species. (e) As appropriate, habitat containing nationally/regionally important concentrations of an

		EN, CR or equivalent national/regional listing.
2. Endemic/ Restricted Range Species	(a) Habitat known to sustain ≥ 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g. a single-site endemic).	(b) Habitat known to sustain ≥ 1 percent but < 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.
3. Migratory/ Congregatory Species	(a) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.	(b) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent but < 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment. (c) For birds, habitat that meets BirdLife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance. (d) For species with large but clumped distributions, a provisional threshold is set at ≥5 percent of the global population for both terrestrial and marine species. (e) Source sites that contribute ≥ 1 percent of the global population of recruits.

Neither IFC Performance Standards nor Guidance Note 6 define what constitutes a nationally/regionally important concentration. However, as Tier 1 critical habitat under Criterion 1 is defined by ≥10 percent of the global population of a CR or EN species, Tier 2 Critical Habitat has been defined by ≥10 percent of the national/regional population of a CR or EN species.

For a number of threatened and endemic plant species, accurate population estimates are not available. Therefore, the analysis of critical habitat is broadly based on the concept of Area of Occupancy (AOO). This is defined by the International Union for Conservation of Nature (IUCN) as the area within its 'extent of occurrence', which is occupied by a taxon, excluding cases of vagrancy. It is recognised as a useful proxy for population size, because there is generally a positive correlation between AOO and population size. AOO is

calculated by multiplying the number of occupied tetrads in a uniform grid that covers the entire range of a taxon by the size of the tetrad. A detailed tetrad distribution atlas is not available for Turkey. However, TÜBİVES (Turkish Plants Data Service)[3] uses a system which divides Turkey into thirty large grid squares. The population distributions provided by TÜBİVES have been used to assess critical habitat thresholds.

1.3 Unit of Analysis

The scale at which the critical habitat determination takes place depends on underlying ecological processes for the habitat and species in question and is not limited to the footprint of the project. GN65 of IFC's Guidance Note 6 states that for Criteria 1-3, the determination of critical habitat should be based on a "discrete management unit" (DMU) which is an area that has a definable boundary within which the biological communities have more in common with each other than they do with those outside the boundary. GN65 goes on to provide the following additional guidance on the selection of the DMU:

'*A discrete management unit may or may not have an actual management boundary (e.g. legally protected areas, World Heritage sites, KBAs, IBAs, community reserves) but could also be defined by some other sensible ecologically definable boundary (e.g. watershed, interfluvial zone, intact forest patch within patchy modified habitat, seagrass habitat, coral reef, concentrated upwelling area, etc.). The delineation of the management unit will depend on the species (and, at times, subspecies) of concern'*.

The DMU at which each habitat and species is considered is described in section 3 of this annex.

[3] http://www.tubives.com/index.php

2 Methodology

2.1 Criterion 1: Critically Endangered and/or Endangered Species

Footnote 11 of the IFC PS6 defines Critically Endangered and/or Endangered Species as species either:

i) listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally/regionally[4] as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; or

ii) in instances where nationally or regionally listed species' categorisations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

Chapter 7.8 Ecology identifies globally, regionally and nationally Critically Endangered and Endangered species that have the potential to be present within the Project Area. This has been completed with reference to the following:

- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (RL)[5];
- IUCN 2010 European Red List[6];
- Black Sea Red Data Book (RDB)[7];
- The Red Book of Butterflies in Turkey (RBBT) [8]; and
- Red Data Book of Turkish Plants (RDBTP)[9].

The classification system used by the IUCN RL, Black Sea RDB, RBBT and RDBTP for representing the extinction risk of species is presented in Table 7.8.G.2. Species classified as VU or above on the IUCN RL are often referred to as 'threatened' species.

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[4] According to the IUCN "the word *regional* is used here to indicate any sub-global geographically defined area, such as a continent, country, state, or province." IUCN. 2012. Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. Gland, Switzerland and Cambridge, UK: IUCN. iii + 41pp.

[5] IUCN. 2013. The IUCN Red List of Threatened Species. Version 2013.2. <http://www.iucnredlist.org>.

[6] IUCN. 2010. European Red List, available at http://ec.europa.eu/environm_ent/nature/conservation/species/redlist/process/use_citation.htm

[7] http://www.grid.unep.ch/bsein/redbook/index.htm

[8] Karaçetin, E. and H.J. Welch. 2011). Red Book of Butterflies in Turkey. Ankara, Turkey: Doğa Koruma Merkezi. Available from: [www.dkm.org.tr].

[9] Ekim, T., Koyuncu, M., Vural, M., Duman, H., Aytaç, Z. and Adıgüzel, N. 2000. Türkiye Bitkileri Kırmızı Kitabı (Red Data Book of Turkish Plants). Ankara, Turkey: Türkiye Tabiatını Koruma Derneği.

Table 7.8.G.2. IUCN Categories of Extinction Risk[10]

IUCN Category	Definition
Extinct in the Wild (EXW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.
Critically Endangered (CR):	Species facing an extremely high risk of extinction in the wild.
Endangered (EN):	Species facing a very high risk of extinction in the wild.
Vulnerable (VU)	Species facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Data Deficient (DD)	Inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.
Least Concern (LC)	A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

In addition to the publications mentioned above, the Red Data Book of Birds of Turkey[11] has been reviewed. However, this publication used an assessment methodology specific to German-speaking countries, which is based largely on population size rather than IUCN categories and criteria. Therefore, the resulting classification categories are not directly comparable with those of the IUCN and cannot be used to inform the determination of critical habitat as defined by IFC PS6.

2.2 Criterion 2: Endemic and/or Restricted-Range Species

IFC's Guidance Note 6 provides the following definitions for Endemic and restricted-range species:

[10] IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

[11] Kiziroğlu, İ. 2008. Türkiye Kuşları Kırmızı Listesi (Red Data Book for Birds of Türkiye). Ankara, Turkey: Ankamat Matbaacılık.

- *"Endemic species: defined as one that has ≥ 95 percent of its global range inside the country or region of analysis.*
- *Restricted-range species:*
  - *For terrestrial vertebrates, a restricted-range species is defined as those species which have an extent of occurrence of 50,000 km^2 or less.*
  - *For marine systems, restricted-range species are provisionally being considered those with an extent of occurrence of 100,000 km^2 or less.*
  - *For freshwater systems, standardized thresholds have not been set at the global level. However an IUCN study of African freshwater biodiversity applied thresholds of 20,000 km^2 for crabs, fish, and molluscs and 50,000 km^2 for odonates (dragonflies and damselflies). These can be taken as approximate guidance, although the extent to which they are applicable to other taxa and in other regions is not yet known.*
  - *For plants, restricted-range species may be listed as part of national legislation. Plants are more commonly referred to as "endemic," and the definition provided in paragraph GN79 would apply."*

Species listed in **Chapter 7.8 Ecology** were screened to identify whether they meet the definition of either endemic or range-restricted species. This was completed with reference to published sources and in liaison with experts.

Criterion 1 and 2 are addressed at the same time in section 3 of this annex.

2.3 Criterion 3 Migratory and Congregatory Species

IFC Guidance Note 6 defines migratory and congregatory species in the following way:

- Migratory species:
  - *"any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem)."*
- Congregatory species:
  - *"species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.*
  - *Species that form colonies.*
  - *Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (e.g., foraging, roosting).*
  - *Species that move through bottleneck sites where significant numbers of individuals of a species pass over a concentrated period of time (e.g., during migration).*
  - *Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (e.g., wildebeest distributions).*
  - *Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species)."*

For birds, habitat that meets Birdlife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance meet the Tier 2 classification for critical habitat.

Chapter 7.8 Ecology identifies a number of migratory bird species that have been recorded within the Project Area.

2.4 Criterion 4 Highly Threatened and/or Unique Ecosystems

IFC Guidance Note 6 defines highly threatened or unique ecosystems as:

- *"at risk of significantly decreasing in area or quality;*
- *with a small spatial extent; and/or*
- *containing unique assemblages of species including assemblages or concentrations of biome-restricted species."*

A working group has been established by the IUCN to develop a system of quantitative categories and criteria, analogous to those used for species, for assigning levels of threat to ecosystems at local, regional, and global levels (Rodriguez *et al.,* 2011)[12]. Ecosystems that fall within the Project Area and meet the definition of EN or CR according to Rodriguez *et al.,* 2011 are assumed to meet Criterion 4 for critical habitat.

Full details of the proposed system are set out in Annex 1. In summary, they are based on four main criteria:

- A: Short-term decline in distribution or function (over 50 years);
- B: Long-term decline in distribution or function (over 500 years);
- C: Small current distribution and decline (in distribution or ecological function) or very few locations; and
- D: Very small current distribution.

Due to lack of evidence of ecological change, the very long timeframe involved and the inherent large amount of uncertainty resulting from this, it is not practical to estimate changes over the last 500 years. Therefore, only criteria A, C and D have been used for the assessment of critical habitat. Ecosystems that fall within the study areas and meet the definition of EN or CR according to Rodriguez *et al*., 2011 are assumed to meet Criterion 4 for critical habitat. For some habitat types, data on distribution and quality are lacking. In these instances estimates have been made based on available evidence, professional judgement and levels of protection (e.g. habitats specifically protected by law, or proportion of habitat types occurring within protected areas).

2.5 Criterion 5: Key Evolutionary Processes

Evolutionary processes are often strongly influenced by structural attributes of a region, such as its topography, geology, soil and climate over a period of time. IFC Guidance Note 6 suggests that this criterion is defined by:

[12] Rodriguez, J.P., K. M. Rodriguez-Clark, J.e.M. Baillie, N. Ash, J. Benson, T. Boucher, C. Brown, N.D. Burgess, B. Collen, M. Jennings, D.A. Keith, E. Nicholson, C. Revenga, B. Reyers, M. Rouget, T. Smith, M. Spalding, A. Taber, M. Walpole, I. Zager, and T. Zamin. 2011. Establishing IUCN red list criteria for threatened ecosystem. *Conservation Biology* 25:21-29.

- "*the physical features of a landscape that might be associated with particular evolutionary processes; and/or*
- *sub-populations of species that are phylogenetically or morphogenetically distinct and may be of special conservation concern given their distinct evolutionary history."*

For the purposes of this assessment, the Project Area has been screened against the following factors:

- level of isolation (e.g. islands, mountaintops, lakes are associated with populations that are phylogenetically distinct);
- extent of endemism (areas of high endemism often contain flora and/or fauna with unique evolutionary histories);
- spatial heterogeneity;
- presence of environmental gradients (*ecotones* produce transitional habitat which has been associated with the process of speciation and high species and genetic diversity);
- Edaphic interfaces; and
- Connectivity between habitats (e.g. biological corridors).

Criterion 5 is usually considered at a relatively fine scale (TBC and FFI, 2012)[13] and thus the most appropriate unit of analysis is that which may potentially experience direct, primary impacts from the Project (i.e. the Project Area).

[13] The Biodiversity Consultancy Ltd and Fauna & Flora International. 2012. Oyu Tolgoi LLC: Critical Habitat Assessment: IFC Performance Standard 6/EBRD Performance Requirement 6.

3 Determination

3.1 Criteria 1 and 2

The species identified by the ESIA as being potentially present within the Project Area have been screened to identify species that are classified as either Critically Endangered or Endangered globally, regionally or nationally, as well as endemic or range restricted species (Table 7.8.G.3).

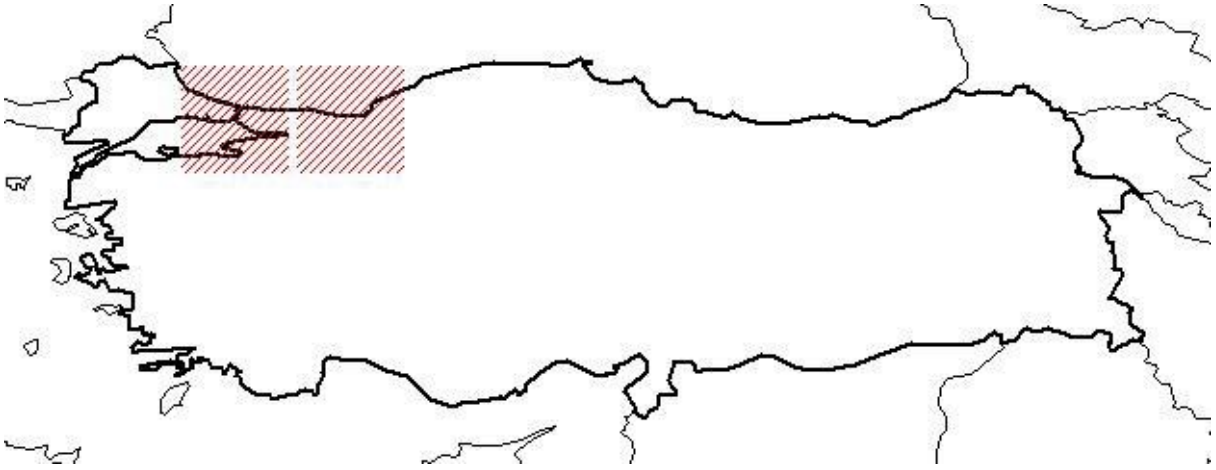
Table 7.8.G.3. Threatened and Endemic Species Present in the Project Area

Species	IUCN	Black Sea RDB	RBBT	RDBTP	Endemic	Restricted Range
Plants						
Lathyrus undulatus	DD (IUCN European RL)	-	n/a	VU	Yes	Yes
Centaurea hermannii	DD (IUCN European RL)	-	n/a	EN	Yes	Yes
Cirsium polycephalum	Not assessed	-	n/a	CR	Yes	Yes
Euphorbia amygdaloides subsp. Robbiae	Not assessed	-	n/a	VU	Yes	Yes
Galanthus x valentiei	Not assessed	-	n/a	VU	Yes	Yes
Convolvulus persicus	Not assessed	-	n/a	EN	No	No
Marine Fish						
Red mullet *Mullus barbatus ponticus*	Least Concern (IUCN Mediterranean RL)	EN	n/a	n/a	Yes	No
Long-snouted seahorse *Hippocampus guttulatus microstephanus*	DD	EN	n/a	n/a	Yes	No
Birds						
Egyptian vulture *Neophron percnopterus*	EN	-	n/a	n/a	No	No
Marine Mammals						
Common bottlenose dolphin *Tursipos truncates ponticus*	EN	DD	n/a	n/a	Yes	No
Short beaked common dolphin *Delphinus delphis ponticus*	VU	DD	n/a	n/a	Yes	No
Harbour porpoise *Phocoena phocoena relicta*	EN	DD	n/a	n/a	Yes	No

3.1.1 *Lathyrus undulates*

Lathyrus undulates has been classified as Vulnerable in the RDBTP. The species has been assessed as Data Deficient by the IUCN European RL. *Lathyrus undulates* is endemic to Turkey. Within Turkey, its distribution is limited to the provinces of Bolu, İstanbul, Bursa, and Sakarya, located in just two grid squares (Figure 1).

Figure 1. Distribution of *Lathyrus undulates* in Turkey[14]



Discrete Management Unit

With the exception of *Convolvulus persicus*, the threatened and endemic plant species present within the Project Area are found within the thermophilous deciduous woodland and highly artificial coniferous woodland (Figure 2). These woodland types are similar in character to other woodlands distributed all the way along the southern Black Sea shore within the Marmara region, from the Bosphorus to Bulgaria. The threatened and endemic plant species can be found distributed through these forest series that continues to the Bulgarian border. Therefore, the woodland area as a whole is defined as the DMU (Figure 3) for *Lathyrus undulates, Centaurea hermannii, Cirsium polycephalum, Euphorbia amygdaloides subsp. Robbiae* and *Galanthus x valentiei*.

[14] http://www.tubives.com/index.php?sayfa=1&tax_id=3075

Figure 2. Distribution of Threatened and Endemic Plant Species in the Project Area

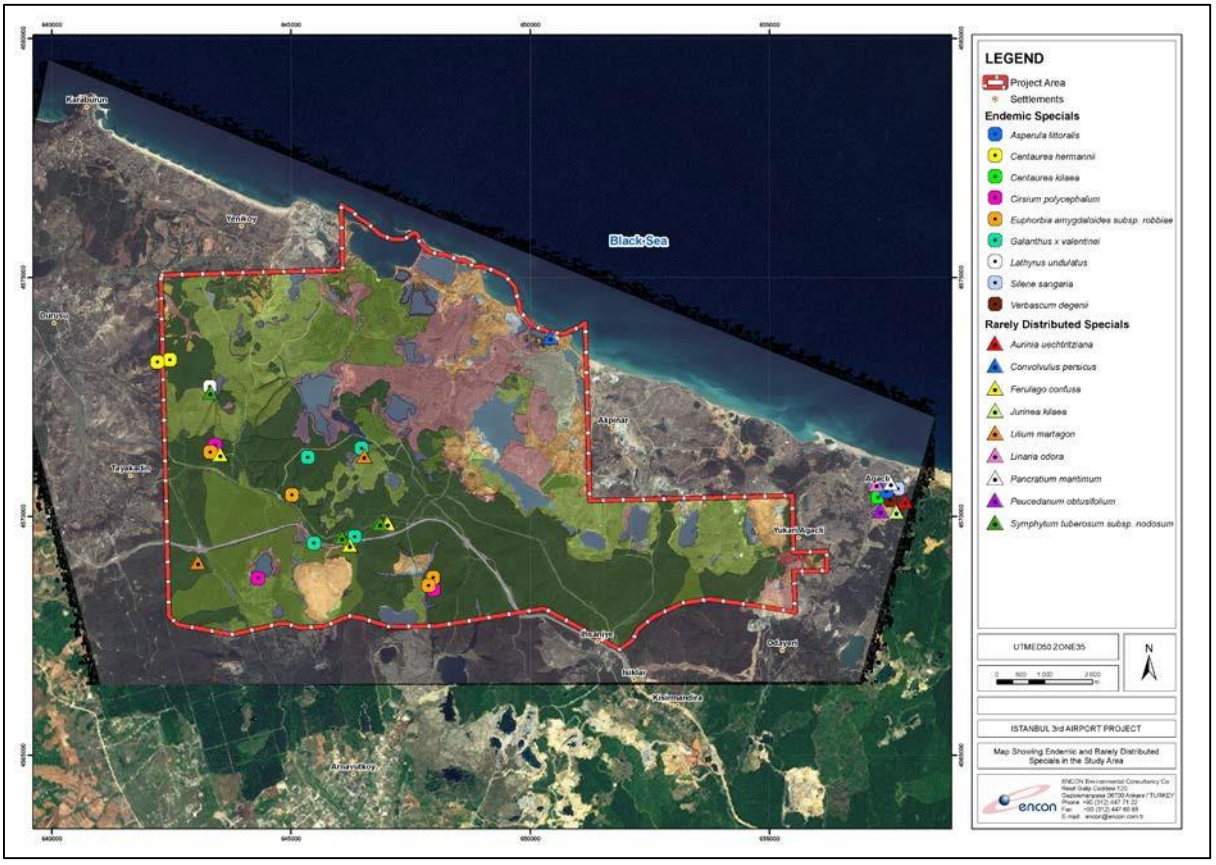
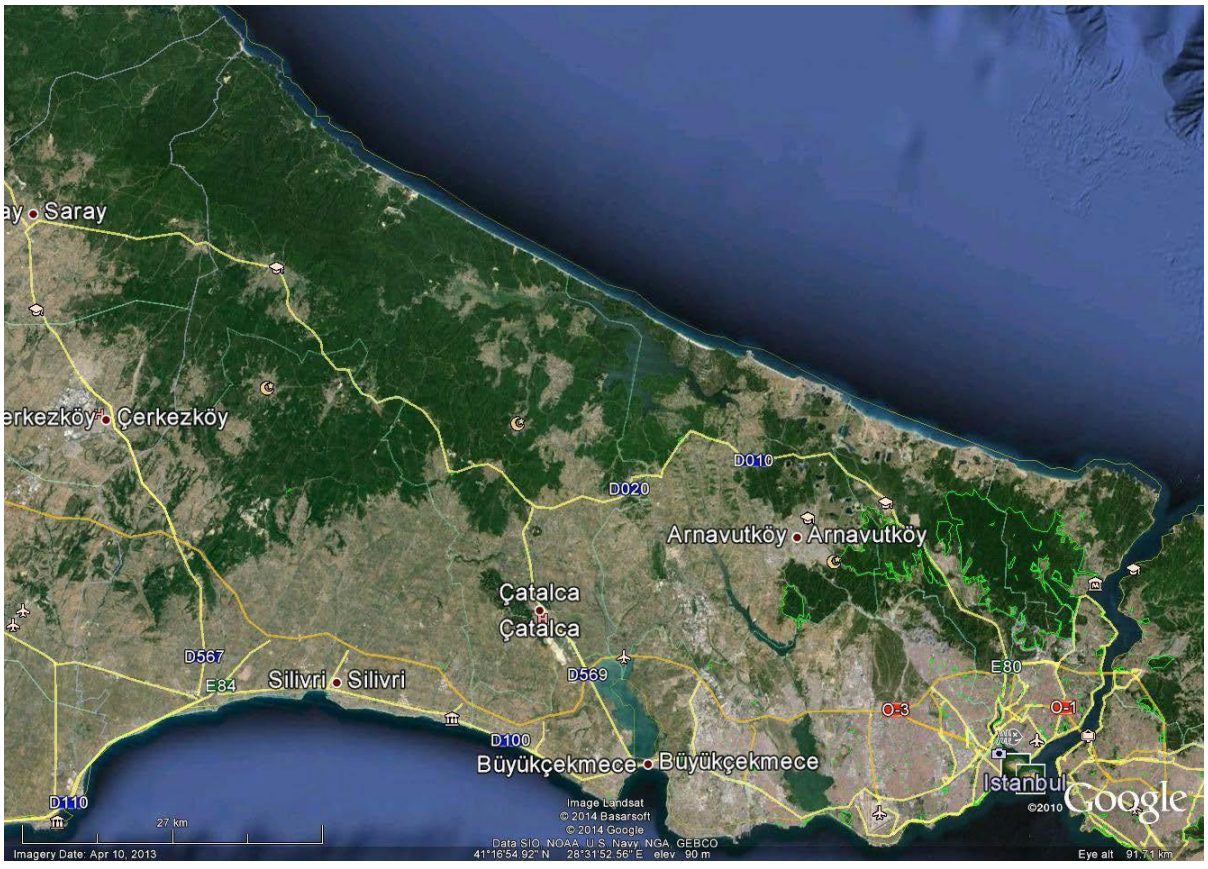


Figure 3. Woodland Plant DMU



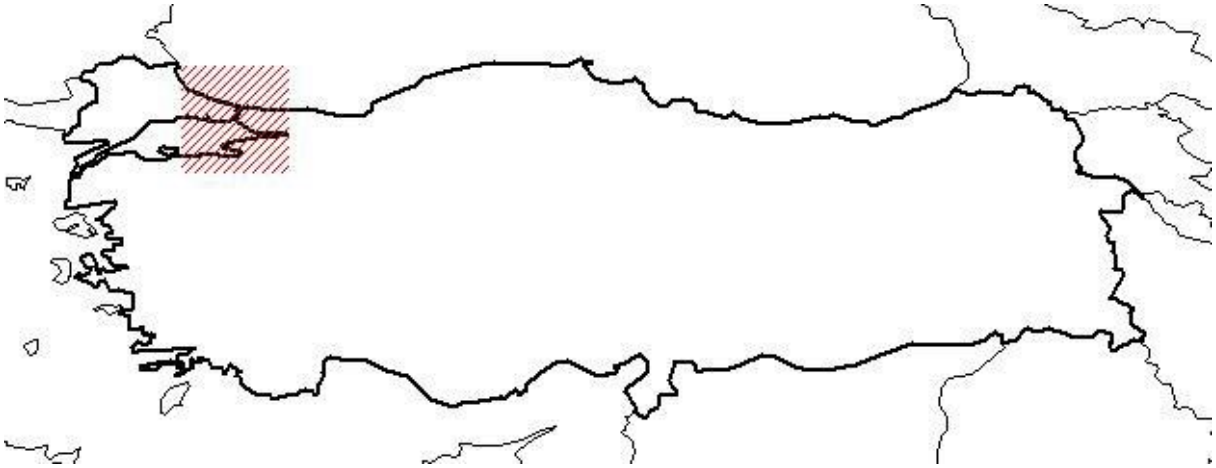
Critical Habitat Determination

The DMU is unlikely to support more than 95 percent of the global population of this species. However based on Figure 1, the DMU is likely to support greater than one percent of the global population. The DMU qualifies as Tier 2 critical habitat under Criterion 2 for *Lathyrus undulates.*

3.1.2 Centaurea hermannii

Centaurea hermannii has been classified as Endangered in the RDBTP. The species has been assessed as Data Deficient by the IUCN European RL. *Centaurea hermannii* is endemic to Turkey and its distribution is limited to the province of İstanbul. The species is just found within a single grid square (Figure 4).

Figure 4. Distribution of *Centaurea hermannii* in Turkey[15]



Discrete Management Unit

The DMU for *Centaurea hermannii* is defined under Section 3.1.1.

Critical Habitat Determination

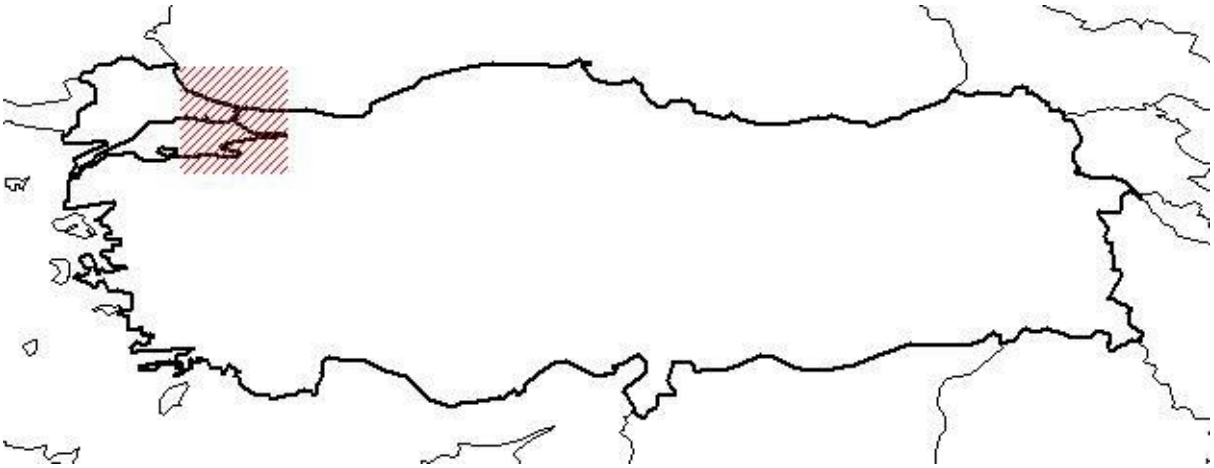
The DMU is unlikely to support more than 95 percent of the global population of this species. However, based on Figure 4 the DMU is likely to support greater than one percent of the global population. The DMU may also support a nationally/regionally important concentration of an EN, CR or equivalent national/regional listing. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 2, and possibly also Tier 2 critical habitat under Criterion 1 for *Centaurea hermannii.*

3.1.3 Cirsium polycephalum

Cirsium polycephalum has been classified as Critically Endangered in the RDBTP. The species has not been assessed by the IUCN. *Cirsium polycephalum* is endemic to Turkey and its distribution is limited to the province of İstanbul. The species is just found within a single grid square (Figure 5).

15

Figure 5. Distribution of *Cirsium polycephalum* in



Discrete Management Unit

The DMU for *Cirsium polycephalum* is defined under Section 3.1.1.

Critical Habitat Determination

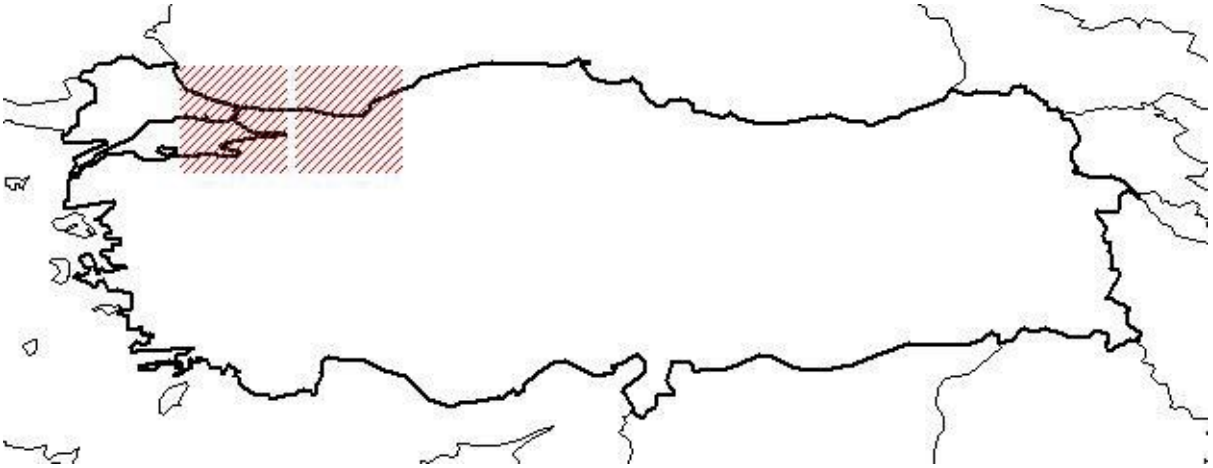
The DMU is unlikely to support more than 95 percent of the global population of this species. However, based on Figure 5 the DMU is likely to support greater than one percent of the global population. The DMU may also support a nationally/regionally important concentration of an EN, CR or equivalent national/regional listing. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 2, and possibly also Tier 2 critical habitat under Criterion 1 for *Cirsium polycephalum.*

3.1.4 Euphorbia amygdaloides subsp. Robbiae

Euphorbia amygdaloides subsp. Robbiae has been classified as Vulnerable in the RDBTP. The species has not been assessed by the IUCN. *Euphorbia amygdaloides subsp. Robbiae* is endemic to Turkey. Within Turkey, its distribution is limited to the provinces of Bolu and İstanbul, located in just two grid squares (Figure 6).

[16] http://www.tubives.com/index.php?sayfa=1&tax_i

Figure 6. Distribution of Euphorbia amygdaloides subsp. Robbiae in



Discrete Management Unit

The DMU for *Euphorbia amygdaloides subsp. Robbiae* is defined under Section 3.1.1.

Critical Habitat Determination

The DMU is unlikely to support more than 95 percent of the global population of this endemic species. However, based on Figure 6 the DMU is likely to support greater than one percent of the global population. The DMU qualifies as Tier 2 critical habitat under Criterion 2 for *Euphorbia amygdaloides subsp. Robbiae.*

3.1.5 Galanthus x valentiei

Galanthus x valentinei has not been classified in the RDBTP. However, the threat category of this species has been assessed by local expert as Vulnerable, according to IUCN criteria. This is based on observations made in the project area and its locality, as well as published records. This species has only recorded in Thrace region: Edirne, Kırklareli and Istanbul provinces in Turkey (Figure 7). Based on the available evidence, it is estimated that between five to ten percent of the global population is located in the Project Area.

Figure 7. Distribution of *Galanthus x valentinei* in Turkey

[17] http://www.tubives.com/index.php?sayfa=1&tax_id=8402

Discrete Management Unit

The DMU for *Galanthus x valentinei* is defined under Section 3.1.1.

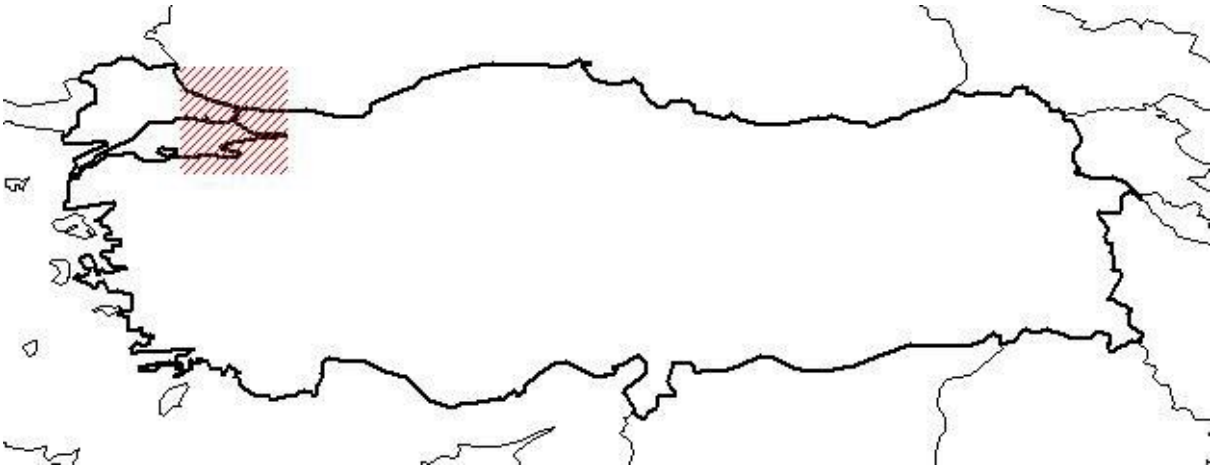
Critical Habitat Determination

The DMU is unlikely to support more than 95 percent of the global population of this endemic species. However, the DMU is likely to support greater than one percent of the global population. The DMU qualifies as Tier 2 critical habitat under Criterion 2 for *Galanthus x valentinei.*

3.1.6 Convolvulus persicus

Convolvulus persicus has been classified as Endangered in the RDBTP. The species has not been assessed by the IUCN. Globally, *Convolvulus persicus* is found within central Asia and Asia Minor, the Caucasus and Black Sea coast[18]. Therefore, the species is not endemic to Turkey. Within Turkey, its distribution is limited to the provinces of İstanbul, located in just a single grid square (Figure 8).

Figure 8. Distribution of *Convolvulus persicus* in Turkey[19]



Discrete Management Unit

Convolvulus persicus was only found within the small 7 hectare area of shifting coastal dunes in the north east portion of the Project Area, adjacent to the Black Sea (Figure 8). The nearest known population to the Project Area is located in the Kilyos Sand Dune Important Plant Area (IPA), approximately 15 km to the east. The species is not known to occur in the Ağacli sand dunes as the species tends not to be found in fixed dunes. Due to the distances involved and the lack of similar habitat linking the known populations, the population within the Project Area is likely to be ecologically isolated from that located in Kilyos sand dunes. Therefore, the DMU for *Convolvulus persicus* can be limited to the small area of shifting coastal dunes within the Project Area.

Critical Habitat Determination

It has been estimated by expert opinion that the DMU supports between five to ten percent of the national population of *Convolvulus persicus*. Therefore, the DMU does not support a

[18] http://e-ecodb.bas.bg/rdb/en/vol1/Conpersi.html

[19] http://www.tubives.com/index.php?sayfa=1&tax_id=6354

nationally/regionally important concentration of an EN, CR or equivalent national/regional listing and does not qualify as critical habitat for *Convolvulus persicus.*

3.1.7 Red Mullet *Mullus barbatus pontica*

Red mullet is represented in the Black Sea by an endemic sub-species. *Mullus barbatus pontica* is restricted to the Black Sea and the Sea of Azov only[20]. *Mullus barbatus pontica* has not been assessed by the IUCN, but has been assessed as Endangered by the Black Sea RDB. Red mullet is a demersal species, found on gravel, sand and mud substrata of the continental shelf at depths of between 10 to 300 m.

Discrete Management Unit

Red mullet's distribution within the Black Sea is limited to the coastal zone. The Black Sea RDB (Figure 9) provides a figure showing that its distribution is patchy, with concentrations along the European Turkish shoreline, Bulgaria, Romania and the Ukraine. Based on this figure, the DMU for red mullet is set at the extent of its distribution along the European Turkish shoreline.

Figure 9. Distribution of Red Mullet in the Black Sea

Critical Habitat Determination

Although population estimates for red mullet within the various sub-regions of the Black Sea, are unavailable, based on the AOO, it is unlikely that the DMU supports greater than ten percent of the global population of the sub-species. Therefore, the DMU does not support a nationally/regionally important concentration of an EN, CR or equivalent national/regional listing. However, it is likely that the DMU supports greater than one percent of this endemic sub-species' population. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 2 for red mullet.

3.1.8 Long-Snouted Seahorse *Hippocampus guttulatus microstephanus*

Long-snouted seahorse *Hippocampus guttulatus* is assessed as Data Deficient by the IUCN and as Endangered by the Black Sea RDB. *Hippocampus guttulatus* is mainly found European waters, including the Atlantic coast from the UK to the Mediterranean Sea[21]. A separate sub-species is present in the Black Sea: *Hippocampus guttulatus microstephanus*.

[20] Yokes, B., Pollard, D.,Bizsel, C. Goren, M. & Kara, M.H. 2011. *Mullus barbatus*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

[21] Woodall, L. 2012. *Hippocampus guttulatus*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

There is no global estimate the species' population size and no global assessment of population trends. *Hippocampus guttulatus* are mostly found inhabiting small home ranges in shallow coastal waters, lagoon systems and estuaries (0.5–15 m). The major continuing threat to the species is habitat degradation and disturbance through direct anthropogenic activities such as coastal developments and the effect of fishing gear (e.g. trawls and dredges).

Discrete Management Unit

The distribution of long-snouted seahorse within the Black Sea is limited to the coastal zone. The Black Sea RDB (Figure 10) provides a figure showing that its distribution is more or less continuous along the Turkish coastline, but patchy elsewhere. The limited dispersal and migration behaviour of *Hippocampus guttulatus* limits its ability to interchange between sub- populations. However, there is no evidence to be able to distinguish between sub-populations within the Black Sea. However, it is reasonable to assume that the Bosphorus may present a barrier to dispersal between European and Asian Turkish populations. Therefore, the DMU for is set at the extent of its distribution along the European Turkish shoreline.

Figure 10. Distribution of Long-Snouted Seahorse in the Black Sea

Critical Habitat Determination

Based on the extent of long-snouted seahorse within the Black Sea as a whole, it is unlikely that the DMU supports greater than ten percent of the global population of the sub-species. Therefore, the DMU does not support a nationally/regionally important concentration of an EN, CR or equivalent national/regional listing. However, it is likely that the DMU supports greater than one percent of this endemic sub-species' population. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 2 for long-snouted seahorse.

3.1.9 Egyptian Vulture *Neophron percnopterus*

Egyptian vulture has been classified by the IUCN as Endangered. The species has a very large range, *inter alia* from southern Europe, east to Central Asia and India[22]. Therefore, the species is neither endemic nor range-restricted. The European and Turkish populations of Egyptian vulture populations migrate for winter to the south of the Sahara. The European breeding population is estimated to number between 3,300-5,050 breeding pairs and a very preliminary estimate of the global population size is 20,000-61,000 individuals, roughly equivalent to 13,000-41,000 mature individuals[23]. Within Turkey, Egyptian vulture is a

[22] http://www.arkive.org/egyptian-vulture/neophron-percnopterus/

[23] BirdLife International 2014. *Neophron percnopterus*. The IUCN Red List of Threatened Species. Version

widespread breeding species, although largely absent from the Mediterranean and Black Sea coastal regions (Kirwan *et al.,* 2008)[24]. The Turkish breeding population has been estimated to be between 1500-3000, although the species has been suffering from a steep decline (Birdlife International, 2004)[25]. The critical threats to the species are thought to be a combination of poisoning (both intentional and unintentional), the decline of extensively bred livestock and stricter sanitary regulation (Iñigo *et al.,* 2008[26]).

During the migrating bird surveys completed within the Project Area in spring 2014, a total of eight individual Egyptian vultures were recorded. These birds are unlikely to have originated from the Turkish breeding population, but rather migrating to breeding grounds in south east Europe. The breeding population of Egyptian vulture in south east Europe has been estimated to number between 150-170 pairs, equating to approximately 300-340 individuals (Iñigo *et al.,* 2008).

Discrete Management Unit

Defining a DMU for migrating birds is not straightforward, as the routes taken span thousands of miles between breeding and wintering grounds. The Project is situated on the Mediterranean/Black Sea Flyway which is one of three Palaearctic-African flyways connecting Europe with Africa. For many larger bird species, the Bosphorus presents a major migratory “bottleneck” where they are funnelled through the Istanbul isthmus by the Black Sea to the north and the Mediterranean Sea (including the Sea of Marmara) to the south. Therefore, one approach to defining the DMU for large-soaring migratory bird species would be to take the Istanbul isthmus bottleneck as a whole. However, the bird survey results collected during the spring 2014, along with previously published surveys suggest that the vast majority of spring migrating birds pass to the north of Istanbul and probably over the Project Area (Arslangündoğdu *et al.*, 2011)[27]. Therefore, the DMU can be limited to the Istanbul isthmus, located to the north of Istanbul where the bottleneck narrows to around a 10-12 km width, which was wholly covered by the spring 2014 survey.

Critical Habitat Determination

The migrating population of Egyptian vulture through the DMU has likely declined significantly in recent decades. A peak autumn count of 544 individuals was made in 1971 (Kirwan *et al.,* 2008). However, recent spring counts made at the Bosphorus have been

2014.2. <www.iucnredlist.org>.

[24] Kirwan, G.M., Boyla, K.A., Castell, P. Demirci, B., Özen, M., Welch, H. and Marlow G. 2008. The Birds of Turkey. Christopher Helm, London.

[25] Birdlife International. 2004. Birds in Europe: population estimates, trends and conservation status. Cambridge, UK: Birdlife International. (Birdlife Conservation Series No.12).

[26] Iñigo A., Barov B., Orhun C., Gallo-Orsi U. 2008. Action plan for the Egyptian Vulture *Neophron percnopterus* in the European Union

[27] Arslangündoğdu, Z., Dalyan, C., Bacak, E., Yardım, U., Gezgin C. and Beşkardeş, V. 2011. Spring migration of the White Stork, *Ciconia ciconia*, and the Black Stork, Ciconia nigra, over the Bosphorus, Zoology in the Middle East, 53:1, 7-13

much smaller: eleven individuals in 2006 (Uner *et al*., 2010)[28], six individuals in 2010 (IKGT, 2010)[29], and thirteen individuals in 2011 (Bilgin and Boyla, 2011)[30]. Based on a peak count of thirteen individuals, the DMU does not support ≥ 10 percent of the global population of a CR or EN species (13,000-41,000 individuals), nor a regionally important concentration of a red-listed EN species (south-eastern Europe population of 300-340 individuals). Therefore, the DMU does not meet Criterion 1 for critical habitat with respect to Egyptian vulture.

3.1.10 Short-Beaked Common Dolphin *Delphinus delphis ponticus*

The short-beaked common dolphin has been assessed as Vulnerable (and DD by the Black Sea RDB). The population size in the Black Sea is unknown, although recent estimates suggest that it may be 10,000s or possibly 100,000s or more[31]. The habitat range of the short-beaked common dolphin encompasses nearly the entire Black Sea. The species is distributed predominantly offshore, but also visits coastal waters following on the seasonal aggregations and mass migrations of small pelagic fishes.

Discrete Management Unit

GN64 of IFC's Guidance Note 6 emphasises that "*relatively broad … seascape units might qualify as critical habitat".* In the case of cetacean species living within the open waters of the Black Sea, where uniform conditions extend over a wide area and species are correspondingly widely dispersed, the DMU is correspondingly very large. Without evidence to support sub-division, the DMU is assumed to encompass the whole Black Sea.

Critical Habitat Determination

The DMU supports greater than 95 percent of the global population of this endemic sub- species and therefore qualifies as Tier 1 critical habitat under Criterion 2 for short-beaked common dolphin.

3.1.11 Harbour Porpoise *Phocoena phocoena relicta*

The harbour porpoise is assessed as Endangered (and DD by the Black Sea RDB). There are no accurate population records. However, estimates range from a least several thousands to possibly 10,000-12,000[32]. The range of this species includes nearly all of the Black Sea. The species is predominantly found in coastal areas, including the vicinity of the Project Area.

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[28] Üner Ö., Boyla K.A., Bacak .E, Birel E., Çelikoba İ., Dalyan C., Tabur E., Yardim Ü. 2010. Spring migration of soaring birds over the Bosphorus, Turkey, in 2006. Sandgrouse. 32:20–33

[29] IKGT. 2010. 2010 İstanbul Boğazı Kuş Göçü Sayımları: 15 Mart – 31 Mayıs 2010. İstanbul Kuş Gözlem Topluluğu

[30] Bilgin S. & Boyla K. 2011. İstanbul Boğazı Göçü İlkbahar 2011. IKGT.

[31] Birkun Jr., A.A. 2008. *Delphinus delphis ssp. ponticus*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

[32] Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. 2008. *Phocoena phocoena*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

Discrete Management Unit

The DMU for harbour porpoise is the same as for short-beaked common dolphin described in Section 3.1.10.

Critical Habitat Determination

The DMU supports greater than 10 percent of the global population of this Endangered sub- species. Therefore, the DMU qualifies as Tier 1 critical habitat under Criterion 1. The DMU also supports 95 percent of the global population of this endemic sub-species and therefore qualifies as Tier 1 critical habitat under Criterion 2 for harbour porpoise.

3.1.12 Common Bottlenose Dolphin *Tursipos truncates ponticus*

The common bottlenose dolphin is assessed as Endangered (and DD by the Black Sea RDB). The total population size in the Black Sea is unknown. However, there are recent abundance estimates for parts of the range suggesting that population size is at least several thousands[33]. The species predominantly occurs in coastal waters, including the vicinity of the Project Area.

Discrete Management Unit

The DMU for common bottlenose dolphin is the same as for short-beaked common dolphin described in Section 3.1.10.

Critical Habitat Determination

The DMU supports greater than 10 percent of the global population of this Endangered sub- species. Therefore, the DMU qualifies as Tier 1 critical habitat under Criterion 1. The DMU also supports 95 percent of the global population of this endemic sub-species and therefore qualifies as Tier 1 critical habitat under Criterion 2 for common bottlenose dolphin.

3.2 Criterion 3 Migratory and Congregatory Species

3.2.1 Large-Soaring Bird Species

During the 2014 spring migrating bird survey, a total of 21,554 observation records were made involving 729,276 individual birds, comprising 137 species. Of these, 35 species can be considered as large-soaring migratory bird species, which include cranes, storks, herons, pelicans and raptors. **Chapter 7.8 Ecology** provides the numbers of each species recorded, as well as their global population estimates. At least seven species were recorded in numbers that represent greater or equal to one percent of the global population: white stork *Ciconia ciconia;* steppe buzzard *Buteo buteo;* honey buzzard *Pernis apivorus;* lesser spotted eagle *Aquila pomarina;* black stork *Ciconia nigra;* short-toed snake eagle *Circaetus gallicus;* and greater spotted eagle *Aquila clanga* (Table 7.8.G.4).

In addition, there is uncertainty in the global population level for two further species, for which the numbers recorded may represent greater or equal to one percent of their global population: Levant sparrowhawk *Accipiter brevipes* and booted eagle *Hieraaetus pennatus*.

[33] Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K.A., Karkzmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y. , Wells, R.S. & Wilson, B. 2012. *Tursiops truncatus*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

While less than one percent of the global population of eastern imperial eagle *Aquila heliaca* was recorded in 2014, these figures are based on a single year's bird survey results. The spring bird survey completed in 2011 at the Bosphorus crossing points recorded a total of 40 individuals, which represents greater than one percent of the global population of this IUCN Vulnerable species (Bilgin and Boyla, 2011).

Table 7.8.G.4. Numbers of Large-Soaring Migratory Birds Species Recorded in Spring 2014

Species	IUCN Category	Number Recorded	Global Population Estimate[1]	Approximate percentage of global population
Ciconia ciconia[2]	LC	424,223	701,000	60.0
Buteo buteo	LC	37,971	4,000,000	1.0
Pernis apivorus	LC	25,884	350,000	7.0
Aquila pomarina	LC	24,581	42,000	58.5
Ciconia nigra	LC	2,777	24,000	12.0
Circaetus gallicus	LC	641	51,400	1.0
Hieraaetus pennatus[i]	LC	462	20,000-100,000	0.1 - 2
Accipiter brevipes[i]	LC	313	20,000-100,000	0.1 - 1.5
Aquila heliaca	VU	16	3,500	0.5
Aquila clanga	VU	73	3,300	2.0

Notes:

1: All population estimates taken from BirdLife International (2014) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 15/07/2014, unless otherwise specified below. Where a range of estimates were given by the sources, the lower number was used to ensure that the estimates are conservative.

2: Wetlands International (2014). "Waterbird Population Estimates". Retrieved from wpe.wetlands.org on Tuesday 15 Jul 2014

i: Population estimate imprecise, estimated to be in the tens of thousands. Therefore a range from 20,000 to 100,000 has been used.

Discrete Management Unit

The DMU for large soaring birds is described in Section 3.1.9 of this annex.

Critical Habitat Determination

None of these species listed in Table 7.8.G.4 are represented by greater or equal to 95 percent of their global population within the DMU. However, several species were recorded in numbers greater or equal to one percent of their global populations. Tier 2 critical habitat is confirmed under Criterion 3 (migratory and congregatory species) for the following eight species of large soaring migratory birds:

- white stork;

- steppe buzzard;
- honey buzzard;
- lesser spotted eagle;
- black stork;
- short-toed snake eagle;
- greater spotted eagle; and
- eastern imperial eagle.

3.2.2 Yelkouan Shearwater *Puffinus yelkouan*

This species has been assessed as IUCN Vulnerable as it is estimated to be undergoing a rapid population decline, caused by extremely low breeding success and adult survival owing to fisheries bycatch and predation by introduced mammals. This species is endemic for the Mediterranean basin, with its largest breeding colonies situated on the coasts of Croatia, Tunisia, southern France, Italy, Greece and Malta (Bourgeous, 2012[34]). The species is assumed to also breed on the coastline of Turkey, although no colonies have yet to be located. The estimated global population is reported as 46,000-92,000 individuals (Birdlife International, 2012[35]). Recent tracking studies of breeding birds from the Mediterranean suggests that the Black Sea is a critically important non-breeding habitat for this species (Raine *et al*., 2013[36]).

During the spring migration period, a total of 33,349 individual yelkouan shearwater *Puffinus yelkouan*, were observed flying offshore from the Project Area. Therefore, the number of the yelkouan shearwater individuals detected offshore of the Project Area could represent between 36 percent and 72 percent of the estimated global population of this species.

Discrete Management Unit

Based on the observations made during spring 2014, it appears that yelkouan shearwater is undertaking active migration as they pass by the Project Area. There was no indication that the species is breeding locally or using the sea area adjacent to the Project Area for feeding. The majority of the birds observed during spring 2014, were flying from west to east: 31,250 individuals, compared to 1929 individuals flying from east to west. These observations are consistent with monitoring results completed within the Bosphorus (Şahin *et al.,* 2012).[37] In the Bosphorus, there is strong seasonal pattern, with highest passage occurring during January and February. Şahin *et al.* (2012) recorded a maximum passage of 55,862

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[34] Bourgeois K. 2012. Yelkouan Shearwater, *Puffinus yelkouan*, Updated state of knowledge and conservation of the nesting populations of the Small Mediterranean Islands Initiative PIM, 24 p.

[35] BirdLife International. 2012. *Puffinus yelkouan*. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.

[36] Raine A.F., Borg J.J., Raine H., Phillips R.A. 2013. Migration strategies of the yelkouan shearwater *Puffinus yelkouan*. *J. Ornithol*. 154: 411

[37] Şahin, D., Bacak, E., Bilgin, S, Atay, C., Boyla, K.A. and Tavares, J. 2012. Presence and behaviour of Yelkouan Shearwaters *Puffinus yelkouan* at the Bosphourus. (pp: 54-57). In: Yesou, P, Bacetti; N. and Sultana,J. (Eds) Ecology and Conservation of Mediterranean Seabirds and other bird species under Barcelona convention-Proceedings of the 13th Medmavaris Pan-meditrranean Symposium. Alghero (Sardinia) 14-17 Oct 2011.

individuals through the Bosphourus in one morning on 3rd February 2011. The numbers recorded remained high from March through to the end of June, when they quickly dropped off and few birds were recorded between July and the beginning of December. The majority of birds observed in the study were flying from north to south. This provides an indication that the birds flying past the Project Area are likely to have been heading towards the Bosphorus, on route to the Marmara Sea and breeding grounds within the Mediterranean beyond. There insufficient published literature to be able to sub-divide the non-breeding population of yelkouan shearwater within the Black Sea into clearly defined separate DMUs. However, the large numbers recorded during spring 2014, together with the strong directional nature of passage, suggests that it represents a specific migration corridor from feeding grounds in the Black Sea, on route to the Bosphorus. It is not possible to define the width of the migration corridor, as birds passing further out to sea were not visible from the shore based observers.

Critical Habitat Determination

Tracking studies completed from Mediterranean breeding grounds show that not all yelkouan shearwaters spend their non-breeding periods within the Black Sea and up to 20 percent may remain in the Mediterranean (Raine *et al*., 2013). Therefore, it is unlikely that greater than 95 percent of the global population of yelkouan shearwaters spend their non-breeding periods within the Black Sea. However, the numbers of yelkouan shearwaters recorded passing the Project Area represent greater than one percent of their estimated global population. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 3 for yelkouan shearwater.

3.2.3 Yellow-Legged Gull *Larus michahellis*

Large numbers of yellow-legged gulls *Larus michahellis* were recorded within the Project Area, both during the wintering bird and the migratory bird surveys. Yellow-legged gull is a common and widespread species, assessed as Least Concern by the IUCN. Yellow-legged gull breeds along most of the coastline of the Mediterranean, the Black Sea, the Atlantic coastlines of France, Spain, Portugal, Morocco, as well as on the Canary Islands[38]. The species congregates to breed colonially in monospecific or mixed-species groups, with pairs usually nesting a few metres apart. During the non-breeding season, the species range expands inland into Europe, northwards along the Atlantic coast to Denmark and the Baltic, as well as southwards along the coast of Africa. *Larus michahellis* forms part of the herring gull species complex that includes six separate sub-species and/or species. Three of these breed and winter in Turkey: yellow-legged gull *Larus michahellis*, Caspian gull *Larus cachinnans* and Armenian gull *Larus armenicus*. The difficulty of identifying the different species/sub-species complicates the understanding of their populations and ecology. However, it is thought that the majority of the birds wintering in western Turkey are thought to be *Larus michahellis,* as *Larus cachinnans* winters mainly in Arabia (Kirwan, *et al.,* 2008).

During the spring migration surveys, a total of 110,973 individuals of yellow-legged gull were recorded. However, many of these birds are unlikely to be actively migrating at the time of the observation. A significant proportion may form part of the overall breeding population of Istanbul, estimated to be between 3000-5000 pairs (Kirwan *et al*., 2008). Large numbers of

[38] BirdLife International. 2014. Species factsheet: *Larus michahellis*. Downloaded from http://www.birdlife.org on 17/09/2014.

this species are found in the Project Area roosting within the lakes or on the sea shore. Many of the observation relate to the daily movements of yellow-legged gulls moving between roost sites and feeding areas, particularly the nearby sanitary landfills. The total number of birds recorded during the surveys for this species is likely to include repeat counts of birds between recording days as they are semi-resident during the survey period. However, a peak daily count of 7,376 individuals was made on the 26 March 2014. The total number of birds occurring within the Project Area over the course of a year will likely be several times this number. During the winter bird survey completed in January 2014, 8507 individuals were recorded within the Project Area.

Estimating the global population of yellow-legged gull is made difficult due to recent taxonomic splits. However, it has been estimated to be somewhere in the region of 770,000 to 1,800,000[39] (the Mediterranean population is estimated to be 630,000 - 768,000 individuals)[40]. Therefore, the number recorded within the Project Area in a single day during spring 2014 approaches one percent of the lower level of the global population estimate. It also exceeds the one percent population threshold for the Mediterranean population of this species (7000 individuals).

Discrete Management Unit

The detailed migration movements of yellow-legged gulls are not well understood. It is reasonably likely that the birds recorded within the Project Area at different times of the year originate from several different breeding sub-populations. However, it is likely that a significant proportion may form part of the breeding population of Istanbul, estimated to be between 3000-5000 pairs, as well as the 3000 pairs estimated to breed on islands in the Sea of Marmara (Kirwan *et al*., 2008). Given the uncertainty in the boundaries of an ecologically based DMU for this species, it is reasonable to limit the critical habitat determination to the populations recorded within the Project Area.

Critical Habitat Determination

The 8,507 individuals recorded in January 2014 exceeds one percent of the lower level of global population estimates of 770,000 to 1,800,000. Therefore, the DMU qualifies as Tier 2 critical habitat under Criterion 3 for yellow-legged gull.

3.2.4 Wintering Bird Assemblage

The Terkos Basin Important Bird Area (IBA) includes the entire watershed of Lake Terkos and overlaps the northwest corner of the Project Area. The qualifying bird populations for the Terkos Basin IBA are provided in Table 7.8.G.5.

[39] Wetlands International. 2002, quoted by http://www.avibirds.com/euhtml/Yellow-legged_Gull.html

[40] Wetlands International. 2014. Waterbird Population Estimates. Retrieved from wpe.wetlands.org.

Table 7.8.G.5. Populations of IBA Trigger Species for Terkos Basin IBA[41]

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria[1]	IUCN Category
Red-breasted goose *Branta ruficollis*	Winter	1995	90 individuals	Poor	A1, B2	EN
Ferruginous duck *Aythya nyroca*	Breeding	2000	20 breeding pairs	Poor	A1	NT
Black stork *Ciconia nigra*	Breeding	-	5-10 breeding pairs	-	B2	LC
Pygmy cormorant *Phalacrocorax pygmeus*	Passage	2000	32 individuals	Poor	A1	LC
Pygmy cormorant *Phalacrocorax pygmeus*	Winter	2002	224 individuals	-	A1	LC
Whiskered tern *Chlidonias hybrida*	Breeding	2000	45 breeding pairs	-	B2	LC

Notes:

A1 – Species of global conservation concern. The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.

B2 - Species with an unfavourable conservation status in Europe. The site is one of the 'n' most important in the country for a species with an unfavourable conservation status in Europe) and for which the site-protection approach is thought to be appropriate.

See Birdlife International website for full list of definitions of IBA criteria (http://www.birdlife.org/datazone/info/ibacriteuro).

Wetlands International have published data from 15 winter surveys of the Terkos Lake between 1967 and 2010[42]. The highest previous recorded count of 10,985 individual water birds (all species combined) was made in 2006. A peak count of pygmy cormorant of 224 individuals was made in 2002. A single count of six red-breasted geese was made in 1997. The only record of ferruginous duck was made in 1995 when five individuals were counted, although this was during the winter and not the breeding season.

In order to confirm the bird species, importance and population densities of these wintering bird species of Terkos Lake, field studies were carried out in January 2014, covering Lake

[41] BirdLife International. 2014. Important Bird Areas factsheet: Terkos Basin. Available at: http://www.birdlife.org

[42] Kostiushyn V., Andryuschenko Yu., Goradze I., Abuladze A., Mamuchadze J., and Erciyas K. 2011. Wintering Waterbird Census in the Azov– Black Sea Coastal Wetlands of Ukraine, Georgia and Turkey.– Wetlands International Black Sea programme.– 2011.– 130 pp. (available for download at http://blacksearegion.wetlands.org/Portals/9/3.4.16.pdf)

Terkos and its vicinity. The field survey recorded a total of 23,791 individual waterbirds of 33 species. The most common waterbird species recorded were Eurasian coot *Fulica atra* (15,408 individuals), greater cormorant *Phalacrocorax carbo* (4,279 individuals) and mallard *Anas platyrynchos* (1378 individuals).The surveys recorded 48 individual pygmy comorants. This is significantly fewer than the 224 individuals recorded in 2002, which forms part of the designation criteria of the IBA. Neither red-breasted goose nor ferruginous duck were recorded in January 2014. Whilst the 2014 winter bird survey results are inconclusive in terms of the qualifying criteria listed in Table 7.8.G.5, Lake Terkos and the Project Area combined was confirmed to support more than 20,000 waterbirds. Therefore, it meets Birdlife International IBA criteria A4. Congregations: iii (i.e. the site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds).

Discrete Management Unit

The boundary of the Terkos Basin IBA uses the watershed of Lake Terkos as its boundary. This conforms to the IFC guidance on the selection of a DMU using a sensible ecologically definable boundary (e.g. a watershed). However, when considering bird populations, it is important to understand that they are often not confined to specific areas. In the case of the Terkos Basin IBA, there is a strong case that the larger water bodies within the Project Area provide supporting habitat to the overall wintering bird populations.

The concept of supporting habitat is well developed under the EU Habitats Directive. Supporting habitat is a habitat outside a designated site that provides significant support to the conservation status of its qualifying features. Examples include habitat buffers and linear routes, feeding, roosting or resting areas for species that are features of interest. The wintering bird surveys completed at Lake Terkos and within the Project Area show that the two areas have a very similar wintering bird assemblages (Table 7.8.G.6).

Excluding yellow-legged gull, the two areas share the same five most numerous species. Wintering pygmy cormorants *Phalacrocorax pygmeus* is one of the trigger species for the designation of the Terkos Basin IBA. The wintering bird surveys recorded almost as many pygmy cormorants within the Project Area as Lake Terkos. Interchange of this species and others between the two localities is likely and they can be considered as a single wintering population. Therefore, the Project Area can be considered as supporting habitat to the IBA and should be included in the DMU for critical habitat determination.

Table 7.8.G.6. Most Numerous Waterbird Species Recorded in Lake Terkos and the Project Area

	Project Area		**Lake Terkos**	
Rank	**Species**	**Number**	**Species**	**Number**
1	*Fulica atra*	577	*Fulica atra*	15,408
2	*Phalacrocorax carbo*	301	*Phalacrocorax carbo*	4,279
3	*Podiceps cristatus*	106	*Anas platyrynchos*	1,378
4	*Anas platyrynchos*	55	*Podiceps cristatus*	809
5	*Tachybaptus ruficollis*	50	*Tachybaptus ruficollis*	538
6	*Phalacrocorax*	32	*Larus ridibundus*	528

	pygmeus			
7	*Larus minitus*	22	*Casmerodius albus*	134
8	*Aythya ferina*	19	*Vanellus vanellus*	131
9	*Gallinula chloropus*	10	*Ardea cinerea*	121
10	*Netta rufina*	8	*Larus minutus*	66
11	*Ardea cinerea*	5	*Phalacrocorax pygmeus*	48

Critical Habitat Determination

The DMU has been confirmed to support more than 20,000 waterbirds. Therefore, it meets the IBA criteria A4. Congregations: iii (i.e. the site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds). The wintering bird assemblage supported by the DMU qualifies as Tier 2 critical habitat under Criterion 3 for habitat that meets Birdlife International's Criterion A4 for congregations.

3.3 Criterion 4 Highly Threatened and/or Unique Ecosystems

Three natural habitats were recorded within the Project Area: shifting coastal dunes, thermophilous deciduous woodland and Mediterranean riparian woodland. Detailed habitat descriptions of these habitats are provided in **Chapter 7.8 Ecology**.

Table 7.8.G.7 shows the relationship between the natural vegetation types recorded in the Project Area and habitats listed on Annex 1 of the EU Habitats Directive. The table also details the known extent and condition for each habitat and whether it supports unique assemblages of species including assemblages or concentrations of biome-restricted species.

Table 7.8.G.7. Natural Habitats Recorded in the Project Area

European Nature Information System (Eunis) Habitat Description[43]	**Habitats Directive Annex I**	**Critical Habitat Criteria**			**Critical Habitat**
		At risk of significantly decreasing in area or quality	**Small spatial extent**	**Contains unique assemblages of species including assemblages or concentrations of biome-restricted species**	
G1.7: Thermophilous deciduous woodland: Forests or woods of submediterranean climate regions and supramediterranean altitudinal levels, and of western Eurasian steppe and substeppe zones, dominated by deciduous or semi-deciduous thermophilous *Quercus* species or by other southern trees such as *Carpinus orientalis, Castanea sativa* or *Ostrya carpinifolia*. Thermophilous deciduous trees may, under local microclimatic or edaphic conditions, replace the evergreen oak forests in mesomediterranean or thermomediterranean areas, and	91M0 Pannonian-Balkanic turkey oak – sessile oak forests	Assessed to be of Unfavourable -Inadequate condition for both for existing structure and functions, as well as future prospects in all EU Bio-geographical regions[44].	The area of habitat in the EU 27 member countries is estimated to be 34,590 km^2, with largest areas present in Bulgaria, Romania, Italy, Greece and Hungary. The area in Turkey is unknown.	Habitat supports eight nationally threatened and endemic plant species. However, these species also found in adjacent highly artificial coniferous woodland and therefore not biome-restricted.	Yes

[43] http://eunis.eea.europa.eu/index.jsp

[44] http://bd.eionet.europa.eu/article17/reports2012/habitat/summary/?period=3&subject=91M0, accessed 23rd September 2014.

occur locally to the north in central and western Europe.					
G1.3 - Mediterranean riparian woodland	n/a	Quantitative data unavailable.	Quantitative data unavailable.	Habitat supports nationally threatened plant species *Galanthus x valentiei* and *Lilium martagon*, but these species are not biome restricted.	No
B1.3: Shifting coastal dunes (B1.324 - Pontic white dunes)	2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")	Assessed to be of Unfavourable - bad or Unfavourable - Inadequate condition for both for existing structure and functions, as well as future prospects in all EU Bio-geographical regions[45].	The area of shifting dune habitat in the EU 27 member countries is estimated to be 470 km^2	Habitat supports single biome restricted species *Convolvulus persicus.*	Yes

[45] http://bd.eionet.europa.eu/article17/reports2012/habitat/summary/?period=3&group=Dunes+habitats&subject=2120&region=

3.3.1 Thermophilous Deciduous Woodland

Thermophilous deciduous woodland within the Project Area meets the definition of the EU Habitats Directive Annex I habitat of 91M0 Pannonian-Balkanic Turkey oak - sessile oak forests.

A: Short-term decline in distribution or function (over 50 years)

Pannonian-Balkanic Turkey oak - sessile oak forests is assessed to be of Unfavourable- Inadequate condition for both existing structure and functions, as well as future prospects in all EU Bio-geographical regions in which it is present. The status in Turkey is likely to be similar to that in the EU as many of the pressures are identical (e.g. removal of dead and dying trees, forestry clearance, invasive non-native species, forest replanting with non-native trees, burning, grazing and development). Therefore, it is likely that there has been short- term decline (in distribution or ecological function) of ≥50percent of the total area, within a 50 year period either past or future. Therefore, thermophilous deciduous woodland meets criterion A and qualifies as critical habitat under IFC PS6 Criterion 4.

C: Small current distribution and decline (in distribution or ecological function) or very few locations

Pannonian-Balkanic Turkey oak – sessile oak forests exceeds 20,000 km^2 in area and therefore does not meet criterion C.

D: Very small current distribution

Pannonian-Balkanic Turkey oak – sessile oak forests exceeds 2000 km^2 in area and does not meet criterion D.

3.3.2 Mediterranean Riparian Woodland

Within Turkey, the habitat is quite widespread within the Marmara, Aegean, Mediterranean and Central Anatolia regions. Quantitative data on the distribution of Mediterranean riparian woodland across Europe and the risks that it faces are not available. The habitat is not analogous to a habitat type listed on Annex I of the EU Habitats Directive and therefore is not subject to EU wide monitoring. Therefore, a full assessment under IFC PS6 Criterion 4 is not possible.

3.3.3 Shifting Coastal Dunes

A: Short-term decline in distribution or function (over 50 years)

The area of shifting coastal dune habitat in Turkey is highly reduced. The naturalness of the remaining areas has significantly reduced through impacts from coastal development and tourism. Within the past 50 years, adverse impacts have affected 80 percent of coastal dunes in Turkey. A similar situation is observed in the Project Area where the coastal dunes have lost their ecological properties as a result of mining or sand excavation activities. Across Europe, shifting dunes are under significant pressure. They have been assessed to be either Unfavourable-bad or Unfavourable-Inadequate condition for both existing structure and functions, as well as future prospects in all EU Bio-geographical regions in which it is present. It is likely that there has been a short-term decline (in distribution or ecological function) of ≥50 percent of the total area, within a 50 year period either past or future. Therefore, shifting coastal dunes meets criterion A and qualifies as critical habitat under IFC PS6 Criterion 4.

C: Small current distribution and decline (in distribution or ecological function) or very few locations

The area of shifting coastal dunes is likely to be less than 5,000 km^2 in area and therefore meets criterion C and qualifies as critical habitat under IFC PS6 Criterion 4.

D: Very small current distribution

The area of shifting coastal dunes is likely to be than 2,000 km^2 in area and has undergone an observed, estimated, inferred, or suspected severe reduction in at least one major ecological process. Therefore, it meets criterion D and qualifies as critical habitat under IFC PS6 Criterion 4.

3.4 Criterion 5: Key Evolutionary Processes

The diversity and importance of the Project Area from an evolutionary perspective is well indicated by its flora. From a bio-geographic perspective, European Turkey is meeting-point of several floristic elements, notably the Mediterranean element, the Balkan-Central European element, the Sarmatian element and the Euxine element[46]. This is reflected in the high diversity of plant species present, with 2,050 species having been recorded within Istanbul province. The diversity is high compared to north western Europe (e.g. the whole of the UK supports c.1,850 species) and the Istanbul has the second highest number of recorded species in any Turkish province (Antalya province has 2,126 recorded species) [47] (although this may in part reflect recording effort).

The level of plant endemism in Turkey is high and it is considered to be an active species- formation center (Bulut and Yilmaz, 2010)[48]. Turkey is one of the world's most important countries in terms of endemic plants, with more than 3,000 endemic species, which constitutes 34 percent of total flora. Compared to Turkey as a whole, European Turkey has a relatively low level of endemism, with approximately 40 Turkish endemic species (c.one percent of the total) of which 27 are endemic to Istanbul and its vicinity.[49] One of the main features likely to drive endemism in Turkey is its mountain ranges, which act like high altitude islands, isolating populations. Important areas of endemism in Turkey include the Amanos Mountains, mountains at the southern tip of the Aegean region and in the western Mediterranean region as well as Mt. Uludağ, Kaz Mountain and Mt. Erciyes (Bulut and Yilmaz, 2010).

The Project Area lacks the extreme topography required to isolate populations and its natural habitats are dominated by thermophilous deciduous woodland which is relatively homogenous. A total of five endemic plant species were recorded within the Project Area, which represents 12 percent of the number in European Turkey and less than one percent of the Turkish endemic flora. No endemic animal species were recorded within the Project Area. Therefore, the Project Area is not considered to support Key Evolutionary Processes.

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[46] http://iste.istanbul.edu.tr/en/?page_id=6581

[47] http://www.tubives.com/index.php?sayfa=istatistik

[48] Bulut, Z. and Yilmaz, H. 2010. The Current Situation Of Threatened Endemic Flora In Turkey: Kemaliye (Erzincan) Case. Pak. J. Bot., 42(2): 711-719, 2010.

[49] http://howtoistanbul.com/en/the-flora-of-istanbul/2764 http://howtoistanbul.com/en/the-flora-of-istanbul/2764.

3.5 Criterion 6: Internationally and/or Nationally Recognised Areas

The Project Area includes small parts of two internationally and/or nationally recognised areas: Terkos Basin KBA, IBA and IPA; and Agacli Sand Dunes KBA and IPA. In addition, there are three additional sites that are likely to be impacted by the Project: Bosporus Region KBA, IBA and IPA; Kucukcekmece Basin IBA and IPA; and West Istanbul Pasture KBA and IPA. The features that have underpinned these designated are detailed in **Chapter**

7.8 Ecology. Surveys completed during 2014 have confirmed the continued presence of many of the qualifying features and, in accordance with IFC PS6, these areas are confirmed to be critical habitats.

3.6 Summary

This annex provides an assessment of critical habitat applicable to the Project. Critical habitat is defined by IFC Performance Standard 6 (PS6) as areas with high biodiversity value. This includes areas that meet one or more of following criteria:

- Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species
- Criterion 2: Endemic and/or restricted-range species
- Criterion 3: Migratory and/or congregatory species
- Criterion 4: Highly threatened and/or unique ecosystems
- Criterion 5: Key evolutionary processes
- Criterion 6: Internationally and/or nationally recognised areas

Table 7.8.G.8 below summarises the critical habitats confirmed to be present in the Project Area.

Table 7.8.G.8. Summary of Critical Habitat within Project Area

Feature	**PS6 Criterion**	**Rationale**	**Critical Habitat**
Lathyrus undulates	2	>1% of global population	Yes - Tier 2
Centaurea hermannii	1 and 2	Nationally/regionally important concentration of an EN species >1% of global population	Yes - Tier 2
Cirsium polycephalum	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population	Yes - Tier 2
Euphorbia amygdaloides subsp. Robbiae	2	>1% of global population	Yes - Tier 2
Galanthus x valentiei	2	>1% of global population	Yes - Tier 2
Red mullet *Mullus barbatus ponticus*	2	>1% of global population	Yes - Tier 2
Long-snouted seahorse *Hippocampus guttulatus microstephanus*	2	>1% of global population	Yes - Tier 2

Common bottlenose dolphin *Tursipos truncates ponticus*	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population	Yes - Tier 1
Short beaked common dolphin *Delphinus delphis ponticus*	2	Nationally/regionally important concentration of an CE species >1% of global population	Yes - Tier 1
Harbour porpoise *Phocoena phocoena relicta*	1 and 2	Nationally/regionally important concentration of an CE species >1% of global population	Yes - Tier 1
Large soaring migratory birds: • white stork; • steppe buzzard; • honey buzzard; • lesser spotted eagle; • black stork; • short-toed snake eagle; • greater spotted eagle; and • eastern imperial eagle.	3	>1% of global population	Yes - Tier 2
Yelkouan shearwater *Puffinus yelkouan*	3	>1% of global population	Yes - Tier 2
Yellow-legged gull *Larus michahellis*	3	>1% of global population	Yes - Tier 2
Wintering Bird Assemblage	3	IBA criteria A4. Congregations: iii	Yes - Tier 2
Thermophilous deciduous woodland	4	Short-term decline in distribution or function (over 50 years)	Yes
Shifting coastal dunes	4	Short-term decline in distribution or function (over 50 years) Small geographical extent	Yes
Terkos Basin KBA, IBA and IPA	6	Internationally and/or nationally recognised areas	Yes
Agacli Sand Dunes KBA and IPA	6	Internationally and/or nationally recognised areas	Yes
Bosporus Region KBA, IBA and IPA	6	Internationally and/or nationally recognised areas	Yes

West Istanbul Pasture KBA and IPA	6	Internationally and/or nationally recognised areas	Yes
Kucukcekmece Basin IBA and IPA	6	Internationally and/or nationally recognised areas	Yes

Annex 1: Ecosystem Red List Criteria

Possible Categories and Criteria for Use in Developing a Red List of Ecosystems (source: Rodriguez *et al.,* 2011)	
A: Short-term decline (in distribution or ecological function) on the basis of any sub-criterion	
1. observed, estimated, inferred or suspected decline in distribution of	
≥80 percent,	CR
≥50 percent, or	EN
≥30 percent	VU
over the last 50 years	
2. projected or suspected decline in distribution of	
≥80 percent,	CR
≥50 percent, or	EN
≥30 percent	VU
within the next 50 years	
3. observed, estimated, inferred, projected, or suspected decline in distribution of	
≥80 percent,	CR
≥50 percent, or	EN
≥30 percent	VU
over any 50-year period, where the period must include both the past and the future	
4. relative to a reference state appropriate to the ecosystem, a reduction or likely reduction of ecological function that is	
(a) very severe, in at least one major ecological process, throughout ≥80percent of its extant distribution within the last or next 50 years;	CR
(b1) very severe, throughout ≥50 percent of its distribution within the last or next 50 years;	EN
(b2) severe, in at least one major ecological process, throughout ≥80 percent of its distribution within the last or next 50 years;	EN
(c1) very severe, in at least one major ecological process, throughout ≥30 percent of its distribution within the last or next 50 years;	VU
(c2) severe, in at least one major ecological process, throughout ≥50 percent of its distribution within the last or next 50 years.	VU
(c3) moderately severe, in at least one major ecological process, throughout ≥80 percent of its distribution within the last or next 50 years	VU

B: Historical decline (in distribution or ecological function) on the basis of either subcriterion 1 or 2	
1. estimated, inferred, or suspected decline in distribution of	
≥90 percent,	CR
≥70percent, or	EN
≥50percent	VU
in the last 500 years	
2. relative to a reference state appropriate to the ecosystem, a very severe reduction in at least one major ecological function over	
≥90 percent,	CR
≥70 percent, or	EN
≥50 percent of its distribution in the last 500 years	VU
C: Small current distribution and decline (in distribution or ecological function) or very few locations on the basis of either subcriterion 1 or 2	
1. extent of occurrence estimated to be	
≤100 km^2,	CR
≤5,000 km^2, or	EN
≤20,000 km^2	VU
and at least one of the following:	
(a) observed, estimated, inferred, or suspected continuing decline in distribution,	
(b) observed, estimated, inferred, or suspected severe reduction in at least one major ecological process,	
(c) ecosystem exists at only one location, 5 or fewer locations, or 10 or fewer locations.	
1	CR
5	EN
10	VU
Or	
2. area of occupancy estimated to be	
≤10 km^2,	CR
≤500 km^2, or	EN

≤2000 km^2 and at least one of the following:	VU
(a) observed, estimated, inferred, or suspected continuing decline in distribution,	
(b) observed, estimated, inferred, or suspected severe reduction in at least one major ecological process,	
(c) ecosystem exists at only one location, 5 or fewer locations, or 10 or fewer locations	
1	CR
5	EN
10	VU
D: Very small current distribution, estimated to be	
≤5 km^2,	CR
≤50 km^2, or	EN
≤100 km^2,	VU
and serious plausible threats, but not necessarily evidence of past or current decline in area or function.	

Annex 7.8.H: Ecosystem Services Review

Ecosystem Services Review (ESR)

Ecosystem services (ES) are the goods and services provided by ecosystems upon which human wealth and individual well-being depend. The environment provides mankind with the food, water and air that are essential for life and with the minerals and raw materials for industry and consumption. Less obviously, it provides the processes that purify air and water, and which sequester or break down wastes. It is also in the environment where recreation, health and solace are found and in which human culture finds its roots and sense of place. Scientists refer to these services that the environment provides as 'ecosystem services', recognising that it is the interaction between the living and physical environments that deliver these necessities[2,3]. For the ESR, ES are depicted within four service subset categories: Provisioning; Regulating; Cultural; and Supporting. Supporting services (e.g. soil formation, primary production and genetic exchange) are those that underpin the other three categories of services. Therefore, supporting services are not assessed separately within this section.

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, focussing 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 wellbeing. 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.

Ecosystem service principles and/or cost-benefit analyses are enshrined in European environmental protection legislation and policies such as the Environmental Liability Directive (2004/35/EC), the Habitats Directive (92/43/EEC), the Water Framework Directive (2000/60/EC) and the REACH Directive (1907/2006). Recent initiatives such as the United Nations Millennium Ecosystem Assessment (2004)[4], UK National Ecosystem Assessment (2011)[2] and The Economics of Ecosystems and Biodiversity (TEEB, 2010[5]) have built on concepts and methods developed over more than 20 years in the United States to deal with legacy contamination (US Natural Resource Damage Act). Many of the US approaches have informed more recent European initiatives on environmental liability, habitat banking, biodiversity offsetting, life cycle assessment (foot printing), strategic planning, operational risk reduction and now product registration.

The IFC Performance Standards divide Ecosystem services into two priority types:

- Priority 1: Those services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities.
- Priority 2: Those services on which the project is directly dependent for its operations (e.g. water).

[2] UK National Ecosystem Assessment (UKNEA, 2011). The UK National Ecosystem Assessment: Synthesis of the Key Findings. UNEP-WCMC, Cambridge.

[3] IFC Performance Standards , January 2012.

[4] Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.

[5] TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

In addition, where Affected Communities are likely to be impacted, they should participate in the determination of priority ecosystem services in accordance with the stakeholder engagement process as defined in IFC Performance Standard 1. Table 1 screens the ecosystem services that are relevant to the Project Area of Influence and categorises them according to either priority 1 or priority 2.

Ecosystem Service	**Relevance to Study Area**
Provisioning	
Crops	Priority 1 – arable crops and gardens. Approximately 55 ha of arable land in the north-west portion of the Project Area will be lost. (See Chapter 7.13 Social and Cultural Assessment)
Livestock	Priority 1 - grazing by cattle and sheep. Approximately 236 ha used by local farmers for grazing. (See Chapter 7.13 Social and Cultural Assessment)
Capture fisheries	Priority 1 – Commercial fishing in the Black Sea and informal fishing in the Project Area lakes.
Aquaculture	Not relevant – no aquaculture
Wild foods	Priority 1 – fungi, leaves and berries collected by local people
Timber and other wood fibre	Priority 1 – Large area of forestry (exceeding 5000 ha). Unofficial timber gathering by local communities. (See Chapter 7.6 Forestry)
Other fibres (e.g., cotton, hemp, silk)	Not relevant – no fibre harvested
Biomass fuel	Not relevant – no biomass harvested
Hunting	Priority 1 – unofficial hunting for food
Freshwater	Priority 1 – freshwater used by grazing livestock. Catchment of Lake Terkos, which is drinking water source for local populations and Istanbul. Priority 2 - freshwater provision to INA Project. Large quantities of water will be required for construction (dust suppression, concrete and water for workers). The operational airport will require 25,000 m3/day of water when running at full capacity. (See the Water Resources section)
Genetic resources	Not relevant – no significant genetic resources
Biochemicals, natural medicines, and pharmaceuticals	Priority 1 – collection of medicinal plants.
Regulating	
Air quality regulation	Priority 1 – clean air used by local communities Priority 2 – construction and operation phases will use the air to dispose of emissions (See Chapter 7.2 Air Quality)
Global climate regulation	Priority 1 - The Project Area currently stores carbon in soils and trees (See the Forestry section)

Ecosystem Service	Relevance to Study Area
Provisioning	
	Priority 2 - construction and operation phases will use the air to dispose of carbon emissions (See Chapter 7.1 Meteorological Conditions and Climate Change)
Regional/local climate regulation	Priority 1 – The Project Area currently regulate micro-climates through its topography and vegetation.
Water regulation	Priority 1 – The Project Area currently regulates hydrology and water tables
Erosion regulation	Priority 1 – Vegetation cover within the Project Area reduces erosion due to disturbance
Water purification and waste treatment	Priority 1 – The Project Area currently regulates water purification and plant waste decomposition
Disease regulation	Priority 1 – naturally functioning ecosystems generally self-regulating against disease/pathogens
Pest regulation	Priority 1 – naturally functioning ecosystems generally self-regulating against pests
Pollination	Priority 1 – The Project Area currently supports pollinators and pollination is important for local crop production
Natural hazard regulation	Priority 1 and 2 – vegetation cover, unimpacted soils and natural drainage important in flood alleviation
Cultural	
Sacred or spiritual sites	Not relevant – no sacred sites present, no cultural heritage sites found within the Project AoI
Areas used for religious purposes	Not relevant – religious centres focussed on mosques, not natural environment
Recreational value	Priority 1 – area used for walking, recreational fishing, camping and beaches.
Ecotourism areas	Priority 1 – local beaches
Aesthetic value	Priority 1 – area appreciated by local people

Annex 7.8.I: Photographs

Flora Photographs

Figure 1. *Pancratium maritimum* Community at Agacli Sand

Figure 2. Agacli Sand Dunes Habitat

Figure 3. ***Asperula littoralis***

Figure 4. ***Centaurea hermannii*** **(endemic)**

Figure 5. ***Centaurea kilaea***

Figure 6. ***Cirsium polycephalum*** **(endemic)**

Figure 7. *Convolvulus persicus*

Figure 8. *Euphorbia amygdaloides* subsp. robbiae (endemic)

Figure 9. *Ferulago confusa*

Figure 10. Mediterranean riparian woodland

Figure 11. ***Galanthus x valentinei***

Figure 12. ***Helleborus orientalis***

Figure 13. ***Iris sintenisii***

Figure 14. Wet Meadow Vegetation

Figure 15. *Jurinea kilaea*

Figure 16. *Lathyrus undulatus* (endemic)

Figure 17. ***Leucojum aestivum***

Figure 18. ***Lilium martagon***

Figure 19. ***Linaria odora***

Figure 20. ***Matthiola fruticulosa***

Figure 21. *Nectaroscordum siculum* subsp. bulgaricum

Figure 22. *Verbascum bugulifolium*

Figure 23. ***Orchis laxiflora***

Figure 24. ***Orchis purpurea***

Figure 25. ***Ophrys apifera***

Figure 26. ***Peucedanum obtusifolium***

Figure 27. *Pinus pinaster*

Figure 28. Plantation Area

Figure 29. *Primula vulgaris* subsp. sibthhorpii

Figure 30. *Convolvulus persicus* community

Figure 31.General View of the Project

Figure 32. *Rosa gallica*

Figure 33. *Silene sangaria*

Figure 34. *Verbascum degenii* (endemic)

Figure 35. General View of *Verbascum degenii*

Figure 36. *Symphytum tuberosum* subsp. nodosum

Figure 37. *Typha latifolia -Phragmites* australis

Figure 38. *Spartium junceum* Community

Figure 39. Thermophillous Deciduous Oak

Figure 40. Deciduous Oak Forest and Plantation Forest

Annex 7.8.I: Photographs

Freshwater and Marine Photographs

Figure 41. ***Petroleuciscus borysthenicus***

Figure 42. ***Scardinius erythrophthalmus***

Figure 43. ***Cyprinus carpio***

Figure 44. ***Scardinius erythrophthalmus***

Figure 45. Balikli Stream

Figure 46. Pirincsuyu Stream

Figure 47. Ayvali

Figure 48. Boyalik Stream

Figure 49. Tayakadin

Figure 50. Sogut Stream

Figure 51. Kulakcayiri Lake

Annex 7.8.I: Photographs

Herptile Photographs

Figure 52. *Lacerta viridis*

Figure 53. *Lissotriton vulgaris* Habitat

Figure 54. *Anguis fragilis*

Figure 55. *Pelophylax ridibundus* Habitat

Figure 56. *Natrix natrix*

Figure 57. *Triturus karelini* and *Natrix tessellata* Habitat

Figure 58. *Lacerta trilineata*

Figure 59. *Podarcis siculus* and *Elaphe sauromates* Habitat

Figure 60. *Bufotes variabilis*

Figure 61. *Testudo graeca* Habitat

Figure 62. *Rana dalmatina* and *Emys orbicularis*

Figure 63. *Bufotes variabilis*

Figure 64. ***Pelophylax ridibundus***

Figure 65. ***Rana dalmatina***

Figure 66. *Triturus karelini* (Southern crested newt)

Figure 67. *Lissotriton vulgaris*

Figure 68. *Testudo graeca* (Spur-thighed tortoise)

Figure 69. *Emys orbicularis* (European pond turtle)

Figure 70. *Lacerta trilineata* (Balkan green lizard)

Figure 71. *Lacerta viridis* (Green lizard)

Figure 72. *Podarcis siculus* (Italian

Figure 73. *Podarcis tauricus*

Figure 74. ***Anguis fragilis***

Figure 75. ***Natrix natrix***

Figure 76. ***Natrix tessellata***

Figure 77. *Elaphe sauromates*

Figure 78. *Dolichophis caspius*

Annex 7.8.I: Photographs

Mammal Photographs

Figure 79. ***Lepus europaeus***

Figure 80. ***Apodemus flavicollis***

Figure 81. *Nannospalax leucodon*

Figure 82. *Sciurus vulgaris* habitat

Figure 83. *Erinaceus roumanicus* adult and feces

Figure 84. ***Talpa europaea***

Figure 85. ***Felis silvestris***

Figure 86. ***Canis aureus***

Figure 87. ***Canis lupus***

Figure 88. ***Sus scrofa***

Figure 89. ***Capreolus capreolus***

Figure 90. ***Vulpes vulpes***

Figure 91. ***Martes foinea***

Figure 92. ***Meles meles***

Annex 7.8.I: Photographs

Bird Photographs

Figure 93. Migrating white storks

Figure 94. Migrating Lesser Spotted Eagle

Figure 95. White stork bathing and

Figure 96. White stork roosting

Figure 97. Migrating Yelkouan Shearwater *Puffinus yelkouan*