Trans Adriatic Pipeline

Supplementary Ecological Assessment

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Background

The TAP project is a greenfield development comprising the design, construction and operation of an 878 km natural gas pipeline (see Figure 1). The pipeline route starts near Kipoi in Greece at the Greek–Turkish border and terminates near San Foca in Italy, crossing Greece, Albania and the Adriatic Sea. The pipeline connects at its entry point to the Trans Anatolian Pipeline and downstream of the Italian SRG natural gas network. The pipeline follows a carefully selected route that is designed to minimise risk in terms of deliverability by trying to avoid densely populated and environmentally sensitive areas, and by ensuring that it runs through the shortest and shallowest offshore route.

Figure 1 TAP route overview

The pipeline's initial design capacity of 10 billion cubic metres per annum (bcma) can rise to about 20 bcma by increasing the system's compression capacity. The pipeline will span 773 km onshore (550 km in Greece, 215 km in Albania and 8 km in Italy) and 105 km offshore.

Early construction works started in 2015 with the building and upgrade of Albanian roads and bridges required to access the pipe-laying sites. Main construction activities began in 2016 and the project is expected to be commissioned at the end of 2019.

1.2 Purpose

The purpose of this Supplementary Ecological Assessment is to:

- provide a whole-of-project biodiversity baseline, updated to include the results of surveys and monitoring carried out since completion of the individual host country Environmental and Social Impact Assessments (ESIAs)
- provide information to fill in data gaps within the host country ESIAs, including the identification of critical habitat, priority biodiversity features, modified vs. natural habitats, etc.
- update information from the host-country ESIAs in relation to legally protected and/or internationally designated areas (this is particularly applicable in Albania, where the protected areas network is currently subject to review and revision)
- assess the residual impacts on biodiversity features (i.e. critical and natural habitats, and priority biodiversity features) as a result of the project, after the mitigation hierarchy has been applied. Based on this biodiversity impact assessment, biodiversity features requiring management will be identified

This report focuses on the pipeline corridor (both onshore and offshore), compressor stations (Greece and Albania), pipeline receiving terminal (Italy) and new/upgraded access roads (primarily Albania). TAP's Environmental and Social Management System (ESMS) includes an Additional Land Take Procedure, which describes the process that must be undertaken before creating any new areas of disturbance. This procedure includes a requirement for the Contractor to undertake a field survey and subsequent environmental and social assessment, which must be reviewed by TAP prior to approval for disturbance being given. This internal process is required to ensure that prior to any additional land disturbance, the risk of encountering areas of high biodiversity value (including critical and natural habitat) is taken into consideration.

2 PROJECT STANDARDS

2.1 Applicable international standards and guidelines

The legislative framework for each of the three host countries, Greece, Albania and Italy, has been described within the respective ESIAs. Within each ESIA, the current laws and planning instruments of relevance to the project have been described and the regulatory constraints have been analysed.

To enhance consistency and uniformity across the TAP project, potential impacts along the pipeline route were also assessed against the European Union (EU) regulatory impact assessment and environmental framework. As best practice, TAP also used the EU framework as a benchmark in Albania. Although Albania is not yet an EU member state, it is an accession country. The following EU Directives are relevant to biodiversity:

- **The EU Habitats Directive 92/43/EC**: This is the EU's response to the Bern Convention, it aims to promote the maintenance of biodiversity by requiring member states to take measures to maintain or restore natural habitats and wild species listed in the Directive's annexes at a favourable conservation status through the introduction of robust protection for those habitats and species of European importance
- **The EU Birds Directive 2009/147/EC**: This places great emphasis on the protection of habitats for endangered bird species, as well as migratory species, especially through the establishment of a coherent network of special protection areas comprising all the most suitable territories for these species.
- **The EU EIA Directive 2014/52/EU**: This provides a standardised approach for Environmental Impact Assessment across Member States, it relates to public and private projects. The process involves screening, scoping, and impact assessment as well as consultation of statutory and non- statutory stakeholders.
- **The EU Marine Strategy Framework Directive 2008/56/EC**: This aims to improve the effectiveness of marine environmental protection across Europe through steps to achieve Good Environmental Status by 2020.
- **The EU Water Framework Directive 2000/60/EC**: The purpose of the water policy directive is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater.
- **EU Wildlife Trade Regulations 338/97**: These regulations implement the provisions of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) throughout EU Member States within the single market, in the absence of systematic border controls being in place.

In addition, the governments of all three host countries are signatory to a number of international conventions related to biodiversity conservation:

- **The Convention of the Conservation of Migratory Species of Wild Animals (CMS) (the Bonn Convention)**: This requires contracting parties to cooperate in the aim to conserve migratory species and their habitats. Strict protection is provided for endangered migratory species through multilateral agreements.

- **The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention):** This focuses on protecting natural habitats and endangered species, including migratory species. It aims to conserve wild flora and fauna and their natural habitats, promote cooperation between states and give particular attention to endangered and vulnerable species including endangered and vulnerable migratory species.
- **The Convention on Biological Diversity (CBD)**: This is a multilateral treaty that outlines the key issues of conservation of biological diversity (or biodiversity), sustainable use of its components, and fair and equitable sharing of benefits arising from genetic resources.
- **The Ramsar Convention on Wetlands**: This is an international treaty aiming to conserve and encourage the sustainable use of wetlands, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.
- **The Convention on Trade in Endangered Species of Wild Flora and Fauna (CITES)**: This treaty aims to protect endangered plants and animals, particularly ensuring that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild.
- **The Convention for the Protection of the Mediterranean Sea against Pollution (the Barcelona Convention)**: This is a regional convention to prevent and abate pollution within the Mediterranean Sea from vessels, aircraft and land based sources to improve the marine environment.

Whilst these conventions are not directly applicable to the project, they provide useful context regarding government policy.

2.2 Applicable national legislation and standards

A detailed list of applicable legislation for Albania and Italy is provided in Appendices 2-5; this has been included as there have been considerable changes to national legislation and standards since publication of the ESIA. The description of biodiversity-relevant legislation in Greece remains as presented in the Greece ESIA, with a concise list provided below.

2.2.1 Greece

The following legislation is applicable to biodiversity in Greece:

- Conservation of biodiversity (Replacement of Articles 18, 19, 21 of L.1650 / 86) L.3937/11
- Determination of measures and procedures to preserve natural habitats (biotopes) and wild fauna and flora. J.M.D. 14849/2008
- Protection of native flora and wildlife P.D. 67/81 P.D. 256/1987
- Validation of the Ramsar Convention L. 191/74
- Establishment of measures and procedures on conservation of wild birds and habitats / inter its claims in compliance with the provisions of Directive 79/409 / EEC "On the conservation of wild bird ', the European Council of 2 April 1979, as consolidated by Directive 2009/147 / EC. Amendment of the JMD 414985/ 1985 M.D. - Η.Π. 37338/1807/Ε.103
- Measures for wild birds protection JMD 414985/85

- Gov Gaz 1077/B/09.04.12 Ministerial Decision setting out procedures for Forest Areas Permits

2.3 Applicable lender standards

During preparation of the ESIAs, TAP voluntarily applied the European Bank for Reconstruction and Development (EBRD) performance requirements (2008 edition[1]) as the main international standards for compliance during the execution of the planned project activities.

TAP is now planning to raise finance from multilateral agencies, export credit agencies and commercial banks. As such, the following financial institution performance requirements and standards are being applied to the project specifically in relation to biodiversity:

- EBRD Performance Requirement 6 (PR6) – Biodiversity Conservation and Sustainable Management of Living Natural Resources, 2014
- European Investment Bank (EIB) Environmental and Social Handbook – 3 Standards on Biodiversity and Ecosystems, 2013
- International Finance Corporation (IFC) Performance Standard 6 (PS6) – Biodiversity Conservation and Sustainable Management of Living Natural Resources, 2012

IFC PS6 sets the following performance standard for projects within natural and critical habitats.

In **natural habitats**[2], 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
- any conversion of degradation is mitigated according to the mitigation hierarchy.

Furthermore, 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 after construction
- implementing biodiversity offsets

[1] Subsequent to the publication of the TAP ESIAs, the EBRD updated its performance requirements in 2014.

[2] Natural habitats are defined as 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 (IFC 2012); areas where ecological assemblages, function and species composition are mainly attributable to natural evolutionary processes and have not been substantially modified by human activities (EIB, 2013).

In areas of **critical habitat**[3], 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
- a robust, appropriately designed and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

Where the client is able to meet the above requirements, the project's mitigation strategy will be designed to achieve **net gains** of those biodiversity values for which the **critical habitat** was designated.

Where a project is located within a legally protected area or an internationally recognised area, the client will meet the above requirements (in relation to natural and critical habitats) in addition to the following:

- demonstrate that the proposed development in such areas is legally permitted
- act in a manner consistent with any government recognized management plans for such areas
- consult protected area sponsors and managers, Affected Communities and other stakeholders as appropriate
- implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area
- enhancement programs will form part of the biodiversity offset strategy and delivered through individual Biodiversity Action Plans.

EBRD PR6 requirements for priority biodiversity features[4] state that the client will not implement any project-related activities unless all of the following are demonstrated

- there are no technically and economically feasible alternatives
- the overall benefits outweigh the project impacts on biodiversity
- stakeholders are consulted
- the project is permitted under applicable environmental laws, recognising the priority biodiversity features
- appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to ensure no net loss and preferably a net gain of priority

[3] The consolidated criteria for critical habitats adopted by the TAP project are (i) habitat of significant importance to Critically Endangered, Endangered and/or Vulnerable species; (ii) habitat important to the survival of endemic or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory and/or congregatory species; (iv) highly threatened or unique ecosystems; (v) areas associated with key evolutionary processes; and (vi) habitat of key scientific value. These criteria are an amalgamation of the relevant criteria from EBRD PR6, IFC PS6 and EIB Standard 3. In areas of discrepancy between the Lender standards, the more stringent requirement has been adopted.

[4] Priority biodiversity features have a high, but not the highest, degree of irreplaceability and/or vulnerability. Although a level below critical habitat in sensitivity, they still require careful consideration during project assessment and impact mitigation (EBRD GN PR6, 2014).

biodiversity features over the long term, to achieve measurable conservation outcomes.

EBRD and EIB requirements in relation to critical habitat and legally protected areas are broadly similar to those outlined above for IFC.

The TAP Critical Habitat Assessment (CHA) identifies and delineates critical habitat triggers in the vicinity of the project– regardless of whether or not the project may affect them. This Supplementary Ecological Assessment (SEA) assesses potential impacts on critical habitat triggers, as well as natural and semi-natural[5] (also referred to as modified[6]) habitats and priority biodiversity features as defined by the performance requirements and standards. The interpretation and application of EIB's (natural and semi-natural habitats) and IFC's (natural and modified habitats) requirements for habitats broadly align with EBRD's priority biodiversity features.

The SEA links closely to the Ecological Management Plan (EcMP) which focuses on specific mitigation and monitoring measures for key biodiversity features, as well as defining roles and responsibilities for wider ecological management as part of TAP's Environmental and Social Management System (ESMS). Requirements relating to biodiversity offsets[7] and compensation are addressed in the project-wide Biodiversity Offsets Strategy (BOS), as informed by the assessment of impacts in this SEA.

[5] Semi-natural habitats are areas where ecological assemblages have been substantially modified in their composition, balance or function by human activities. These ecosystems have often evolved through traditional agriculture, pastoral or other human activities and depend on their continuation. Despite not being natural, these habitats and ecosystems often present high value in terms of biodiversity and ecosystem services (EIB, 2013)

[6] Modified habitats are 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 (IFC, 2012)

[7] Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimisation and restoration measures have been taken (IFC, 2012)

3 ECOLOGICAL CONTEXT

3.1 Regional overview

The project area of influence (AOI[8]) is located entirely within the Mediterranean Basin biodiversity hotspot[9], as identified by the Critical Ecosystem Partnership Fund (CEPF)[10]. The Mediterranean Basin biodiversity hotspot is the second largest hotspot in the world, covering more than two million square kilometres and stretching west to east from Portugal to Jordan and north to south from northern Italy to Cape Verde (Figure 2). It is the third richest hotspot in the world in terms of its plant diversity (Mittermeier et al. 2004).

Figure 2 Mediterranean Basin biodiversity hotspot

Evergreen oak trees, coniferous and deciduous forests form the climax vegetation of large areas of the hotspot. Nevertheless, much of this has disappeared due to thousands of years of human settlement and habitat modification that has distinctly altered the climax vegetation (Tucker and Evans 1997). Today, the most widespread vegetation type is hard-leafed or sclerophyllus shrublands called maquis, maintained by grazing and sporadic fires. Many of the endemic and restricted-range plants depend on this anthropogenic habitat, thus several species are threatened from land-use changes and rural abandonment (Tucker and Evans 1997).

[8] The project AOI encompasses environmental and social receptors that may be impacted directly or indirectly by project activities; it is defined individually for each receptor but is necessarily broader than the physical footprint of the project.

[9] Globally, the 36 identified biodiversity hotspots represent the Earth's most biologically rich and threatened areas. To qualify as a hotspot a region must a) contain at least 1500 species of vascular plant as endemics and b) have lost at least 70% of its original habitat

[10] A joint initiative of l'Agence Française de Développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank

Within the Mediterranean Basin biodiversity hotspot, the CEPF has identified 17 corridors incorporating 435 key biodiversity areas (KBAs); one of these corridors, the Southwest Balkans corridor (Figure 3), overlaps with the project AOI in Albania and Greece. This corridor was primarily identified for the unique freshwater biodiversity associated with the Prespa and Ohrid Lake systems (shared between Albania, Greece and FYR Macedonia), the Skadar Lake system (shared between Albania and Montenegro) and the Dojran Lake KBA (shared between FYR Macedonia and Greece). The corridor also includes many coastal KBAs for breeding water birds and endemic plants. Although many of these KBAs are legally protected areas, enforcement and management of the protected areas is inadequate. In addition, many of these protected areas are multiple-use zones and do not effectively conserve the nature found in the KBAs. Hunting and overfishing are the key threats driving biodiversity loss in the corridor. Habitat destruction along the coast is also driven by continued building for tourism.

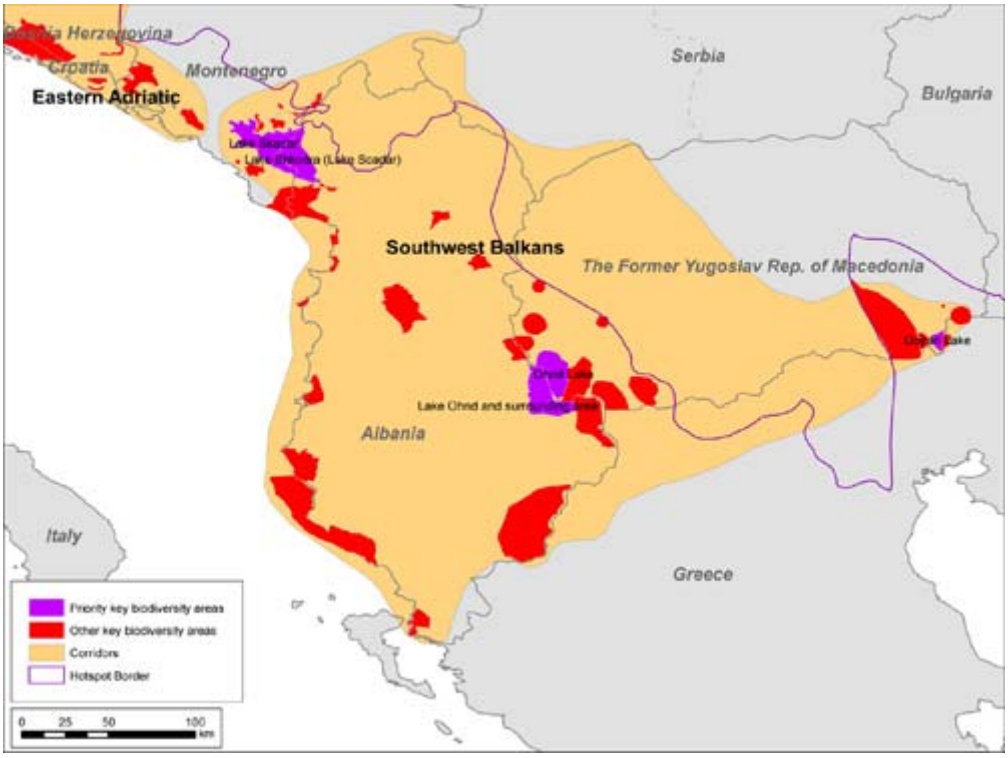


Figure 3 Southwest Balkans priority key biodiversity area (Source: KBA Partnership)

The offshore pipeline route intersects part of the South Adriatic and Ionian Strait Ecologically or Biologically Sensitive Areas (EBSA), which is located in the central southern part of the southern Adriatic basin and the northern Ionian Sea (Figure 4). It is characterized by steep slopes, high salinity and a maximum depth of up to 1500 m. The EBSA supports an array of marine megafauna including the striped dolphin (*Stenella coeruleoalba*) and loggerhead turtle (*Caretta caretta*), both of which are listed in Annex II of the Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD) Protocol under the framework of the Barcelona Convention. Benthos includes deep-sea cold water coral communities and deep-sea sponge aggregations. Tuna, swordfish and a variety of sharks and rays are also found within the region.

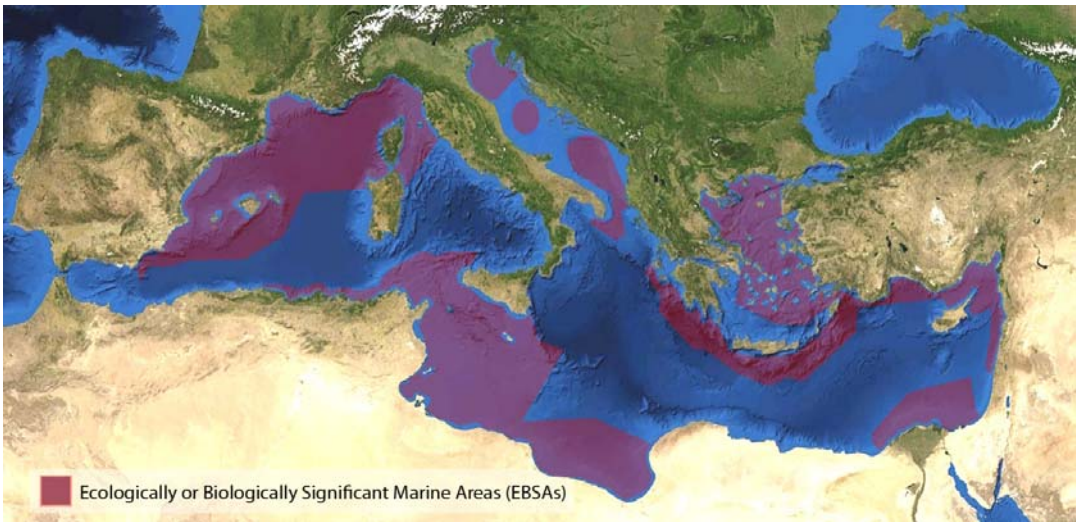


Figure 4 EBSAs in the Mediterranean Basin

3.2 Protected and designated areas

Table 1 presents a summary of the protected and designated areas within 2 km of the project. Note terrestrial sites are presented only for Greece and Albania, as there are no protected or designated sites within 2 km of the project in Italy onshore. In Italy onshore, the nearest protected area is Le Cesine, located approximately 2.3 km away.

Table 1 Protected and designated areas

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Greece					
South forest complex of Evros prefecture *Includes the Loutros Forest*	KP13.6 Intersected by the pipeline	Notio Dasiko Symplegma Nomou Evrou (GR005)	Important Bird Area (IBA) and Key Biodiversity Area (KBA)	71800 ha site containing forest complex at the south-eastern end of the Rodopi mountain. It is characterized by low hills covered with Quercus, Caprinus, Fraxinus and Acer woodland and scrub. Small wetlands are also present.	Golden jackal White-tailed eagle (*Haliaeetus albicilla*), Egyptian vulture (*Neophron percnopterus*), Cinerous vulture (*Aegypius monachus*), Short-toed eagle (*Circaetus gallicus*), Long-legged buzzard, Lesser spotted eagle, Greater spotted eagle (*Aquila clanga*), eastern imperial eagle (*Aquila heliaca*), Golden eagle (*Aquila chrysaetos*), Booted eagle, Lesser kestrel (*Falco naumanni*), Eagle owl and masked shrike (*Lanius nubicus*).
	KP21.7 Intersected by the pipeline	NOTIO DASIKO SYMPLEGMA EVROU	Special Protection Area (SPA) under the Birds Directive	293km^2 site designated for the 125 bird species it supports, comprising a forest complex at the southeastern end of the Rodopi mountain. It is characterized by low hills covered with oak, ash, hornbeam woodland and scrub. Loutros Forest comprises mature *Pinus* nigra with breeding habitat for raptors	
	KP16.1 Intersected by the pipeline	Pylaias - Kavissou - Ferron Dimou Ferron	Wildlife Refuge	9km^2 designation to protect flora, fauna, habitats and landscapes	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP50.7 Intersected by the pipeline	Kirki Dimou Alexandroupolis	Wildlife Refuge	14km^2 designated to protect flora, fauna, habitats and landscapes	
	KP52.3 Intersected by the pipeline	Kirki Alexandroupolis	Game breeding station	5km^2 protection relevant for fauna, flora and habitat conservation. Important site for breeding and wintering birds of prey associated with forests.	
Delta Evrou	KP34.8 1.7km from the pipeline	Evros delta	Ramsar Site	9,267ha site within the river delta, significant reed habitat for birds. Shallow seas, brackish lagoons, freshwater lakes, mudflats, saltmarsh, some freshwater marsh supporting important bird and fish habitats. 8,930ha of Ramsar overlaps with IBA.	Yellow bellied toad (*Bombina variegata*), Italian crested newt (*Triturus cristatus*), Four lined snake, Mediterranean spur-thighed tortoise, Fire bellied toad (*Bombina bombina*), *Triturus karelinii* Pygmy comorant (*Phalacrocorax pygmeus*), Great white pelican (*Pelecanus onocrotalus*), Dalmatian pelican (*Pelecanus crispus*), Greater spotted eagle, Ferruginous duck (*Aythya nyroca*), White-headed duck (*Oxyura leucocephala*), White-tailed eagle, Eastern imperial eagle, Lesser kestrel, Audouin's gull (*Larus audouinii*), Moustached warbler (*Acrocephalus melanopogon*),

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
					Grey heron (*Ardea cinerea*), Squacco heron (*Ardeola ralloides*), Black stork, Purple heron (*Ardea purpurea*), Spotted Crake (*Porzana porzana*), Montagu's Harrier Twait shad (*Alosa fallax*)
Ismaris-Vosvozis-Filiouris Catchment	KP59.1 Intersected by the pipeline	Ismaris-Vosvozis-Filiouris (2080009560)	Freshwater KBA	Site includes the freshwater Ismaris Lake and two lowland rivers and the upper part of both rivers.	European eel (*Anguilla anguilla*), thick shelled river mussel (*Unio crassus*), wild common carp (*Cyprinus carpio*)
Potamos Filiouris	KP77 Intersected by the pipeline	Potamos Filiouris	Site of Community Importance (SCI) and Special Area for Conservation (SAC) under the Habitats Directive	21km^2 10 The site is a deep sided valley vegetated with oak forests and pastures that supports birds of prey and is an important feeding ground for vultures.	Four lined snake , Mediterranean spur-thighed tortoise, *Triturus karelinii*, Yellow bellied toad Dalmatian pelican , Ferruginous duck , Pygmy cormorant , Squacco heron, Egyptian vulture, griffon vulture, short-toed eagle, lesser spotted eagle, golden eagle
Chatisio (Kosmiou)	KP98.5 Intersected by the pipeline	Chatisio (Kosmiou)	Wildlife Refuge	13km^2 designated to protect flora, fauna, habitats and landscape	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Vistonis Catchment	KP103.3 Intersected by the pipeline	Vistonis (2080009581)	Freshwater KBA	Vistonis river catchment, including Lake Vistonis.	Vistonis shemaja (*Alburnus vistonicus*), Shad (*Alosa vistonica*)
Kompsatos valley	KP124.6 0.4km from the pipeline	Kilada Kompsatou (GR009)	IBA and KBA		Golden jackal, Grey wolf (*Canis lupus*). Four lined snake, Mediterranean spur-thighed tortoise, *Triturus karelinii*, yellow bellied toad, *Triturus carnifex* 42 bird species including Levant sparrowhawk (*Accipiter brevipes*), Black stork, Short-toed eagle, Syrian woodpecker, Peregrine falcon (*Falco peregrinus*). Twait shad
Porto Lagos, limni Vistonida kai parakties limnothalasses	KP112.5 Intersected by the pipeline	Porto Lagos, limni Vistonida kai parakties limnothalasses (GR011)	IBA and KBA	15,300 ha site containing a wetland complex of freshwater lakes and coastal lagoons, with reedbeds (Phragmites), wet meadows and saltmarsh. The area is important for breeding, passage and wintering waterbirds and raptors, and breeding species associated with reedbeds.	Golden jackal, Grey wolf Four lined snake, Mediterranean spur-thighed tortoise, *Triturus karelinii*, yellow bellied toad Baillon's crake (*Porzana pusilla*), Pygmy cormorant, Osprey (*Pandion haliaetus*), Olive-tree warbler (*Hippolais olivetorum*), Peregrine falcon, Marsh harrier

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP119.2 2km from the pipeline	Lake Vistonis, Porto Lagos, Lake Ismaris & adjoining lagoons	Ramsar Site	24,396ha wetland complex of lakes and lagoons, saltmarsh, mudflats, reedbeds, scrub and freshwater marsh.	(*Circus aeruginosus*), Golden eagle, Lesser spotted eagle, Purple heron, Grey heron, Black stork, Lesser kestral, Red-backed shrike (*Lanius collurio*). Twait shad
	KP123.3 0.7km from the pipeline	LIMNES VISTONIS, ISMARIS - LIMNOTHALASSES PORTO LAGOS, ALYKI PTELEA, XIROLIMNI, KARATZA	SPA	182km^2 encompassing a series of coastal lakes with varying salinities and river outlets, extensive reedbeds, Tamarix scrub, saltmarsh, dunes, agricultural lands. Important for 238 species of breeding, passage and wintering waterbirds, raptors etc.	
	KP123.5 Intersected by the pipeline	Limnes Kai Limnothalasses Tis Thrakis - Evryteri Periochi Kai Paraktia Zoni	SCI and SAC	295km^2 the site encpmpasses a series of coastal lakes, the largest is brackish/freshwater the others saline, surrounding habitats include extensive reedbeds, Tamarix scrub, saltmarsh, dunes supporting a diverse array of taxa. Important for 219 species of breeding, passage and wintering waterbirds, raptors etc.	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP111.3 Intersected by the pipeline	Periochi oikoanaptixis Ethnikou Parkou Anatolikis Makedonias kai Thrakis	National Park		
	KP111.3 Intersected by the pipeline	Ethniko Parko Anatolikis Makedonias kai Thrakis	National Park	929km^2 designation to protect flora, fauna, habitats and landscapes	
	KP116.1 0.5km from the pipeline	Kompsatou Dimou Iasmou	Wildlife Refuge	37km^2 Designation types used with the intention to protect fauna, flora, habitats and landscapes	
	KP123.4 Intersected by the pipeline	Prostatevomena topia Ethnikou Parkou Anatolikis Makedonias kai Thrakis	National Park	259km^2 Designation types used with the intention to protect fauna, flora, habitats and landscapes	
Filia-Simantra (Selerou)	KP129.4 1.5km from the pipeline	Filia-Simantra (Selerou)	Wildlife Refuge	4km^2 designation to protect fauna, flora, habitats and landscapes	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Nestos delta and coastal lagoons	KP161.2 Intersected by the pipeline	Delta Nestou kai parakties limnothalasses (GR012)	IBA and KBA	22,000 ha site, consisting of a series of brackish lagoons and arable fields with fragmented patches of freshwater marsh, grassland, saltmarsh and forest.This is an important site for breeding, passage and wintering waterbirds, raptors and passerines associated with reedbeds.	Nathusius's pipistrelle (*Pipistrellus nathusii*) Golden jackal, Grey wolf Italian crested newt, Mediterranean spur-thighed tortoise, Four lined snake , yellow bellied toad , *Triturus karelinii*, loggerhead turtle (*Caretta caretta*) Mute Swan (*Cygnus olor*), Lesser White-fronted Goose *(Anser erythropus*), Ferruginous Duck, Yelkouan Shearwater (*Puffinus yelkouan*), White Stork (*Ciconia ciconia*), *Ixobrychus minutus*, Great White Egret (*Ardea alba*), Dalmatian Pelican, Pygmy Cormorant, European Shag (*Phalacrocorax aristotelis*), Great Cormorant (*Phalacrocorax carbo*), *Burhinus oedicnemus*, *Charadrius alexandrinus,* Spur-winged Lapwing (*Vanellus spinosus*), Slender-billed Curlew (*Numenius tenuirostris*), Collared Pratincole (*Glareola pratincola*), Mediterranean Gull (*Larus melanocephalus*), Little Tern (*Sternula albifrons*), Greater
	KP157.9 Intersected by the pipeline	Delta Nestou Kai Limnothalasses Keramotis - Evryteri Periochi Kai Paraktia Zoni	SCI and SAC	225km^2 20 habitats and 210 species, 194 of which are birds. The site consists of Nestos Delta and Keramoti lagoons, it is a valuable part of a wetland chain included between Axios river and Delta Evrou in northern Greece. The riparian forest and coastal areas are important for breeding birds, the lagoons for migrating birds and the river for overwintering species.	
	KP161.1 Intersected by the pipeline	DELTA NESTOU KAI LIMNOTHALASSES KERAMOTIS KAI NISOS THASOPOULA	SPA	This 146km^2 site is a large delta and consists of agricultural land with few freshwater lagoons separated from the sea by narrow sandy strips. It still is a valuable part of a wetland chain	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
				included between Axios river and Delta of Evros of north Greece.	Spotted Eagle Levant Sparrowhawk (*Accipiter brevipes*), Syrian Woodpecker, Lesser Kestrel , Lesser Grey Shrike (*Lanius minor*), Masked Shrike (*Lanius nubicus*), *Calandrella brachydactyla*, Greater spotted eagle , Lesser spotted eagle , Purple heron, Stone curlew (*Burhinus oedicnemus*), Roller (*Coracias garrulus*), peregrin falcon, common tern (*Sterna hirundo*), Avocet (*Recurvirostra avosetta*), Whooper swan (*Cygnus cygnus*). Bladetail (*Lindenia tetraphylla*), Green gomphid (*Ophiogomphus cecilia*) Twait shad
	KP153.8 Intersected by the pipeline	Ethniko Parko Anatolikis Makedonias kai Thrakis - Periochi prostasias tis fysis	National Park	223km^2 Designation to protect fauna, flora, habitats and landscape	
	KP154.7 Intersected by the pipeline	Kotza Orman Nestou Dimou Topeirou	Wildlife Refuge	83km^2 Designation types used with the intention to protect fauna, flora, habitats and landscapes	
	KP176.6 Intersected by the pipeline	Perifereiaki zoni Ethnikou Parkou Anatolikis Makedonias kai Thrakis	National Park	2km^2 Designation types used with the intention to protect fauna, flora, habitats and landscapes	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Nestos gorge	KP154 1.8km from the pipeline	Stena Nestou (GR013)	IBA and KBA	14,500 ha site with a large gorge with steep rocky slopes. Forest occupies the bottom of the gorge whilst the surrounding mountain slopes are covered with a mixture of forest and maquis.	Yellow bellied toad, Italian crested newt, Mediterranean spur-thighed tortoise European Bee-eater (*Merops apiaster*), Eurasian Eagle-owl, Eurasian Griffon (*Gyps fulvus*), Pygmy Cormorant, Common tern (*Sterna hirundo*), Osprey (*Pandion haliaetus*), Woodlark (*Lullula arborea*), Red-backed shrike (*Lanius collurio*), Booted eagle, Syrian Woodpecker, Eygptian vulture (*Neophron percnopterus*), Olive-tree warbler (*Hippolais olivetorum*), White Stork, Lesser spotted eagle
Kastene Ntag Dimou Oreinou	KP179.8 2.7km from the pipeline	Kastene Ntag Dimou Oreinou	Wildlife Refuge	25km^2 designated to protect fauna, flora, habitats and landscapes	
Agios Timotheos-Koupia	KP191.4 0.7km from the pipeline	Dasi Amygdaleona Kavalas	Aesthetic Forest	26km^2 designated to protect fauna, flora, habitats and landscapes	Large carnivores and birds of prey
	KP192.9 Intersected by the pipeline	Agios Timotheos-Koupia	Wildlife Refuge	26km^2 designated to protect fauna, flora, habitats and landscapes	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Aggitis Catchment	KP192.3 Intersected by the pipeline	Aggitis (2080625500)	Freshwater KBA	Catchment for tributaries running into first order stream	*Turcorientalia hohenackeri* Greek Brook Lamprey (*Eudontomyzon hellenicus*), Aggitis spined loach (*Cobitis punctilineata*), Aegean Minnow (*Phoxinus strymonicus*)
Loungas-Kava-Tzikia-Ntermentersi (Krinidos-Fyllid*	KP226.4 1.1km from the pipeline	Loungas-Kava-Tzikia-Ntermentersi (Krinidos-Fyllidos)	Wildlife Refuge	11km^2 designated to protect fauna, flora, habitats and landscapes	
Alistrati-Petroto	KP231 Intersected by the pipeline	Alistrati-Petroto	Wildlife Refuge	11km^2 designated to protect fauna, flora, habitats and landscapes	
Cheimarros Gazorou-Palaia Zichni (Gazorou-Agiou C*	KP252.2 1.4km from the pipeline	Cheimarros Gazorou-Palaia Zichni (Gazorou-Agiou Christoforou-N.Zichnis-Anastasias)	Wildlife Refuge	10km^2 designated to protect flora, fauna, habitats and landscapes	
Profitis Ilias (Pentapoleos)	KP257.6 0.9km from the pipeline	Profitis Ilias (Pentapoleos)	Wildlife Refuge	7km^2 part of 432km^2 designation to protect flora, fauna, habitats and landscape	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Dimotiko Diamerisma Chrysou Dimou Emmanouil Papa	KP266.6 1.9km from the pipeline	Dimotiko Diamerisma Chrysou Dimou Emmanouil Papa	Wildlife Refuge	10km^2 designated to protect flora, fauna, habitats and landscapes	
Kerkini Catchment	KP287 Intersected by the pipeline	Kerkini (2080623931)	Freshwater KBA	Site includes the Kerkini lake, lowland and upper part of Strymonas river, Kerkinitis and Bistritsa rivers and many rivlets from the mountains Kerkini, Dysoro and Mavrovuni. The lake serves not only as the heart of a fertile and important nature reserve but also as an essential water resource for thousands of hectares of arable land	
Lakes Volvi, Koroneia and Rentina Gorge	KP348.4 Intersected by the pipeline	Perifereiaki zoni C Ethnikou Parkou ygrotopon ton limnon Koroneias - Volvis kai ton Makedonikon Tempon (349980)	National Park		Schreiber's Bat, Bechstein's bat, Greater horseshoe bat Mediterranean spur-thighed tortoise Ferruginous duck , White-headed duck (*Oxyura leucocephala*), Lesser spotted eagle , Booted eagle , long legged buzzard , Lanner falcon (*Falco biarmicus*), Black stork, European roller, Calandra lark (*Melanocorypha calandra*)

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
					Thick shelled river mussel (*Unio crassus*), Bladetail (*Lindenia tetraphylla*)
Volvi-Koronia Catchment	KP348.4 Intersected by the pipeline	Volvi-Koronia (2080009751)	Freshwater KBA	Site includes catchments for Lakes Volvi & Koronia	Volvi Bleak (*Alburnus* sp. nov. 'Volvi'), Yalartza (*Alburnus volviticus*), Macedonian Shad (*Alosa macedonica*)
River Axios	KP375 1.3km from the pipeline	Axios–Loudias–Aliakmon Delta (59)	Ramsar Site		Italian crested newt, Four lined snake , European pond turtle (*Emys orbicularis*), Mediterranean spur-thighed tortoise , Hermann's tortoise Pygmy Cormorant, *Himantopus himantopus*, Pied Avocet, Slender-billed Curlew (*Numenius tenuirostris*), Collared Pratincole (*Glareola pratincola*), Mediterranean Gull, Greater spotted eagle, White-tailed eagle, Eurasian Spoonbill, Little bittern (*Ixobrychus minutus*), Little egret,
	KP374.6 1.4km from the pipeline	Delta Axiou, Loudia, Aliakmona (GR028)	IBA and KBA	A coastal wetland of small lagoons, sandflats, and alluvial forests dominated by Tamarix, Alnus , and Salix. Human activities include rice production, livestock farming, fishing and mussel culture. This is a very important site for breeding, passage and wintering waterbirds.	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP376.2 Intersected by the pipeline	Axios Potamos (GR025)	IBA and KBA	This site contains the River Axios together with patches and islands of riverine forest and pasture. The site is an important corridor for migratory species.	Black-crowned night heron (*Nycticorax nycticorax*), Squacco Heron, Dalmatian Pelican, Pygmy Cormorant, Eurasian oystercatcher (*Haematopus ostralegus*), Kentish Plover (*Charadrius alexandrinus*), Black-tailed Godwit (*Limosa limosa*), Caspian gull (*Larus cachinnans*), Little Tern, Greater short-toed lark (*Calandrella brachydactyla*)
	KP374.8 Intersected by the pipeline	DELTA AXIOU - LOUDIA - ALIAKMONA - ALYKI KITROUS (GR1220010)	SPA	Important wetland for birds, delta and rivers fringed by a range of natural and artificial waterbodies, lagoons, rice fields, drainage ditches, riverine forests, poplar plantations, endemic fish.	
	KP374.8 Intersected by the pipeline	Delta Axiou - Loudia - Aliakmona - Evryteri Periochi - Axioupoli (GR1220002)	SCI and SAC	337km^2 containing a delta formed by the rivers Axios, Loudias and Aliakmonas riverine forests and popular plantations, important spawning area for endemic and other fish species, important area for breeding, feeding and resting of migratory birds.	
	KP375 1.5km from the pipeline	Ethniko Parko Axiou - Perioches Prostasias tis Fysis PD1, PD2, PD3, PD4 (392895)	National Park	Designation types used with the intention to protect fauna, flora, habitats and landscapes	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP377.7 1.2km from the pipeline	Ethniko Parko Axiou - Perioches Prostasias tis Fysis B1, B2, B3, B4, B5, B6, B7 (392894)	National Park		
	KP377.7 1.2km from the pipeline	Ethniko Parko Gallikou, Axiou, Loudia, Aliakmona, Alykis Kitrous, Limnothalassas Kalochoriou (392899)	National Park		
Lower Axios Catchment	KP367.1 Intersected by the pipeline	Lower Axios (2080009900)	Freshwater KBA	Site includes catchment for Lower Axios	
Aliakmon Naoussa Catchment	KP382.2 Intersected by the pipeline	Aliakmon Naoussa (2080009930)	Freshwater KBA	Site includes catchment for Aliakmon Naoussa	*Paladilhiopsis neaaugustensis*
Flamouria - Grammatikou Dimou Edessas	KP437.9 Intersected by the pipeline	Flamouria - Grammatikou Dimou Edessas (341376)	Wildlife Refuge	Designation types used with the intention to protect fauna, flora, habitats and landscapes (the latter as far as relevant for fauna, flora and for habitat protection) (Code A)	Brown bear, Grey wolf Fire bellied toad (*Bombina bombina*) and European pond turtle

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Oros Vermio	KP442 2km from the pipeline	Oros Vermio (GR1210001)	SCI	site containing a small and large gorge as well as pasture land with Paliurus scrub and oriental plane trees, Moglenitsa River flows most of the year. It is a flyway for migratory birds and provides nesting habitat for birds of prey.	Schreiber's bat , Lesser mouse eared bat , Long fingered bat, Geoffroy's bat , Greater mouse eared bat Grey wolf Yellow bellied toad, *Triturus carnifex*, Four lined snake, Hermann's tortoise
Lake Vegoritis and Lake Petron	KP460.3 0.4km from the pipeline	Limni Vegoritida and Limni Petron (GR045)	IBA and KBA	The site is important for wintering ducks and geese. Species of global conservation concern that do not meet IBA criteria: Aythya nyroca (wintering), Haliaeetus albicilla (non-breeding).	Yellow bellied toad , *Triturus caarnifex*, Hermann's tortoise Pygmy Cormorant, Ferruginous Duck, White-tailed eagle
	KP460.3 0.4km from the pipeline	Limnes Vegoritida - Petron (GR1340004)	SCI	Site with two calcareous lakes between bare mountains, the reedbed dominated wetlands are important for breeding, resting and feeding birds. It is also important for birds of prey.	
Kouri (Ptolema¿das)	KP477.2 Intersected by the pipeline	Kouri (Ptolema¿das) (341861)	Wildlife Refuge		
Lake Chimaditis and Lake Zazaris	KP489.9 1.1km from	Limni Chimaditida and Limni Zazari (GR046)	IBA and KBA	Two eutrophic lakes at the foot of Mount Verno. They are	Grey wolf Italian crested newt, Hermann's

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	the pipeline			surrounded by extensive reedbeds (Phragmites). Beyond the lakes is a mosaic of woodland, pastures and arable fields.	tortoise Ferruginous Duck, Pygmy Cormorant, Dalmatian Pelican, Whiskered Tern (*Chlidonias hybrida*), Lesser Kestrel, Golden Eagle
	KP490.5 1.6km from the pipeline	LIMNES ChEIMADITIDA KAI ZAZARI (GR1340008)	SPA	Lake Cheimaditida and Lake Zazari support a large number of nesting birds, more important being the Teal Anas crecca (The first discovered nesting site in Greece), the Ferruginous Duck Aythya nyroca, the Purple Heron Ardea purpurea and the Little Bittern Ixobrychus minutus, the Marsh Harrier Circus aeruginosus and the Pochard Aythya ferina. Other species of interest include the Golden Eagle Aquila chrysaetos, the Little and Great Crested Grebe and the Bee-eater.	
	KP490.5 1.7km from the pipeline	Limnes Cheimaditida - Zazari (GR1340005)	SCI	Wetland with reed beds used by birds to rest, nest and feed, notable rooted, submereged and floating vegetation, also important for birds of prey and herpetofauna.	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP495.3 1.8km from the pipeline	Chintsko kai Cheimaditida Dimou Aetou kai Koinotiton Lechovou kai Varikou (341519)	Wildlife Refuge		
Kastoria Catchment	KP499.1 Intersected by the pipeline	Kastoria (2080634661)	Freshwater KBA	Site includes catchment for Kastoria river	Pelagos trout (*Salmo pelagonicus*), *Bithynia kastorias, Unio crassus*
Lake Kastoria (Orestiada)	KP514.5 0.9km from the pipeline	Limni Kastorias (Orestiada) (GR048)	IBA and KBA	An inland freshwater lake with the town of Kastoria on its shore. Around the north-western part of the lake an area of riverine forest remains.	Greater horseshoe bat , Geoffroy's bat , Schreiber's bat Hermann's tortoise; Mediterranean spur-thighed tortoise Ferruginous Duck, Common Merganser (*Mergus merganser*), Pygmy Cormorant, Squacco Heron, Dalmatian Pelican
	KP513.8 0.6km from the pipeline	Limni Kastorias SCI (GR1320001)	SCI	47km^2 containing freshwater lake surrounded by partly forested mountains the wetland provided important breeding, feeding and wintering place for birds. It supports a diverse avifauna including rare and threatened species and birds of prey.	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
	KP514.5 0.9km from the pipeline	LIMNI ORESTIAS (KASTORIAS) SPA (GR1320003)	SPA	An important site for breeding and wintering waterbirds, and an important foraging area for Pelecanus crispus. Species of concern include: Phalacrocorax pygmeus, Pelecanus crispus, Ardeola ralloides, Aythya nyroca and Mergus merganser	
	KP514.5 0.8km from the pipeline	Limni-Vouno Kastorias (GR95)	Wildlife Refuge		
Upper Aliakmon Catchment	KP532.4 Intersected by the pipeline	Upper Aliakmon (2080642700)	Freshwater KBA	Site includes catchment for the Upper Aliakmon river	Pelagos trout, Note *Heleobia tritonum* is listed as a QF for this site however in-country scientists have confirmed that this species is only known from two sites in the Peloponnese, hundreds of kilometres away. With a restricted range of 100 km^2, this species could therefore not also be present in the Aliakmon and the species in the Aliakmon is likely to be a different species under the *Heleobia* genus.
Albania					

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Prespa Lakes	KP20.8 1.5km from the pipeline	Mali I Thate	Corine Biotope		Greater horseshoe bat , Lesser horseshoe bat Brown bear, Wolf Yellow bellied toad, *Tritrus carnifex*, Four lined snake , Leopard snake , Dahl's whip snake (*Coluber najadum*), smooth snake (*Coronella austriaca*) Tufted Duck (*Aythya fuligula*), Squacco Heron, Dalmatian Pelican, Great White Pelican, Pygmy Cormorant; Great Cormorant Large blue butterfly (*Maculinea arion*)
Morava Mountains	KP23.5 Intersected by the pipeline	Morava Protected Landscape (AL000013)	Candidate Emerald Site	Contains six Annex 1 habitats, supports bats, wolf, otters, brown bear, raptors, game birds and reptiles. The most ecologically sensitive habitats include broadleaved and coniferous woodland and alpine meadows, none of which are crossed by the pipeline.	Brown bear, wolf
	KP18 0.4km from the pipeline	Cangonji	Managed Nature Reserve (category IV		

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
			IUCN)		
	KP24.4 Intersected by the pipeline	Cangonj-Bredhi Drenoves-Nikolice	Corine Biotope		
Forest of Markeza	KP59.5 0.9km from the pipeline	Forest of Markeza	Nature Monument	Comprises Mediterranean pine forest with two small reservoirs.	
Vithkuq-Ostrovice	KP62.7 Intersected by the pipeline	Vithkuq-Ostrovice	Corine Biotope	Supports alpine and sub-alpine pastures and meadows, alpine wetlands, old growth forests of beech, pine and oak.	Brown bear, wolf
	KP81 2km from the pipeline	Forest of Lirza	Nature Monument	High-quality beech forest supporting brown bear and with some stands of high forest, also a freshwater spring	
	KP84 2km from the pipeline	Forest of Helmesi	Nature Monument	Dominated by black pine although mapped as beech forest	

Locality (co-located Areas)	Location: KP and distance from pipeline	Protected/Designated Area Name	Designation	Site description	Qualifying Features
Bogove	KP119.2 1.3km from the pipeline	Bogove (11681)	Managed Nature Reserve (category IV IUCN)	Mediterranean oak woodland and macchia habitats close to the Osumi River	Brown bear, wolf
Semanit-Pishe Poro	KP209.9 365277 , 4516535 0km from pipeline	Grykederdhja Semanit-Pishe Poro	Corine Biotope		Migrant, shorebird, raptor and wildfowl species
Offshore					
South Adriatic and Ionian Strait Ecologically or Biologically Sensitive Area (EBSA)	Intersected by the pipeline	South Adriatic and Ionian Strait EBSA	EBSA	This area encompasses Albanian and Italian waters and is characterized by steep slopes, high salinity and a maximum depth of up to 1500 m. The EBSA supports an array of marine megafauna, elasmobranchs and large pelagic species of conservation interest as well as rare slow growing deep water corals.	

In addition to the sites listed above, there is a proposal currently undergoing public consultation in Greece to expand the Natura 2000 network (Kotzageorgis et al., 2015) which moots the expansion of site GR1150005 in Kavala (see grey lines in Figure 5), in proximity to the pipeline corridor between KP204 and KP227. The proposal relates to freshwater fish of conservation interest, namely Greek brook lamprey (*Eudontomyzon hellenicus*) and Aggitis spined loach (*Cobitis punctilineata*).

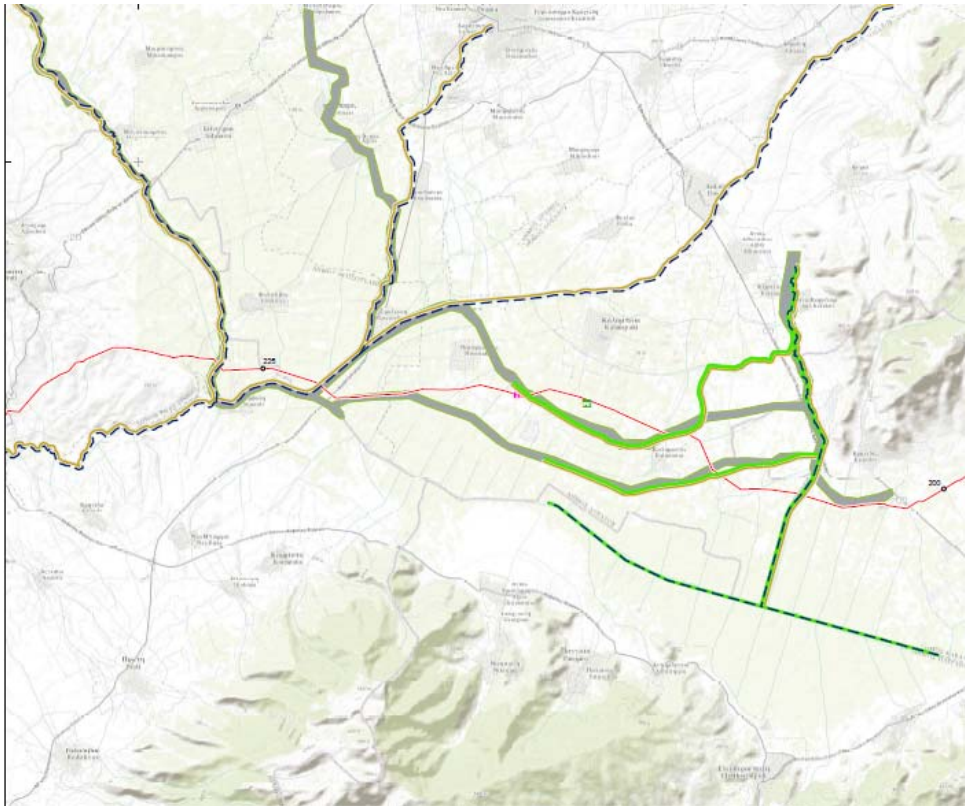


Figure 5 Proposed expansion of GR1150005 in relation to TAP

As indicated in Figure 5 (green lines), these watercourses have already been identified as critical habitat DMUs for the fish species in question, and are discussed further in Section 10.7.

3.3 Natural and modified habitats

As per IFC Guidance Note 6 (IFC, 2012), modified habitats are 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 or wetlands, etc. Natural habitats are 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. Both modified and natural habitats could be further classified as critical habitat, depending on the biodiversity features they support.

In the Mediterranean there has long been discussion on natural, semi-natural and degraded habitats. However, the influence of human activities on the landscape since the end of the last major glaciation in Europe means the current vegetation communities have never been free from anthropogenic influence (Grove & Racham 2001). Therefore, a conservative approach to simplify issues was adopted. This involved treating all EU Annex 1 habitats and Greek protected habitats as 'natural' (including semi-natural) for the purpose of assessing critical habitat and priority biodiversity features. This classification includes the EIB's 'semi-natural habitat'. Further justification of this approach lies in the rich vegetation communities and high vascular plant diversity found in many areas that are often considered 'degraded' as a result of cultural exploitation (such as wood extraction and grazing). The EU Annex 1 habitats and Greek protected habitats were mapped along the pipeline corridor as part of the ESIA preparation, extending to a 500 m buffer from the pipeline. These areas formed the DMUs that are the basis for the assessment of individual habitats.

Field survey data was used to identify the extent of natural versus modified habitat within the working strip, including access roads in Albania. To supplement this, and in order to provide a robust and consistent assessment of the level of human intervention on the environment, the Ecosystem dataset of Europe v2.1 mapping (European Environment Agency, 2015) was also assessed within a desktop GIS to derive the following habitat summary (Table 2). This is mapped in Figure 12, Appendix 1. The EEA Ecosystem dataset was used to provide a consistent and complete coverage of the DMUs, beyond the ESIA corridor, mapped within the investigation area (20km buffer). Where field survey data confirms the EEA mapping and where it appears that a habitat type or DMU extends further than the ESIA or RSK survey corridor, the EEA mapping has been used to delineate the furthest extent.

Table 2 Natural and modified habitats

	Natural habitat	Modified habitat
Greece	132 ha	1,780 ha
Albania	467 ha	343 ha
Italy	1.2 ha	15 ha
Total	599 ha 21.8%	2,148 ha 78.2%

3.4 Biodiversity studies undertaken

3.4.1 Onshore

Updated (including post-ESIA data) baselines are provided by host county in Sections 4 (Greece), 5 (Albania) and 6 (Italy) of this report, the methodologies of these baseline surveys are presented in Appendices 6 to 8.

Post ESIA terrestrial ecological surveys undertaken include the following:

Greece

- pre-construction ground-truthing of areas of ecological sensitivity was undertaken via walk-through surveys, these were also used to inform any data gaps
- surveys for flora and vegetation were undertaken in 2015 and 2016 to identify early flowering and other species in need of monitoring and/or additional conservation e.g. seed collection, translocation.
- a desk based assessment was undertaken in 2016 to inform the development of a method statement for amphibian and reptile mitigation within suitable habitats, including watercourse crossings
- a review of available literature relating to the 32 bat species recorded in Greece was undertaken in 2016. Information was combined with the requirements of the Habitats Directive, particularly for Annex IV and Annex II listed species, to produce a best practice method statement for roosting bats to minimise project impacts on bats
- large carnivore surveys for brown bear, wolf and jackal were undertaken in 2015 and 2016 in areas of the pipeline corridor mapped as containing potentially suitable habitat
- surveys to identify locations of wildlife crossings where rapid reinstatement is required in order to maintain connectivity
- otter surveys were undertaken in 2015 to assess the status of otter habitat along the TAP route and to identify appropriate mitigation measures for this species
- freshwater fish surveys and aquatic ecology assessments were undertaken in 2016 along the Philippi River, specifically for the Greek brook lamprey (Eudontomyzon hellenicus11) and Aggitis spined-loach (Cobitis punctilineata) to inform development of mitigation measures
- An ornithological survey was undertaken in 2015 to address gaps in project knowledge of the status of species of conservation interest along the pipeline route. This data was used to inform development of mitigation.
- European ground squirrel surveys were undertaken in May 2016, following on from those undertaken in 2014 to inform the ESIA Amendment, to ensure ESIA monitoring commitments for this species were implemented
- mitigation of project impact on other small / burrowing mammals is outlined in a project specific method statement for these species
- A desk-based review of all readily available data on invertebrates was undertaken for the CHA. The IUCN and Greek Red Lists were reviewed, along with citations for all protected and designated areas within 2km of the project, to identify any CR, EN or VU invertebrates that could be present. Of the 195 species initially identified, the majority were screened out on the basis of their known or likely distribution does not overlap with the project AOI. The remaining species have habitat requirements that are not supported within the project AOI.

Albania

[11] Taxonomically, this species was recently assigned to the genus *Caspiomyzon* (Barbieri et al., 2015). For reasons of consistency, we have continued to use the scientific name used in previous TAP reports (*Eudontomyzon hellenicus*) in this report.

- general pre-construction ecological walkthrough to ground-truth areas of the project that were not surveyed in detail as part of the ESIA and to confirm sites of ecological sensitivity
- surveys for early-flowering plants such as alpine plants in high-altitude areas were undertaken in spring 2015
- surveys for threatened flora species requiring translocation or seed collection prior to site clearing, for use in reinstatement were also undertaken in 2015 and again in 2017
- development of a method statement for mitigating potential impacts on amphibians and reptilians at suitable habitats, including at watercourse crossings
- bat surveys of military tunnels, caves and other potential roost sites within proximity to the pipeline, particularly in areas where rock blasting may be required were undertaken in 2015
- large carnivore surveys for brown bear and wolf were undertaken in 2015 in areas of the pipeline corridor mapped as potentially suitable habitat, in both spring and autumn
- surveys to identify locations of wildlife crossings where rapid reinstatement is required in order to maintain connectivity
- targeted otter surveys were undertaken in 2015 in locations considered to be potentially important for otters to confirm their presence/abundance and suitability of pipeline crossing locations
- aquatic ecology and fish surveys for pipeline and/or access road crossings of sensitive watercourses were undertaken in 2015 to inform mitigation measures required for sensitive ecological features
- migratory and breeding bird surveys in 2015 in order to record any important assemblages and identify any particular areas of interest
- surveys to identify important feeding areas for pygmy cormorant and little egret were also undertaken in 2015
- A desk-based review of all readily available information on invertebrates identified 11 IUCN or Albanian Red Listed species (CR, EN or VU) for consideration. Citations and management plans of protected and designated areas within the project AOI were also reviewed for information on invertebrates. Three species were identified that could potentially occur within the project AOI and DMUs for these species were mapped based on habitat preferences.

Italy

- breeding, resident and migratory bird surveys were undertaken in spring 2015 around the Italian micro-tunnel exit point
- amphibian and reptile surveys were undertaken around the micro-tunnel exit point in spring 2015 to record the abundance and distribution of species in the study area
- vegetation and flora surveys were undertaken to assess and map the species present around the micro-tunnel exit point
- a census of olive trees was undertaken in 2015 to inform the mitigation and management of impacts on them

- a desktop review of protected fauna found in association within the micro-tunnel exit study area and surrounds was undertaken to inform further surveys

3.4.2 Offshore

The offshore biodiversity baseline has been informed by a variety of sources since 2012, these include:

- Project-specific marine surveys to sample the benthic (seabed) environment along and around the proposed TAP offshore route. A range of survey techniques were used, including geophysical (such as side-scan sonar), benthic grabs (to sample benthic infauna present in sediments) and drop-down video (DDV) to record seabed habitat types.
- the survey data was supplemented with an extensive desk-based review of available literature, including scientific papers, research reports and other publicly available information.
- in 2012/2013 both a reconnaissance and detailed route geophysical survey were undertaken and an environmental survey report produced
- in 2013/2014 a geophysical survey of the Italian nearshore waters was undertaken followed by the production of a habitat assessment report and an environmental baseline report a broad review of seabed geophysical data (2012/13) was carried out by an RSK geophysicist experienced in pipeline routing and identification of sensitive environmental features, to identify any areas for potential further investigation, such as pock marks, gas seeps etc. (summer 2017)
- a deep water habitat review was then undertaken comprising of a literature review, a review of TAP commissioned environmental survey data (including video imagery) and TAP commissioned geophysical data as noted above, to inform the need for further investigation of benthic habitat features and species (autumn 2017, on-going)
- as deemed necessary and informed by the above review, a further review of 2012/13 geophysical data by OGS ecologists will be undertaken with a view to advise on any need for further ROV and/or geophysical surveys

Italy

A number of pre-construction monitoring surveys were undertaken in Italy during 2016, these included:

- geophysical surveying to improve data coverage and quality from previous surveys to inform habitat classifications
- remotely operated vehicle (ROV) video mapping of a pre-identified seagrass survey area around the micro-tunnel exit to assess whether they could be considered ‘meadows’ based on quality and extent
- video mapping of potential bioconstructions within a ca.55m corridor centered on the pipeline route to verify and classify them, then characterise their conservation status. This recorded habitat information and was able to identify some encrusting biota to species level, although many taxa were identified only to genus, family, or higher classifications (e.g. ‘encrusting algae’, ‘calcareous algae’)
- water quality (including phytoplankton sampling)

- sediment sampling (vibrocores for particle size analysis and grabs for infaunal analysis)
- installation of a continuous monitoring system for water turbidity, suspended solid concentrations and sea currents (ADCP) on the seabed adjacent to the dredging works associated with the micro-tunnel exit (installed 2016, monitoring on-going), to characterise ambient variability of turbidity seagrass beds in the Italian coastal waters.

Albania

Pre-construction surveys undertaken during 2017 include a turtle nesting survey in summer 2017 (recently completed)

3.4.3 Future surveys

Onshore

- a freshwater invertebrates survey is proposed in Greece in autumn 2017, in locations where the potential for critical habitat-qualifying features has been identified

Rapid ecological assessments of all critical habitat, priority biodiversity features and protected areas will be undertaken to enable potential impacts to be verified / identified and appropriate mitigation and monitoring requirements to be selected for each location and species. Further information is provided in the Ecological Management Plan (CAL00-C5577-640-Y-TTM-0002).

Offshore

- water and sediment quality surveys including benthic infaunal sampling of the landfall / nearshore area is planned in Albania in Q3 2017
- a fish ecology survey is planned in nearshore waters in Italy in 2018 and an equivalent is also being considered in Albania.

Stakeholder consultation is also on-going with regulatory authorities and non-governmental organisations. An updated (including post-ESIA data and information) offshore baseline is presented in Section 7 and further details of marine surveys are presented in Appendix 9.

4 BIODIVERSITY BASELINE - GREECE

A more detailed description of the survey methodologies applied along the pipeline corridor in Greece is provided in Appendix 6.

4.1 Summary overview

The pipeline corridor in Greece hosts a wide variety of flora including evergreen and deciduous forests, shrublands, riparian areas, grasslands, meadows, pastures and farmlands.

Between the settlements of Kipoi and Amfitriti (north of Alexandroupolis), from KP00 to KP43, the pipeline corridor covers an expansive flat region with an average elevation of 150 m, through which tributaries of the Evros River and other watercourses run and where the Loutros forest is located. Northwest of Alexandroupolis, the corridor runs along the south-eastern end of the Rhodopi Mountain, from KP43 to KP62, into a more mountainous and densely vegetated area reaching an elevation of 500 m. From KP62 to KP150, the pipeline corridor is covered almost entirely by cultivated fields. Wetland vegetation and grasslands appear in the area of the Filiouris, Aspropotamos and Xiropotamos (Kompsatos) rivers.

Shrubby vegetation and clusters of plane trees (*Platanus orientalis*) are found at some locations, near Nestos River and the foothills of the Kavala mountains. At the crossing of the Nestos River, a riverside forest appears. The vegetation at this location includes galleries of willow (*Salix alba*) and poplar (*Populus alba*) (Plate 1) (classified by the European Habitats Directive).

Plate 1 Filiouris River

West of the Nestos River the pipeline corridor is predominantly covered by cultivated fields, from KP155 to KP177 leading to the Kavala Mountains, where arid shrub vegetation (*sclerophyllous plants*) and grasslands are present, while stands of deciduous species can be also found.

Following a direction from Kavala to Serres, from KP194 to KP294, the pipeline corridor again passes through an area dominated by large traditional cultivations separated by hedges and tree stands, while there are also areas of intensive cultivation and poplar plantations, part of the Serres agricultural plain. Along the Kroussia Mountains, some natural areas covered by oak deciduous forests, shrublands and stands of riparian vegetation along the small streams are present.

Near Thessaloniki, the pipeline corridor predominantly passes through cultivated areas, apart from a 24 km section that runs through the outskirts of the Koronia and Volvi Lakes National Park where areas of natural grasslands are present. A small section east of Gallikos River is characterised mainly by scrublands, natural grasslands and stands of pines and oaks.

As most of the area from Kipoi to Nea Mesimvria (KP0 to KP359) is intensely cultivated, important flora species are generally only expected in or close to the protected areas in the region.

From Nea Mesimvria to the Greek–Albanian border (KP359 to KP550), the pipeline corridor hosts a variety of vegetation formations from lowlands to montane areas, including evergreen and deciduous shrubland and forests, riparian forests, dry and wet grasslands and meadows. Forest habitats found along this western section of the pipeline corridor include beech forests (*Fagus sylvatica*), mixed broadleaved forest dominated by oak (Quercus sp.) and coniferous forests dominated by pine (*Pinus nigra*). Additionally, riparian forests and galleries are found along rivers and streams

throughout sections of the study area. Among a number of important plant species found in this study area, a total of 65 species are protected by Greek legislation (Presidential Decree 67/81). Among these, 11 are Greek endemics, 17 are Balkan endemics, five are Greek–Albanian endemics, two are Balkan–Anatolian endemics and one is Greek–Anatolian endemic. Moreover, two species are included in the Greek Red Data Book (*Centaurea charrelii*, critically endangered status; *Dactylorhiza incarnate*, vulnerable status) and two species are on the global IUCN Red List of Threatened Species (*Juniperus excelsa*, *Platanus orientalis*), but these are common in the Greek flora.

4.2 Flora and vegetation communities

4.2.1 Surveys undertaken

Floral and vegetation communities have been studied along the pipeline corridor since ESIA baseline work along the alternative routes began in 2010, all re-alignments have also been surveyed. Table 3 below presents a summary of the flora surveys undertaken between 2010 and 2015. The ESIA and ESIA amendment surveys provided the general baseline information on the current status and conservation value of the flora and habitats along the pipeline route, however there were some gaps particularly in the east and control plots were not established. The 2015 survey aimed to cover all habitats and to establish control plots.

Table 3 Summary of flora and habitat field surveys along the TAP corridor (2010-2015)

Survey Period	Area	Main Findings and Flora of Conservation Interest
November 2010	Western section with all alternative corridor options	• Montane grasslands in Mt. Vermio (IP 1103 – IP 1128 approx) • General woodland features • General status of riparian forest stands in river Aliakmonas as well as other crossing points (priority habitat type
February 2011	Western section with all alternative corridor options	
May – June 2011 and 2012	Western section of the ESIA base route (including several reroutings such as LARCO rerouting, Kastoria-Korce rerouting, river Axios rerouting)	• Habitat mapping along the entire western section (approx. from IP001 westwards) • EU Priority habitat types crossed by the pipeline: o 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus* excelsior; ▪ west of IP 1273-01 (Aliakmonas I crossing point) ▪ between IP 1287-1288 (Aliakmonas III crossing point) ▪ south of Verga (Kleisoura area) between IP1224 –

Survey Period	Area	Main Findings and Flora of Conservation Interest
		IP1225 (also considered stream of high aesthetic value) o 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) ▪ Kleisoura between IP 1214-IP1223 o 3170 Mediterranean temporary ponds ▪ Mt.Vermio IP 1116 • Other habitats of conservation interest: o *Quercus trojana* forest (various sites) o *Populus alba* and *Salix* riparian galleries (various sites as fragmented/point habitat) o *Platanus orientalis* riparian forest (various sites as fragmented/point habitat) • Thirty six (36) taxa of conservation interest (minimum number), 62% of the sampling plots comprised at least one (1) taxon of conservation interest. Most of these taxa were recorded in more than one (1) sampling sites. • Systematic surveys of spring flowering plants along the meadows and the *Fagus* and *Quercus* forests of western Macedonia
October 2012	Eastern section (from Greek-Turkish border IP00001-1 to IP0242 “Fylakas”)	• Flora species and subspecies catalogue comprising more than 400 taxa altogether • Habitat mapping along the entire eastern section • Twenty nine (29) taxa of conservation interest encountered in more than two-hundred (200) sampling plots allocated according to expert judgment. • Habitat types of conservation interest: o *Populus alba* and *Salix* riparian galleries (various sites, strongly degraded) o *Platanus orientalis* riparian forest (various sites as fragmented/point habitat) o *Quercus macrolepis* forest (IP0198 – IP0202) • The priority habitat type 3170 at first
September 2012 & May 2013	Eastern section (from Greek-Turkish border to Nea Mesimvria IP1001)	

Survey Period	Area	Main Findings and Flora of Conservation Interest
		considered as present in Nestos and Kompsatos Rivers was later reconsidered and thought as “non-existing” within the TAP eastern section.
June 2014	Reroutings at: Nestos plain (IP0374-9 to IP0374-25) Kosmio (IP0249 to IP0251-15) Tenagi (IP00445-15 to IP0450-32)	• Habitat mapping along the reroutings • Riparian galleries status assessment • Anecdotal evidence on flora taxa of conservation interest (i.e. by far all these reroutings comprise intensively cultivated land and are often monocultures, therefore unlikely to host populations of taxa of conservation interest)
June 2015		• a survey for threatened flora species to identify those that may require translocation or seed collection before site clearing for use in reinstatement, including: • identification of ‘threatened’ species not previously recorded • recording any new sites for species known to occur on or near the ROW • recording frequency of occurrence and densities of individuals for these species. • a baseline flora survey for BACI monitoring.

4.2.1.1 *Overview*

East Macedonia and Thrace contain rich vegetation expanding from typical Mediterranean lowlands to coniferous forests and subalpine grasslands in the uplands. Abundant vegetation types include evergreen broadleaved shrublands (maquis or pseudomaquis), Mediterranean pine forests (*Pinus halepensis*, *P. brutia*), lowland grasslands, wetlands, deciduous broadleaved shrublands (silbjak or pseudosilbjak), deciduous broadleaved forests (*Quercus* and *Fagus sylvatica* forests), coniferous forests (*Pinus nigra*, *P. sylvestris*, *P. leucodermis*, *Picea excelsa*), subalpine grasslands. The mountainous areas are estimated to host >1,000 plant species; in Mt Rhodope more than 1,500 plant species and subspecies are found (Tsiripidis & Athanasiadis 2003, Eleftheriadou & Raus 1996). Rare or endemic species are found in the area.

Streams and rivers dominated by white willow (*Salix alba*), silver popular (*Populus alba*) and oriental plane (*Platanus orientalis*) galleries are of high ecological importance as they connect coastal and mountainous habitats. In areas where semi-natural and synanthropic vegetation is dominant; species such as field elm (*Ulmus minor*), European nettle tree (*Celtis australis*), Jerusalem thorn (*Paliurus spina-christi*) and *Rubus* ssp. can be found. Nitrophilus species competition keeps floristic diversity relatively low. Hedges are of high ecological importance.

High floristic diversity is found in abandoned fields and semi natural grasslands but they are dominated mostly by common synanthropic taxa (species and subspecies), such as field wormwood (*Artemisia campestris*), common nettle (*Urtica dioica*), hedge mustard (*Sisymbrium officinalis*), many species of which are invasive e.g. silverleaf nightshade (*Solanum eleagnifolium*) and the poisonous Devil's snare (*Datura stramonium*). Forestry vegetation dominates the hills and foothills of high mountains kermes oak (*Quercus coccifera*) shrublands are common, green olive tree (*Phillyrea latifolia*), south European flowering ash (*Fraxinus ornus*), oriental hornbeam (*Carpinus orientalis*) are also found. The foothills of Mount Paggaio are dominated by small patches of evergreen shrublands *Erica* spp., *Arbutus* spp. etc. Stands of *Quercus* sp forests, dominated by Hungarian oak (*Quercus frainetto*), are found in the foothills of high mountains. Valonia oak forest remnants and pine forests of great floristic interest are found in the foothills of Evros prefecture. Centuries of intensive grazing has produced numerous openings and patches of grasslands within forest vegetation.

Western and central Macedonia also supports a diverse array of vegetation formations spanning from sea to alpine level; these include wetland and coastal vegetation, evergreen and deciduous shrubland and forests, riparian forests, dry and wet grasslands and meadows. The area contains ca. 25% of the total Greek forest cover, and is one of the most forested areas in Greece (Voulgaris et al., 2010). Montane and subalpine levels contain the black pine (*Pinus nigra*) forests, a European priority habitat, and the Bosnian pine (*Pinus heldreichii*) and Bulgarian fir (*Abies borisii-regis*) forests. Other notable forest formations include the deciduous European beech (*Fagus sylvatica*) forests and mixed broad-leaved forests dominated by oaks (Boratynski et al., 1992; Strid & Tan, 1997). Along rivers and streams with permanent or seasonal flow, riparian forests and galleries occur; these are mostly dominated by white willow, silver popular, oriental plane and / or European alder (*Alnus glutinosa*) (Dafis et al., 2001). A variety of rare, endangered and endemic plant species are found within the grasslands and meadows, particularly at the montane, subalpine and alpine levels (Strid & Tan, 1997).

4.2.2 ESIA survey results

4.2.2.1 *Eastern area*

A total of 29 important plant taxa were recorded in the project area during 2012 and 2013, two of which, green foxglove (*Digitalis viridiflora*) and *Centaurea affinis*, were recorded just outside the 500m buffer. The majority of taxa of conservation interest identified such as the butcher's broom (*Ruscus aculeatus*) and purple mullein (*Verbascum phoeniceum*) occur widely in north eastern Greece. The butcher's broom is the only of the 29 taxa to be listed in Annex IV of the Habitats Directive, whilst eight others are protected by the Greek legislation (Presidential Decree 67/81): oriental plane, Greek juniper (*Juniperus excels*), green foxglove, the lady's tresses orchid (*Spiranthes spiralis*), bee orchid (*Ophrys oestifera*), lady orchid (*Orchis purpurea*), *Cephalanthera epipactoides*, *Ophrys mammosa*, green winged orchid (*Anacamptis morio* ssp *caucasica*). In addition all species of the Orhidaceae family are also protected by the CITES Convention (Annex III).

The oriental plane was recorded in several riparian sites and streams of the project area, at Loutros stream it was found forming a rather extensive forest. It has a limited general distribution within the Balkan Peninsula and Anatolia. The lady's tresses orchid was recorded in one locality, north east of the Atarni village, in loose stands with valonia oak (*Quercus ithaburensis* subsp*. macrolepis*) and downy oak (*Quercus pubescens*). Greek juniper was recorded in only two localities, east and west of Pefka village in evergreen shrublands. The green foxglove was found in one location, on the mountains of Palaia Kavala, in evergreen shrublands. Fourteen Greek endemic, or subendemic to the Balkan Peninsula, species were recorded, two of which were deemed to be of high importance due to their limited distribution: *Satureja pilosa* subsp. *origanita*[12] an endemic subspecies of the Evros and Rodopi Prefectures, where it is locally common (Dardioti, 2005). It was recorded along roadsides in *Quercus coccifera* shrubland and at the Filiouris river crossing, it is included in the Balkan endemic *Satureja pilosa*, which belongs to the "Other Important Plant Species" of the Natura 2000 network in Greece. *Onosma halacsyi*[13] is a Greek endemic species that was recorded in openings in pine forests.

While none of the 29 species recorded are listed by the IUCN or Red Data Books of Greece, some are of importance due to their declining populations (*Malus trilobatus* and common gum cistus (*Cistus lavadifer*)) or being on the list of "Other Important Taxa" (i.e. narrow leaved ash (*Fraxinus angustifolius*) and *Fritillaria pontica*). Anthropogenic influences in the area are likely to be the reason for the low number of important species recorded.

No plant species recorded in Annex II of the Habitats Directive were observed during the survey or found during the literature review for the project area, despite a few listed species being found in the wider region.

A further study was undertaken in 2014 to account for the reroutings at Nestos plain (IP 374-4 to IP 374-24 approx. of the ESIA basecase) and the Kosmio region (IP 251 to IP 251-15 of the ESIA basecase). The vegetation and flora ESIA basecase route surveys indicated that the following taxa of conservation interest were found to be present along the particular sections, and therefore are likely to occur in the nearby regions as well:

- Butcher's broom protected under Annex V of the Directive 92/43/EC
- *Oriental plane* and green foxglove, protected under the Greek law (P.D. 67/81)
- Balkan endemics *Bromus cappadocicus, Erysimum crassistylum* and *Verbascum phoeniceum* subsp. *flavidum.* Common habitat types in the area are 92A0 (white willow and silver popular galleries), 6420 (Mediterranean tall humid herb grasslands (European habitat)) and 72A0 (Reedbeds (Greek habitat)).

The larger parts of the study area along the "Kosmio" or "Nestos plain" reroutings were found to comprise of agricultural land (sunflower, corn, cotton and wheat) and very

[12] This sub-species listed in the ESIA is no longer considered separate from the whole species (Dimopoulos *et al.* 2013), so the taxon treated in the ESIA is included under *Satureja pilosa sensu lato* (a more widespread species) in the subsequent assessment.

[13] This 'endemic' taxon reported in the ESIA was taxonomically revised to be part a species with a much wider distribution (Dimopoulos *et al.* 2013), *Onosma pseduarenaria*, so was not considered in the subsequent assessments.

small portions were covered by shrubs and grasslands. Streams that pass through the valleys of the study area are dominated by white willow and silver popular galleries. Synanthropic vegetation encompasses species such as *Ulmus* sp., Jerusalem thorn and *Rubus* ssp.

One species of conservation interest, *Dianthus tenuiflorus* was recorded within the project area, it is a range-restricted Balkan endemic species that grows locally in north eastern Greece in open pine forest, deciduous scrub and roadsides, at 50-1100 m a.s.l. (Strid & Tan, 1997; Dimopoulos et al., 2013). It was found within the Kosmio optimization rerouting project area between IP251-8 and IP251-9 (FH-80). A few individuals were observed growing at the vicinity of a dry stream in a small patch of Jerusalem thorn among cultivated land.

4.2.2.2 *Western area*

In total 36 plant taxa of high conservation interest were recorded within the 500m buffer, these fall into the following categories: protected, Greek endemic, Balkan endemic and rare taxa (species and subspecies). Only one species included in Annex II of the Habitats Directive, lizard orchid (*Himantoglossum caprinum*)[14], which is also protected by the Greek legislation. This was recorded on Mount Vermio.

Greek legislation (Presidential Decree 67/81) protects 20 taxa recorded along the route; Bug orchid (*Anacamptis coriophora*), green winged orchid, pink butterfly orchid (*Anacamptis papilionacea*), pyramidal orchid (*Anacamptis pyramidalis*), deadly nightshade (*Atropa belladonna*), sword leaved helleborine (*Cephalanthera longifolia*), red helleborine (*Cephalanthera rubra*), common spotted orchid (*Dactylorhiza saccifera*), helleborine (*Epipactis* sp.), lizard orchid, violet limodore (*Limodorum abortivum*), bird's nest orchid (*Neottia nidus-avis*), bee orchid, *Ophrys scolopax* subsp. *cornuta*, early spider orchid (*Ophrys sphegodes* subsp. *epirotica*), early purple orchid (*Orchis mascula*), great butterfly orchid (*Platanthera chlorantha*), oriental plane, *Scutellaria rupestris* subsp. *adenotricha* and the lady's tresses orchid.

The majority of the protected taxa found (18 out of 20) are orchids and were recorded mainly in Mount Vermio. Among these pyamidal orchid, Epipactis sp., bird's nest orchid, red helleborine and greater butterfly orchid were the most common and abundant in the study area. Most of the orchids recorded had a rather large general distribution and only the early spider orchid, has a restricted general distribution from north west Greece to Albania. *Scutellaria rupestris* subsp. *adenotricha*, and oriental plane, both recorded in Mount Vermio, have also a limited general distribution, the first occurring in Greece and Albania and the latter in the Balkan Peninsula and Anatolia.

One Greek endemic taxon has been recorded along the route, the subspecies *Veronica chamaedrys* subsp. *chamaedryoides*. This subspecies occurs in open *Pinus* forest and scrub, stony meadows and pastures and rocky slopes up to 1900m throughout Greece (Peloponnisos, Sterea Ellas, Pindhos, Central and Western Macedonia) (Strid & Tan 1991). Balkan endemic taxa constitute a key element of the flora of west and central

[14] This species has subsequently been split into multiple taxa. The species occurring in Greece and reported in the ESIA is *Himantoglossum jankae*. The new species has a smaller range than the original, so although the legislation has not been updated to reflect this change, the new species is treated as the original.

Macedonia, and 16 species were recorded during the survey: *Achillea holosericea*, *Anthyllis vulneraria* subsp.*bulgarica*, *Centaurea napulifera* subsp. *napulifera*, *Dianthus stenopetalus*, *Galium oreophilum*, *Linaria peloponnesiaca*, *Linum hologynum*, *Paronychia macedonica*, *Phlomis samia*, *Polygala supina* subsp. *rhodopea*, *Scabiosa tenuis*, *Silene atropurpurea*, *Stachys iva*, *S. plumosa*, *Scutellaria rupestris* subsp. *adenotricha* and *Ophrys sphegodes* subsp. *epirotica*. The last two species are also protected by Greek legislation.

Most of the Balkan endemics (10 out of 15) have a restricted general distribution occurring in northern and central Greece, extending slightly into adjacent areas in Albania, former Yugoslavia or Bulgaria. These are: *Galium oreophilum*, *Linaria peloponnesiaca*, *Paronychia macedonica*, *Phlomis samia*, *Polygala supina* subsp. *rhodopea*, *Scabiosa tenuis*, *Stachys iva*, *S. plumosa*, *Scutellaria rupestris* subsp. *adenotrica* and *Ophrys sphegodes* subsp. *epirotica*. The peony (*Paeonia peregrine*) is a rare species in Greece it was recorded on the north east slopes of Mount Vermio in mixed deciduous forests with Hungarian oak, *Quercus* spp., south European flowering ash, Jerusalem thorn, green olive tree etc.

Of the 36 taxa of high conservation interest recorded, 17 are on the list of “Other important plant species” of the Natura 2000 network in Greece. Mount Vermio hosts the majority of taxa of conservation interest recorded, namely 16 protected, one Greek endemic, eight Balkan endemics and one rare. In the Eordea plain taxa of conservation interest (seven protected and three Balkan endemics) were recorded in the montane and subalpine areas near Kleisoura village. In the border area few taxa of conservation interest have been recorded (four protected, three Balkan endemics). Two protected orchids, red helleborine and spotted orchid (*Dactylorhiza saccifera*), were recorded at the crossings of Aliakmonas River near Kastoria.

Eleven habitats list in the Habitats Directive were identified and three Greek habitats, as defined in Dafis et al., (2001), were also recorded. The latter are habitats described in the Corine Biotope manual that have been identified, described and mapped during the European Habitats mapping of the Natura 2000 network in Greece (Dimopoulos et al., 2005).

4.2.3 Post-ESIA survey results

A thorough assessment of habitats along the ROW was conducted during the ESIA surveys and four main vegetation categories were identified: grasslands, shrubland, forests and riparian habitats. Within these 13 European and 14 Greek natural, semi-natural or man-made habitat types were identified (Table 4), of which four European habitat types (habitat codes: 62A0, 5210, 9140, 9540), five Greek habitat types (habitat codes: 6290, 5160, 5340, 5350, 924A) and the main river crossings points, each hosting several riparian habitat types (habitat codes of EU riparian habitats: 92A0, 92C0, 91E0; habitat codes of Greek riparian habitats: 72A0, 32B0), were selected based on the TAP commitments for further monitoring in 2015.

Table 4 European and Greek habitats in the project area

Habitat code	Habitat name	Sampled sites within the project area	Habitat status[1]
32B0	Annual riparian communities	FH-23, FH-35, FH-37, FH-49, FH-69, FH-70	Greek
5160	South-eastern sub-Mediterranean deciduous thickets	FH-19, FH-20, FH-55, FH-59, FH-60, FH-66	Greek
5210	Arborescent matorral with *Juniperus* spp	FH-84, FH-85	European
5340	Garrigues of Eastern Mediterranean	FH-1, FH-2, FH-3, FH-4, FH-43, FH-44, FH-45, FH-46, FH-47	Greek
5350	Pseudomaquis	FH-26, FH-56	Greek
62A0	Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*)	FH-7, FH-9, FH-21, FH-22, FH-24, FH-25, FH-39, FH-41, FH-64, FH-65, FH-68, FH-77, FH-80	European
6290	Mediterranean sub-nitrophilous grasslands	FH-40, FH-42, FH-53, FH-61, FH-62, FH-63, FH-67	Greek
6420	Mediterranean tall humid grasslands of the Molinio-Holoschoenion	FH-72, FH-73, FH-74, FH-75	European
72A0	Reedbeds	FH-29	Greek
9130	*Asperulo–Fagetum* beech forests	FH-71, FH-76, FH-78, FH-79	European
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	FH-83	European, priority
92A0	*Salix alba* and *Populus alba* galleries	FH-15, FH-23, FH-34, FH-37, FH-48, FH-50, FH-51, FH-54, FH-70, FH-81, FH-82	European
924A	Thermophilous oak woods of E Mediterranean and Balkans	FH-5, FH-6, FH-8, FH-10, FH-11, FH-28, FH-31, FH-31a, FH-57, FH-58	Greek
92C0	*Platanus orientalis* and *Liquidambar orientalis* galleries (*Platanion orientalis*)	FH-7a, FH-7b, FH-38	European
9540	Mediterranean pine forests with endemic	FH-12, FH-13, FH-33	European

Habitat code	Habitat name	Sampled sites within the project area	Habitat status[1]
	Mesogean pines		

The 2015 survey provided a quantitative and representative baseline of the abundance of species of conservation interest against which post-construction recovery will be measured (GR0524). Freshwater (GR0472) and terrestrial ecology (GR0421) baselines have also been recorded during the pre-construction survey. It also drew on previous survey results to identify rare and protected species potentially requiring mitigation in accordance with commitments GR0534, GR0545 and GR0424 relating to potential translocation.

Based on their inclusion in the European and/or Greek Red Data lists, or the fact they are severely range-restricted 14 taxa of conservation interest were identified. Potential impacts of the project on individual species' populations were determined along with the most appropriate action, monitoring/translocation/seed collection, to mitigate any impacts.

Priorities for the development of watercourse crossing plans in accordance with commitments GR0460 and GR0078 (and during construction GR0485) were identified and the survey also confirmed the need for a procedure to be developed to control invasive species (GR0478).

4.2.4 Hotspots

Five hotspots of rare and protected plant species were identified along the route based on the findings of the ESIA and pre-construction surveys, as well as relevant floristic literature reviews.

Evros

Species of conservation interest recorded in the Evros region included protected orchids; red helleborine, *Epipactis* sp., fragrant orchid (*Gymnadenia conopsea*), greater butterfly orchid and Balkan endemics or other rare species, such as *Paronychia macedonica*, *Thymus comptus* and *Satureja pilosa*. They were recorded at low and medium altitudes, mostly in *Quercus* and *Pinus* forests, pure or mixed, natural or planted, but also in shrubland and grasslands.

Kavala

The hilly areas of the Kavala region, mostly comprising garrigues shrubland, were found to host several species of conservation interest, such as the rare species (Balkan or Greek endemics, range-restricted) *Dianthus gracilis*, *Thymus comptus*, *Verbascum dingleri* or the protected orchid *Himantoglossum jankae* and butcher's broom.

Vermio

Numerous species of conservation interest, again mainly protected orchids were found including; the bug orchid, green winged orchid, pyramidal orchid, Phalanthera, sword-leaved helleborine, red helleborine, bird's-nest orchid, bee orchid and Balkan endemics (e.g. *Achillea holosericea*, *Centaurea napulifera* subps. *napulifera*, *Scabiosa tenuis*, *Stachys plumosa*). Most species of conservation interest on the mountain were

recorded primarily in *Quercus* forests, but also in *Fagus* forests, grasslands and shrubland. In general, Vermio is known as a species-rich mountain in Greece, hosting many endemic (local, Greek, Balkan) and protected plant species (Chochliouros, 2005).

Kleisoura

High-elevation grasslands, but also Fagus forests and Pinus plantations crossed by the pipeline in Kleisoura were found in the present and past surveys to host several species of conservation interest, such as the protected orchids green winged orchid, pink butterfly orchid (*A. papilionacea*), bird's-nest orchid, *Limodorum abortivum*, *Platanthera* sp., or the Balkan endemics *Dianathus stenopetalus* and *Linum hologynum*.

River crossings

Several species of conservation interest were recorded at river crossings along the route, including protected orchids and riparian tree species of conservation interest. The most interesting river crossings in terms of rare and protected species were:

- Loutros (FH-7b) and Loutros tributary (FH-7a at C0073A and C0074), hosting extensive stands of the protected by the Greek legislation oriental plane
- Nestos (FH-36, FH-37, FH-37a-c at C0530 and adjacent crossing channels), hosting several species of protected by the Greek legislation orchids, including *Himantoglossum jankae*, also listed in the 92/43/Directive and bug orchid, also listed in the Other important plant species of Natura 2000
- Krinides (FH-48 at C0778-N), hosting almost pure riparian stands of the rare narrow leaved ash (*Fraxinus angustifolia*), listed in the Other important plant species of Natura 2000
- Rema Kleisoura[15] hosting riparian stands of the rare European alder, listed in the other important plant species of Natura 2000, also a European priority habitat type (91E0)
- Aliakmonas 3 (FH-83, C2843), hosting riparian stands of the rare European alder, listed in the other important plant species of Natura 2000, also a European priority habitat type (91E0).

4.2.5 Rare and protected habitats

91E0 – Alluvial forests with black alder and European ash (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

91E0 is a European priority habitat type, it was observed forming narrow riparian galleries at two river crossings, Kleisoura stream[16] and the Aliakmonas 3 river crossing (FH-83, Crossing ID C2843). A stand of this habitat previously recorded at the Aliakmonas 2 crossing was since recorded beyond the 50m zone of the river crossing and is expected to remain intact during construction.

92C0 – Oriental plane and oriental sweetgum galleries (*Platanion orientalis*)

[15] This crossing does not appear to be in the TAP crossing table so RSK has not been able to allocate a crossing reference or crossing method.

[16] This crossing does not appear to be in the TAP crossing table so RSK has not been able to allocate a crossing reference or crossing method.

This habitat type is dominated by the oriental plane which is protected by the Greek Presidential Decree 67/81, which prohibits, transplantation, root removal, cutting and transfer of individuals throughout the year. Riparian galleries of this habitat type develop at the Loutros (FH-7b), Loutros tributary (FH-7a) and Nea Karvali-Lefki (FH-38) river crossings. The extensive riparian galleries at Loutros are already considerably damaged where the existing pipeline crosses the river.

92A0 – white willow and silver popular galleries

A rare sub-category of habitat type 92A0 was recorded at the Krinides river crossing (FH-48, Crossing ID C0778-N), where almost pure riparian galleries of narrow leaved ash, a rare tree listed in the "Other important plant species" of Natura 2000 (Kokkini et al., 1996), were observed. Remnants of a recently cut poplar plantation were observed close to the crossing. This crossing point is a result of a re-routing. The older crossing point, closer to Krinides villages (FH-48a), was revisited and observed to have less impact, as only a few small narrow leaved ash individuals were present by two rows of planted poplars.

7230 – Alkaline fens European habitat

Small remnant fen communities were reported at two locations in the Tenagi area during the June 2014 surveys (IP0540-25 to IP0450-27), these were re-assessed in 2016 and found to be heavily modified agricultural land with a cover of common reed (*Phragmites australis*). No evidence or indicator species of alkaline fen habitat were found to be present, so this habitat is considered to be absent from the pipeline corridor in Greece.

3170 – Mediterranean temporary ponds (in habitat 6420 Mount Vermio)

This habitat was recorded in early surveys of the TAP project (2013) along the ROW within the tall humid meadows of Mount Vermio (habitat type 6420, IP1116). Nevertheless, despite repeated subsequent surveys in the area, its seasonal occurrence in the same site could not be verified. It is now considered a coincidental feature in the area. The area does support permanent agricultural ponds created to sustain the agricultural fields in the area, but these do not support the annual flora that characterise the Annex 1 priority habitat. There are also extensive areas of wet-flushed grassland and sedge-beds. These areas were mapped as 'Mediterranean humid grasslands' in the ESIA and this classification has been retained in subsequent assessments.

4.3 Brown bear

The brown bear is a protected species in Greece. Law 86/69[22] (article 258, clauses 2e and 2z) strictly prohibits the killing, capturing or exhibiting to public view of brown bear. It is listed in Annexes II and IV of the EU Habitats Directive and several habitat types (mainly forest) containing bear habitat are also listed as priority habitat types under the Directive (Mertzanis et al., 2012). Both the International Union for Nature Conservation (IUCN) and Red Data Book for Greece[17] classify the brown bear as Endangered.

[17] http://www.nationalredlist.org/tag/greece/

Annex 2 of the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979), which Greece has ratified, list brown bear meaning they and their habitats are protected. Both EC Regulation No. 338/97 on the protection of species of wild fauna and flora by regulating trade and the CITES Convention strictly prohibit international trading of any brown bear specimen (dead or alive, or part of it). The brown bear is also listed on the International Convention on Biological Diversity. Finally, the Pan-European Brown Bear Action Plan[18] contains recommendations for an action plan to protect the species in Greece (Mertzanis et al., 2012).

The brown bear is well-established on Mount Grammos and the population has expanded towards other mountains of western Macedonia since the late 1980s. Mount Vermion and Mount Askion are parts of the mountainous range where the bear is constantly present, however records in Mount Vermio are thought to be vagrant animals as there is no evidence of a permanent population there.

Home range sizes vary extensively between male and female animals and between different seasons ranging up to hundreds of square kilometres, consequently the species is well dispersed within the whole mountainous part of the area studied in the ESIA and pre-construction baseline surveys. The status of the population can vary annually reflecting constant and vagrant individuals and transboundary movements.

Main features of bear habitat in Greece are large remote mountainous forests characterized by mixed coniferous and hardwood vegetation with openings and rich undergrowth of fruit bushes and grass, rugged topography and rocky parts. Overall, suitable brown bear habitats can be found on both sides of the TAP route and over a relatively large area. Nevertheless there are three main highly suitable areas:

a) Vermio Mountain at the areas of Giannakoxori-Rodoxori villages

b) Kleisoura-Lehovo area, including the villages of Variko, Kleisoura, Korrissos, Vasiliada, Melisotopos

c) Greek – Albanian border, at the area of Drosero and Aliakmonas River villages of Ampelokipoi, Mesopotamia, Oinoi.

The ESIA made the following commitments to bears: That a pre-construction baseline would be established (GR0421) and construction time restrictions to be adopted wherever possible to mitigate disturbance impacts to bears (GR0446).

Existing data on brown bear presence and distribution in west and north Greece, including data collected during TAP ESIA baseline studies, was used to determine where the proposed TAP route crosses potentially important habitats for bears. According to these data, further surveys focused on four priority study areas for bears (F, G and H), which were surveyed during field trips in 2015.

A thorough literature review to identify any new secondary data (publications in journals, conference abstracts, LIFE reports etc.) was undertaken however no additional information was found to inform the pre-construction surveys.

18 http://ec.europa.eu/environment/nature/conservation/species/carnivores/pdf/9_Valchev_Transborder_bear_conservation_AP.pdf

Table 5 summarises the TAP segments that were selected as priority study areas, during both the ESIA and the current study. All areas were selected because of their increased potential for wolves and bears to be breeding close to the TAP route, based on the results of previous studies, expert opinions and habitat modelling. Wolves are addressed in the next section.

Table 5 TAP segments that were surveyed in priority study areas

Study area	Section name and selection criteria	June 2015 KP	Species considered	ESIA survey period	2015–2016 survey period
E	**Vermio Mountains** High-quality habitat for bear and wolves. Presence of wolf homesites. Recolonisation of the area by bears in the last 8–10 years	429–450	Wolf and bear	July 2011	October–November 2015
F	**Kleisoura Pass** High-quality habitat for bear and wolves. Presence of wolf homesites. Important corridor/linkage zone for both species	495–502	Wolf and bear	July 2011	October–November 2015
G	**Aliakmon River** High suitability habitat for bear and also a wildlife corridor for them	533–536	Wolf and bear	July 2011	Not surveyed during 2015–2016
H	**Oinoi-Ieropigi Pass** High-quality habitat for bear and wolf. Important reproduction area for bears. Potential for cumulative effects with Egnatia KA45 highway	538–549	Wolf and bear	July 2011	October–November 2015

4.3.1 Surveys

The ESIA surveys for bears concentrated on four study areas in the western part of the TAP route, these areas were chosen based on a review of previous distribution maps. Field surveys took place over five days in July 2011.

Surveys and assessment involved; direct interviews; transect surveys to collect bear signs (tracks, scats, feeding signs, hairs, dens and resting places); evaluation of bears' spatial behaviour using telemetry data collected as part of the LIFE project LIFE09NAT/GR/000333 (Arctos- Kastoria); habitat suitability modelling using spatial statistical modelling (ecological niche factor analysis, ENFA).

The field work was constrained by time which resulted in a low sampling effort and surveys were biased towards areas where bear presence had previously been

recorded. Many sectors were not surveyed adequately for their value as a denning site or sector, due to ruggedness of terrain and very dense vegetation at the time of survey.

The presence of bears was confirmed in all four study areas, and interviews in areas E, F and H confirmed the permanent and sporadic presence of bears in these areas.

4.3.1.1 *Survey area E: Vermio Mountains*

No field signs were found during the ESIA studies between KP 431–438 (north and west of Rodohori village). However, records from previous years, information from interviews and the high suitability of the habitat clearly indicate the permanent use of this area by bears.

Habitat evaluation of KP 432–435, KP 436–441.5 and KP 442–447 during 2015 remained consistent with that recorded at the time of the ESIA as no other infrastructure has been constructed and landscape attributes remain similar. Bears seem to still exist at low densities when compared to 2011 ESIA data at this segment, as no additional field data were found during 2015 surveys along this segment

No field signs were found during the ESIA studies at KP 447–451 (N and NE of Pyrgos village). The ENFA model predicted both highly suitable habitat and high possibility of den sites along this section of the route. Several re-routes were considered and a re-route was subsequently implemented in this area. This has significantly reduced the severity of any potential adverse impacts in this area.

4.3.1.2 *Survey area F: Kleisoura Pass*

During the ESIA studies strong evidence of bear presence was found (feeding signs, territorial and reproductive marking, daybeds) within the 500 m buffer zone at KP 497 - 502. The habitat was of high suitability for bear (especially at KP 499–502) and the possibility of den sites was among the highest predicted. In addition, the area was noted as an important commuting corridor, linking larger areas of suitable bear habitat either side of the TAP route.

The suitability of bear habitat was evaluated to be the same at KP 495–498 and KP 498–502 as it was at the time of the ESIA survey, as landscape attributes remained largely similar and no other infrastructure has been constructed. Data from the ESIA was supplemented with field evidence of bear presence and movement collected the baseline survey, the area is considered to be of high importance for bear conservation.

Predictions regarding the importance of the area for large carnivores, possible impacts which may arise and the significance of these effects remains similar to the ESIA. However, the current study has identified additional, potential risks for bear dens during construction phase and identified a slight reduction of habitat suitability due to loss of foraging habitat.

It should be noted that potential temporary disturbance-related impacts were recognised in both studies, however the additional data collected in 2015 allows for a greater overview and comparison and confirmed the importance of the area for bears.

4.3.1.3 *Survey area G: Aliakmon Basin and Survey Area H: Oinoi–Ieropigi*

At KP 533–535, field findings (tracks) and telemetry data proved frequent use of the riparian forest (an important connection corridor and functional habitat) by bears. In addition, the ENFA model predicted highly suitable habitat, which was confirmed during the ESIA studies. This area was noted as being an important corridor for bear movements, linking larger bear habitat units in Vernon and Vitsi mountains.

At KP 541–549.2, field signs clearly indicated reproductive and territorial behaviour (frequent marking on electric poles) of bears during the ESIA study. Data made available during the LIFE study in the region also confirmed that three radio-collared bears regularly used the area. The ENFA model predicted both highly suitable habitat and the high possibility of den sites on either side of TAP route. During the ESIA field surveys, evaluation and mitigation proposals were based on and organised according to a different route that was further away (2km to the east) from the current alignment.

Transect surveys directly recorded signs of bear activity in areas F, G and H. Of 20 survey recordings, 10 were within 500m of the TAP route (7 within 100m). The remaining 10 points were recorded at distances ranging from 680-3300m from the route.

Telemetry data from the LIFE Arctos- Kastoria project were collected during May–August 2011. The data clearly indicated intersections in study areas G (Aliakmon Basin) and H (Oinoi-Ieropigi area) between bear activity/movements and the TAP route (high activity levels around riparian corridor at KP 533–535). Home ranges using minimum convex polygon (MCP) techniques are predicted to be intersected by the TAP route in areas F, G and H.

Habitat modelling predicted area F to have the highest probability of supporting denning sites. Area E also supports two areas with high potential to support den sites along the TAP route.

Habitat evaluation during 2015 at KP 533–542 and KP 544–549 has not revealed any changes regarding bear habitat suitability as landscape attributes remained similar to those reported in the ESIA. Telemetry data from bears (LIFE project, Callisto NGO) provided additional field evidence on bear presence and movement complementary to ESIA surveys. Importance of the areas is considered high as commuting areas and even for denning areas (KP 533–535).

The potential for cumulative impacts with the KA45 highway construction may require consideration. Potential impacts remain similar to those raised during the ESIA i.e. potential risks for bear den and bear daybeds during the construction phase of the TAP project. However, new issues regarding temporary impacts to wildlife corridor suitability and the functionality of linkage areas have also arisen since submission of the ESIA.

4.4 Grey wolf

Although now protected the grey wolf was considered a pest species in Greece until 1993.

In 1989 the European Parliament approved a resolution (Doc. A2-0377/88, Ser.A) calling for all European States to take immediate steps to support wolf conservation,

and to adopt the IUCN Manifesto of Wolf Conservation[19]. It also asked the European Commission to expand and provide financial means to support wolf conservation (Salvatori and Linell, 2005).

The EC Habitats Directive lists the wolf in Annexes II and IV, limited exceptions to the scope of this protection include the populations in Greece north of 39° longitude (which includes the TAP route). The wolf is listed as Vulnerable in the Greek Red Data Book.

Wolves are also included in Appendix II of the Bern convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979), which Greece has ratified, meaning they and their habitats are protected. The treaty requires contracting parties to take all necessary measures to protect wolf habitat and reproduction areas from destruction or degradation. The wolf is also covered under CITES which Greece ratified in 1984.

Wolf distribution covers a large part of continental Greece, they are present in 30 prefectures of the country. There are no geographically separated sub-populations and distribution seems continuous (Iliopoulos, 1999, Life project “Wolf” 1998-2001). A wolf pack generally comprises of a reproductive pair, offspring from the latest and some from the previous reproductive years. Wolf packs in Greece are relatively small and consist of 3 - 11 individuals averaged to about 4 members in early spring (Iliopoulos 1999, 1999(1), 2000, 2010). Wolves in Greece may move even 50km per day while seeking prey although daily distance travelled averages 12-25 km depending on wolf’s sex and season. The wolf is often referred to as a generalist species capable of surviving in very diverse environments (e.g. Blanco and Cortes, 2002; Fuller, 1995; Mech, 1995) due to their great ecological plasticity compared to other Eurasian carnivores, attributed to their high mobility, relatively high reproductive potential and the opportunistic nature of their foraging techniques (Carroll et al., 1999).

The ESIA committed to: Establish a pre-construction baseline (GR0421) and ensure detailed mitigation measures including seasonal restrictions to construction activities are in place in areas identified as being highly suited to wolves (GR0444).

The 2012/2013 ESIA baseline studies used habitat modelling (using variables derived from previous, unrelated surveys), interviews with local people and field visits (survey points and vantage points) to ground-truth assumptions made regarding habitat suitability to asses wolves. Incidental signs of wolf activity were recorded where encountered. Surveys on the eastern section were undertaken in November 2012 and April/May 2013. Surveys in the western section were undertaken in July 2011.

A thorough literature review was undertaken to identify any new secondary data (publications in journals, conference abstracts, LIFE reports etc.), however no additional information was found to inform the pre-construction surveys.

Existing data on wolf presence and distribution in western and northern Greece, including data collected during TAP ESIA baseline studies, was used to determine where the proposed TAP route crosses potentially important habitats for wolves. This data informed the design of the 2015/2016 pre-construction surveys which focused on

[19] http://www2.nina.no/lcie_new/pdf/634991502778171292_IUCN%20Wolf%20Manifesto.pdf

eight main areas of interest. Areas A, B, C, D, E, F, G and H were surveyed during field trips in October 2015, December 2015 and January 2016.

Table 6 summarises the TAP segments that were selected as priority study areas, during both the ESIA and the 2015/2016 study. Areas were selected because of their increased potential for wolves and bears to be breeding close to the TAP route, based on the results of previous studies, expert opinions and habitat modelling.

Table 6 TAP segments that were surveyed in priority study areas

Study area	Section name and selection criteria	June 2015 KP	Species considered	ESIA survey period	2015–2016 survey period
A	**Loutros** Medium to highly suitable habitat for wolves. Presence of potential homesites	27–32	Wolf	November 2012	December 2015–January 2016
B	**Palagia-Kirki** Medium to highly suitable habitat for wolves. Presence of potential homesites	45–62	Wolf	November 2012	December 2015–January 2016
C	**Kavala** Locally good quality denning habitat for wolf. TAP bisects highly suitable wolf homesite in the area	187–194	Wolf	April 2013	December 2015–January 2016
D	**Serres-Thessaloniki (Kroussia mountains)** Highly suitable wolf habitat and presence of homesites, especially denning sites	299–314	Wolf	April 2013	December 2015–January 2016
E	**Vermio Mountains** High-quality habitat for bear and wolves. Presence of wolf homesites. Recolonisation of the area by bears in the last 8–10 years	429–450	Wolf and bear	July 2011	October–November 2015
F	**Kleisoura Pass** High-quality habitat for bear and wolves. Presence of wolf homesites. Important corridor/linkage zone for both species	495–502	Wolf and bear	July 2011	October–November 2015

Study area	Section name and selection criteria	June 2015 KP	Species considered	ESIA survey period	2015–2016 survey period
G	**Aliakmon River** High suitability habitat for bear and also a wildlife corridor for them	533–536	Wolf and bear	July 2011	Not surveyed during 2015–2016
H	**Oinoi-Ieropigi Pass** High-quality habitat for bear and wolf. Important reproduction area for bears. Potential for cumulative effects with Egnatia KA45 highway	538–549	Wolf and bear	July 2011	October–November 2015

4.4.1 Eastern surveys

Field surveys for the ESIA focused on areas that surveyors assumed could support wolf reproduction. Surveys took place over eight days in November 2012 and April/May 2013. Wolf assessment for the ESIA was based on habitat suitability modelling (using variables derived from previous, unrelated surveys), interviews with local people, field visits to survey points and vantage points for evaluation of wolf homesite suitability and opportunistic field collection of wolf presence data (tracks, markings, scats). Surveys were constrained by limited field trip durations meaning some areas could have passed undetected as reproduction sites.

4.4.1.1 *Survey area A: Loutros–Alexandroupoli*

Suitable habitat existed for wolves in this area and they were confirmed present during ESIA baseline surveys, with the most probable homesite region being KP 29–32 (330m from pipeline route). However, a number of interviews did not thoroughly validate the area as a reproduction site.

Habitat evaluation during pre-construction surveys has not revealed any changes regarding wolf habitat suitability; no other infrastructure has been constructed and landscape attributes remain similar to that assessed for the ESIA. The key area of interest is KP 29–31.5.

These surveys produced more data on wolf presence and movement than the ESIA surveys as more interviews were undertaken and field data collection was improved by equipment such as camera traps (Plate 2). This improved data enabled more detailed mitigation measures to be proposed.

The pre-construction field surveys focused most on areas closest to the pipeline route and concluded that overall importance of the wolf habitat in this area was underestimated in the ESIA.

Plate 2 Wolf pack, including young, captured by camera trap in January 2016

4.4.1.2 *Survey area B: Palagia–Kirki, Alexandroupoli*

The area supported habitats suitable for wolf use all year round and wolf presence was confirmed during ESIA baseline surveys. The most suitable homesite close to the TAP route was predicted to be north-east of KP 47–50 (280m from TAP route, near Palagia village). A habitat assessment and interviews with locals supported this assumption. Wolf field signs were recorded during ESIA site visits.

The second potential homesite domain was predicted south of KP 52–57 (660m from TAP route). Field observations and interviews with locals confirmed the area's high suitability and signs of a territorial wolf pack were found during field visits.

The third possible home-site was located north-east of KP 59–61 (590m from TAP route, near Sykorachi village). Habitat was considered suitable during a field visit, but the presence of livestock/shepherds reduces denning suitability. Wolf presence was confirmed during visits.

Habitat evaluation at KP 47-51 & KP- 53.5-61 during 2015–2016 did not reveal any changes regarding wolf habitat suitability, as no other new infrastructure has been constructed and landscape attributes remained similar to the 2012 ESIA study period.

Surveys provided more data on wolf presence and movement than the ESIA surveys. Wolf presence was evident during both surveys and territoriality and reproduction was verified using field methods. More detailed mitigation measures have since been proposed.

4.4.1.3 *Survey area C: Kavala Mountains*

The most suitable homesite closest to the TAP route was predicted at KP 190–192.3 (extending from 0-1200m from the route). Field visits and interviews with locals confirmed the area's suitability as a potential reproduction site.

Habitat evaluation from KP 187-194 during pre-construction surveys has not revealed any changes regarding wolf habitat suitability, as no other infrastructure has been constructed and landscape attributes remained similar to the 2013 ESIA study period. More data relating to wolf presence and movements was collected and wolf presence was evident during both surveys with territoriality and reproduction both being verified. This data informed mitigation measures proposed.

4.4.1.4 *Survey area D: Kroussia Mountains*

Permanent presence of wolves was confirmed during the ESIA surveys and field data (tracks) indicated the presence of a pack of at least five wolves. The area was thought to be part of two wolf home ranges that encompass a much larger area.

Two main home site domains were predicted both north and south of KP 300–311. The segment with the most suitable habitat was located south-east of KP 302–309. The most suitable home site region was located around KP 306.7 (south-east of Kefalochori village, 1500–4500m from pipeline route). KP 302–303.6 along the route was also considered highly suitable wolf habitat.

A highly suitable homesite habitat was confirmed through direct field evaluation and interviews with locals during the ESIA studies. Tracks of five wolves were also recorded in the field, moving towards and away from this area.

At KP 300.2–313.2 TAP crosses highly suitable wolf habitat and very highly suitable large ungulate (roe deer and wild boar) habitat. High densities of wild ungulates were recorded in the area and indication of wolf predation on these species was recorded in the field. Roe deer presence was particularly evident in all transects inspected.

Habitat evaluation at KP 299-314 during 2015–2016 has not revealed any changes regarding wolf habitat suitability, as no other infrastructure has been constructed and landscape attributes remained similar to that recorded in the ESIA. Additional wolf presence and movement data was recorded. Wolf presence was evident during both surveys and it can safely been assumed that reproduction occurs regularly (annually) in the area. Territoriality and reproduction were verified with the use of field methods. Quantitative information on commuting areas exist (camera trapping) and showed frequent use of the area. This data has informed the development of mitigation measures.

4.4.2 Western surveys

Field surveys concentrated on three areas that surveyors assumed could support wolf reproduction based on habitat suitability modelling.

The surveys to inform the ESIA took place over five days in July 2011. The survey was undertaken during the summer when the ground was hard and dry and tracks may have

been harder to find, as a result of this and the limited field trip duration, some areas could have passed undetected as reproduction sites.

These information gaps have been filled by the 2015/2016 surveys, from KP 299-314 habitat evaluation did not reveal any changes regarding wolf habitat suitability, as no other infrastructure has been constructed and landscape attributes remained similar to that in the ESIA. These surveys provided additional data and field evidence on wolf presence and movement which complements the ESIA surveys. Wolf presence was evident during both surveys and it can safely be assumed that reproduction occurs annually. Territoriality and reproduction was verified with the use of field methods. Quantitative information on commuting areas exist (camera trapping) and showed frequent use of the area. More detailed mitigation measures have now been proposed.

4.4.2.1 *Survey area E: Vermio Mountains*

Three main home-site domains and a smaller home-site area were predicted here at the time of ESIA drafting, most likely supporting two different wolf pack reproduction sites (distance between domains was >10 km).

The first potential home-site region was south of KP 445 (close to Kato Grammatiko village). Field visits and interviews with locals confirmed suitability of this area as a potential reproduction site.

The second potential home-site domain fully encompassed KP 443–446, and the TAP route crossed this area through “very high” suitability class. Predictions seemed to correspond to field data (interviews and habitat assessment) and re-routing was requested in this area during the ESIA data collection phase. A re-route was subsequently adopted that reduces impacts compared to the original ESIA route.

A smaller home-site area was predicted north of KP 440, here locals had observed wolf pups in the area. The fourth and larger home-site domain was predicted south of KP 432–434. Field visits and interviews with locals confirmed suitability of this area as a potential reproduction site.

Habitat evaluation during 2015 did not reveal any changes regarding wolf habitat suitability from KP 432-425, as no other infrastructure has been constructed and landscape attributes remained similar to the 2011 ESIA study period. The surveys produced some additional indirect data and field evidence on wolf presence and movement.

The evaluation of habitat suitability from KP 436- 441.5 was consistent with that determined in the ESIA as the landscape attributes remained similar and no other infrastructure has been constructed since the ESIA survey.

These surveys provided additional indirect data and field evidence on wolf presence and movement, wolf presence was evident during both surveys and it can safely be concluded that wolf has a permanent presence in the area. Territoriality was verified with the use of field methods.

The habitat suitability evaluation from KP 442-447 in 2015 revealed no changes as no other infrastructure has been constructed and all landscape attributes remained similar to that recorded in 2011. These surveys provided additional indirect data and field

evidence on wolf presence and movement; while wolf presence was evident during both surveys it was impossible to locate field signs.

4.4.2.2 *Survey area F: Kleisoura Pass*

The ESIA studies confirmed wolf presence and predicted three main home-site domains.

The first potential home-site area was located south of KP 498–501 (westwards of Kleisoura village). Field visits and habitat analysis confirmed suitability of this area, but interviews did not confirm the area as a reproduction site. However, it should be noted that the sampling effort was low.

The second potential home-site area was located north of KP 499–501 (close to Verga village). Habitat assessment, interviews and the recording of field signs of a territorial wolf pack confirmed the suitability of the area as a reproduction site.

A third potential site was predicted south of KP 496–497 (westwards of Variko village). However, this area could not be evaluated in the field due to the short duration of the surveys.

The evaluation of habitat suitability from KP 495-502 and specifically KP 495-498 during 2015 did not record any changes from the ESIA baseline. Additional field evidence was collected on wolf presence. The area is considered to be of high importance for wolves, and consequently potential temporary disturbance related impacts may occur here, these conclusions agree with the predictions in the ESIA.

4.4.2.3 *Survey areas G: Aliakmon river KP 533- 536 and H: Oinoi- Ieropigi KP 538-554*

Two potential wolf reproduction sites were predicted in this area. The first potential home-site one was located far north of KP 539–540. Field visits and interviews with locals confirmed this area as a suitable reproduction site with sightings of pups reported. The second potential home-site is located south-east of KP 547–549.2 (north of Polyanemo village). However, this area could not be evaluated in the field owing to the short duration of the surveys. During the ESIA field surveys, evaluation and mitigation proposals were based on, and initially organised according to, a different route that was further away (2 km east) from the current alignment (June 2015 base case).

Habitat evaluation of the Aliakmon River KP533-542 during 2015 revealed changes in habitat suitability for wolves as landscape attributes have remained similar to the 2011 ESIA study period.

The 2015 surveys at Oinoi – Ieropigi from KP538-554 revealed important changes regarding wolf habitat suitability. Construction of KA45 has already reduced habitat suitability in the area as limited resources (wolf homesites) have been negatively affected (destruction of wolf homesites). It also restricts connectivity of habitats. The cumulative impacts of KA45 and TAP therefore need to be considered as new issues regarding temporary impacts to wildlife corridor suitability and the functionality of linkage areas have arisen since submission of the ESIA.

Table 7 Summary of wolf homesites close to TAP route: KPs related to current alignment (June 2015)

TAP part	Survey area	Potential wolf home sites (KP)	ESIA recommendation
East	A: Loutros- Alexandroupoli	29–32	Mitigation proposed
	B: Palagia Kirki-Alexandroupoli	47–50	Mitigation proposed
		52–57	Mitigation proposed
		59–61	Mitigation proposed
	C: Kavala Mountains	190–192	Mitigation proposed
	D: Kroussia mountains	301.8–303.4	Mitigation proposed
		304–311	Mitigation proposed
West	E: Vermio mountain	432–434	Mitigation proposed
		443–445	Mitigation proposed
	F: Kleisoura Pass	496–497	Mitigation proposed
		499–501	Mitigation proposed
	H: Oinoi	539–540	Mitigation proposed
		547–549.2	Mitigation proposed

4.5 Golden jackal

The golden jackal has a vast range spanning north and north-east Africa, the Arabian Peninsula and Europe where they have a patchy distribution, being resident in the Balkans, Hungary and south-western Ukraine. Eastwards they range into Turkey, Syria, Iraq, Iran, Central Asia, India, Sri Lanka, Myanmar, Thailand and parts of Indo-China.

Jackals are usually active during the night, especially in regions with intense human activity, the distance they cover can reach 7 km per day. Nocturnal activity is manifested by howls and these emissions play a special role in their social organization. Wolves normally dominate jackals, who in turn dominate foxes and therefore jackals are not often found where wolves are.

The golden jackal is not considered a priority species by the EU as is reflected by its listing on Annex V of the Habitats Directive. It is also listed on Appendix III of CITES, showing a global increasing population trend. IUCN assess the species globally as ‘Least concern’ but ‘Near threatened’ in Europe. Since 2013 the golden jackal is considered to be a large carnivore by the Large Carnivore Initiative for Europe (LCIE), a classification that is expected to contribute to the species conservation in a wider European range and reinforce its monitoring scheme.

Conversely, in Greece, the legal status of the species is still obscure and undetermined as it is legally unclassified i.e. it neither appears in the list of game animals that could be hunted nor in the protection list. It is listed as “Endangered” in the Greek Red Data Book meaning it is facing a very high risk of extinction in the wild, due to population declines habitat fragmentation. The entire Greek population is estimated at <1500

individuals. The jackal is protected under the auspices of the Greek Law 3937/2011 for the Protection of Biodiversity which sets clear targets for the protection of species by means of conserving their habitats, especially in those listed in the Red Data Book.

During the early 2000s extensive surveys within insular and mainland Greece were undertaken, these found that the golden jackal occurs in few and isolated groups in Thrace, eastern Macedonia and Chalkidiki, Peloponnese and central Roumeli as well as the island of Samos. Reviewing this information for the ESIA highlighted that the TAP eastern section was very likely to cross territories of the fragmented jackal population in northern Greece.

4.5.1 Surveys

To inform the ESIA surveys from Komotini to the Turkish border were undertaken in October 2012 and between Komotini to the Serres plain between in April - May 2013 (with 5 days actually spent in the field). These surveys provided conclusive data on the range of the species in the vicinity of the pipeline route.

Post-ESIA ecological surveys and ecological management tasks have been agreed for large carnivores including the jackal. Surveys were undertaken in 2016 to monitor the status of jackal populations along the pipeline route, review the ESIA data, explore jackal presence along two re-routed areas not previously surveyed (i.e. Filippoi region from KP201 to KP213 and the Aggitis area between KP226 and KP237) and to comment on the mobility of current groups.

Several commitments have been made in the ESIA with regard to jackals; the requirement to establish a pre-construction baseline (GR0421), develop mitigation measures for areas where jackals are present (GR0445), seasonal restrictions of construction activities (GR0595) and transboundary mitigation measures (GR0568). The ESIA reported the presence of jackals in five areas along route as outlined in Table 8.

Table 8 ESIA results: jackal territories in the vicinity of the TAP route

Nr.	Area	Prefecture	KP chainage (2016 chainage)	Remarks
1	Kipoi to Tyhero	Evros	0-3	A riparian part of Evros River close to Greek/Turkish border. Six (6) jackal groups were detected on the Greek-Turkish border along the river.
2	Southern of Antheia	Evros	32-35	Western part of the Evros delta; one(1) group of jackals was detected 4 km south of the ESIA corridor but it was considered

Nr.	Area	Prefecture	KP chainage (2016 chainage)	Remarks
				as possible to move closer to the pipeline trajectory at least occasionally
4	Dialampi to Amaxades	Rodopi	114-128	Vistonida Lake with a buffer zone of almost 3 km around it: five (5) groups were located in the northern part of Vistonida
5	Toxotes to Pontolivado	Xanthi-Kavala	151-176	Riparian area around both sides of Nestos River: ten (10) groups were recorded along the river
6	Mitrousi to Kalokastro	Serres	280--296	Strymonas River, and the whole area around it: two (2) jackal groups were located close to Provatas

Jackal groups were detected all along Evros River, from the city of Soufli in the north, and south to the river's Delta, where the Evros River joins the Aegean Sea. The animals seem to communicate easily within their distribution area as there is no natural or man-made barrier to their movement. Given the swimming ability of the species, it is plausible that jackals can cross Evros River the natural border between Greece and Turkey and move between the two countries according to food availability, weather conditions and land cover.

Rodopi, Xanthi and Kavala host the healthiest, most stable jackal populations within Greece. The hydrological cluster of Nestos River, Vistonida Lake and Komotini Lagoons supports the largest population groups, with a density peak of three individuals per km^2 in Nestos Delta (Giannatos *et al*. 2005). The entire area is considered to hold the most important jackal population in Greece.

Prior to the ESIA surveys it was thought that jackals were only found in the northern parts of Serres around Kerkini Lake. However survey data indicated that they follow the Strymonas River and the suitable habitat alongside it, moving southwards to the delta. For this reason the area where the pipeline route crosses Strymonas River and its channels have also been considered as a hotspot for the 2016 survey.

Results obtained during the ESIA confirmed five established jackal territories along the pipeline route as shown in Table 9.

Table 9 Jackal territories confirmed during the ESIA survey

Pipeline chainage KP (2016 trajectory)	Jackal territories within the study area	Closest distance to the pipeline
0-3	6	0 m
34-35	1	2.12 km
117-126	5	100 m
150-159	10	0 m
282-295	2	0 m

Excluding the groups detected in KP34-KP35 that are not considered susceptible, the other four localities are deemed to be of importance for the overall jackal population in the region and therefore are considered as areas of special interest in the context of the TAP project.

The 2016 survey design was based on information from the ESIA, an updated desktop review, consultation with relevant local Management Bodies including the Evros Delta Management Authority[20] and the National Park of Eastern Macedonia – Thrace Management Authority[21] and a recent literature review. The same sampling areas have been retained to allow comparison with ESIA data and add other areas if deemed necessary e.g. the reroutings area in Tenagi Filipon (KP201 - KP213) and the Aggitis River (KP226 - KP237).

4.5.1.1 *Evros KP0-3 and KP32-35*

The 2015 survey results did not provide evidence of jackal territories along or in the vicinity of the pipeline route, however there is recent literature information that indicates the opposite (Migli, 2014). It is currently unclear if this should be considered as coincidental or whether it is evidence of abandonment due to disturbance potentially from traffic noise associated with the highway and/or intensive evening/night agricultural activities within the Evros delta (summer 2015). Disturbance could displace jackals into neighbouring areas. It should be noted that a camera trap set for the pre-construction surveys for bears and wolves recorded a golden jackal on the move in the vicinity of KP31.

4.5.1.2 *Xanthi KP116-126 and KP150–161*

The 2015 survey results clearly show that this is a stronghold of the jackal population in northern Greece with eight jackal groups, three between KP 116-126 and five between KP 150-161. This situation is very much like the one described in the ESIA three years ago. This finding is consistent with literature which cites the region as hosting the biggest jackal population in Greece. Three of them were found in the northern part of Vistonida Lake, from KP116 to KP126, south of the route and seems that they can easily communicate, as they use the same habitat. The remaining five groups were

[20] evros-delta.gr/en/the-management-body

[21] fd-nestosvistonis.gr/

detected along Nestos River, southern of Toxotes up to west of Chrysoupoli, from KP150 to KP161, as the route crosses their territories.

4.5.1.3 *Kavala KP170-176*

Only one of the three areas surveyed in Kavala was found to host established jackal populations. The ESIA found no evidence of jackal populations here, however the 2015 fieldwork detected five groups, 11 jackals in total. These results indicate that the jackals have expanded from the core area along the Nestos River lowlands (KP150 – 161) into the westernmost part of the Nestos delta. These groups may be in contact with animals recorded approximately 20km eastward further upstream of the River Nestos estuary.

4.5.1.4 *Serres KP286-297*

The results of the 2015 survey corroborate the ESIA's speculation that jackals from Kerkini Lake move and establish territories into a southern direction along Strimonas River. One large group of five jackals was recorded close to Strymoniko village. Shepherds from Strymoniko also claimed that jackals have shown an increasing tendency to move around the area within the last three years. Jackals are gradually moving south from Kerkini Lake, where their presence is confirmed and constant over time, moving next to Strymonas River where the habitat is suitable. Thus, their range along the route is expected between KP286 to KP297.

4.6 Otter

Eurasian otters (*Lutra lutra*) are widespread throughout mainland Greece where they are most frequently found in the north-east, they also occur on some of the islands. They inhabit a wide range of freshwater habitats; rivers, streams, canals, lakes, marshes and deltas. Classified as 'Endangered' in the Red Data Book of Greece, otters are protected under the 1981 Greek Presidential Decree (PD no. 67/1981)[22] which transposes CITES, and under Annex II and Annex IV of the EU Habitats Directive (92/43/EEC), enacted via the Common Ministerial Decision no. 33918/1998[22].

Otters are known to inhabit Greece's major wetland systems in the study area but specific population data is lacking. However based on data from other areas it is anticipated that a sparse population with very extensive foraging areas may exist, meaning it is unlikely that more than a single individual, or a pair, forages occasionally at each crossing point (CP) that contains suitable habitat along the pipeline route. Additionally these individuals are expected to move several kilometres away from any particular CP on a regular basis as their territory covers several kilometres.

During the 2011-2013 hydro-ecological surveys that informed the ESIA all watercourses with permanent flow crossed by the TAP route were visited, this involved 15 watercourses in the eastern study area and 11 watercourses in the western study area. However, although anecdotal data regarding otter presence were collected at most CPs, specific surveys for otters were not undertaken along the pipeline route. As a result the presence or absence of otters was not noted at every site surveyed, otter

[22] http://www.ekby.gr/ekby/en/PA_main_en.html#NAT_LEGISL

presence was confirmed at only five of the 26 surveyed sites, their absence was recorded at ten sites and at the remaining 11 no information was recorded.

Targeted otter surveys were undertaken in 2015. The purpose of these surveys was to confirm otter presence (or likely absence) on the watercourses and, more importantly, confirm the suitability of the pipeline crossing location (or the part of the watercourse closest to the TAP project) for otter holts (underground otter breeding or resting sites).

4.6.1 Eastern survey

4.6.1.1 *Evros River KP0 (ESIA ref: EVROS_12)*

During the ESIA surveys otter presence was confirmed at this site. It was not possible to access the site in 2015, however the area is considered to support commuting and foraging otters as well as providing a potential resting area and breeding sites.

The Evros Delta, 35 km south of the TAP CP, supports otters, according to a 2015 surveillance project which recorded otters at 11 sites in the Evros Delta (Management Authority of Evros National Park, pers. comm.). Otters can have long linear territories, ranging from 6 km for females (Georgiev, 2007) and up to 45 km for males (Loy et al., 2010)

4.6.1.2 *Provatonas Canal KP0-1 (ESIA ref: PAR_EVROS)*

This site was not mentioned in relation to otters in the ESIA and it was not possible to access it during the targeted otter survey, however presence of otters outwith the survey area was confirmed as was the suitability for the site to contain resting holts.

4.6.1.3 *Fytemata Stream KP13-14 (ESIA ref: Fyt_1)*

No reference to otters at this site was made during the original surveys, however in 2015 the presence of otters was confirmed.

It should be noted health and safety issues prevented access to the CP and the nearest possible point was instead surveyed. Four old spraints were found under a bridge surveyed on the eastern riverbank, at four different sites, downstream of the new CP. Overall, the signs confirmed otter occurrence in the area using the watercourse for commuting, foraging and potentially resting but holt suitability could not be fully assessed at the CP.

4.6.1.4 *Apokrimno Stream KP 41-42 (ESIA ref: Erene)*

No signs of otter were noted here in the ESIA survey; however the 2015 survey confirmed their presence and also the suitability of the site to contain resting holts.

Potential otter prey (frogs) were present and one fresh spraint was recorded on an exposed rock close to the current CP. The surveyed section is unlikely to support breeding sites, but it could support resting areas at the CP. The habitat in the stream could also support foraging sites and be used as a corridor. Overall, the survey confirmed otter occurrence in the area and use of the watercourse for commuting, foraging and, potentially, resting. No holts were confirmed within 100m of the crossing point.

4.6.1.5 *Filiouris River KP 78-79 (ESIA ref: Filiouris)*

Otter presence was recorded on both survey occasions, and the 2015 survey also noted that the site could potentially contain both breeding and resting holts. The site is within the Natura 2000 site GR1130006.

Habitat connectivity was considered adequate to support all otter functions (breeding sites, resting areas, corridors) and the stream habitat had capacity to support foraging; containing fish and amphibians. Two old spraints were found 20m upstream of the new CP on an exposed tree at the water's edge. At the old CP, one old spraint and a slide by the water next to the spraint was recorded. Overall, the signs confirmed that otters occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site, however no holts were confirmed within 100m of the CP.

4.6.1.6 *Chionorema Stream KP 99-100 (ESIA ref: CH1)*

No mention of otters is made in relation to this site in the ESIA, but their presence was confirmed in 2015 as was the potential for resting holts to be found in the vicinity.

Reed beds provide some habitat connectivity and are considered adequate to support otter functions related to resting areas. The stream habitat could also support foraging sites. Presence of prey was observed, including fish and amphibians. An old spraint was found on an exposed rock and fresh tracks were recorded in the riverbed of the side stream, close to the junction of the two streams. Overall, the signs confirm that otters occur in the area and use the watercourse for commuting, foraging and, potentially, resting. No otter holts were confirmed within 100m of the CP.

4.6.1.7 *Aspropotamos Stream KP 105 (ESIA ref: AS1)*

The ESIA survey doesn't note any information for this species at this site, the presence of both otters and potential for the presence of resting holts was confirmed by the 2015 survey.

On both banks of the surveyed section habitats suitable for use as otter resting areas (e.g. reed beds) were found and habitat connectivity was considered adequate to support otter resting requirements. The habitat in the stream could support foraging sites, prey observed included fish and amphibians. Fresh otter footprints were found in five places and fresh spraints were found at two sites approximately 50m downstream of the CP. Old spraints were also observed close to the CP, on exposed riverbanks of the surveyed transect. Overall, the signs confirm that otters occur in the area and use the watercourse for commuting, foraging and, potentially, resting. No otter holts were recorded during the survey.

4.6.1.8 *Xiropotamos Stream (Kompsatos River) KP 112-113 (ESIA ref: XK1)*

This is another site where otter presence / absence was not discussed at the time of the ESIA, the targeted survey did confirm their presence but the site was not deemed suitable for any type of holts. The area is located within the Natura 2000 site GR1130009.

Old spraints were recorded at two sites on the eastern riverbank during the 2015 survey, but the surveyed section was deemed unlikely to support breeding sites or resting areas at the CP. Overall, the signs confirm that otters occur in the area and use the watercourse for commuting and foraging.

4.6.1.9 *Kosinthos River KP 136 (ESIA ref: KO1)*

The 2015 survey confirmed the presence of otters and suitability of the site for resting holts to exist despite the original survey not mentioning otters at all.

Prey observed to be present included fish and amphibians. Many fresh spraints were recorded on exposed rocks close to the reed beds, and fresh and old spraints and fresh otter footprints were also recorded downstream of the CP. Upstream of the CP, the river habitat and its connectivity could support otter resting areas, but the surveyed section is unlikely to support otter breeding at the CP. Overall, signs confirm otters occur in the area and use the watercourse for commuting, foraging and, potentially, resting, however, no otter holts were recorded within 100m of the CP during the survey.

4.6.1.10 *Nestos River KP 153-154 (ESIA ref: N1)*

In 2015 the site was found to be suitable for both resting and breeding holts and otter presence was confirmed, no data had previously been recorded for this species at the site. The area is located within the Natura 2000 site GR1150010.

The majority of the habitat up and downstream on both sides of the river at the CP is considered suitable for otter breeding and resting. Habitat connectivity was considered adequate to support all otter functions (breeding sites, resting areas, corridors) throughout the surveyed section. Presence of prey was observed, including fish, amphibians, birds and invertebrates. Many fresh otter footprints and one old spraint were observed at the western bank of the surveyed transect, downstream of the TAP CP. Overall, the field signs confirm that otters occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site, however, no holts were identified within 100m of the CP during the survey.

4.6.1.11 *Tafros Aggiti KP 223 (ESIA ref: TA1)*

No mention of otters was made in the original survey report and no presence of them was found during the targeted survey, however the site characteristics suggest both breeding and feeding holts may be found here.

Habitat connectivity was considered adequate to support all otter functions (breeding sites, resting areas, corridors) throughout the surveyed area and the stream was assessed as being able to support foraging sites. No otter signs were recorded owing to the recent severe rainfall and flooding in the region. Overall, based on otter findings in the wider area and the habitat assessment at the CP, otters are expected to occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site. No holts were recorded within 100m of the CP during the survey.

4.6.1.12 *Aggitis River KP 226-227 (ESIA ref: A1)*

The presence of otters was recorded here during the ESIA survey, and the site was deemed to be suitable for holts used for both breeding and resting in the targeted survey, however no otter presence was recorded.

Habitat connectivity was considered adequate to support all otter functions (breeding sites, resting areas, corridors) throughout the surveyed area and the stream adequate to support foraging. No otter signs were found owing to the severe rainfall and flooding in the previous days. Based on the previous findings and the habitat assessment, otters are expected to occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site, however no holts were recorded during the survey.

4.6.1.13 *Tafros Belitsa KP 285 (ESIA ref: TB1)*

This site was not noted to contain suitable habitat features for otters, this is supported by the absence of reference to them in the ESIA surveys and their recorded absence in the targeted survey.

Habitat connectivity was considered inadequate to support otter functions (breeding sites, resting areas, corridors) throughout the surveyed area. The habitat in the irrigation channel was not considered able to support foraging sites. Presence of prey observed included amphibians.

Despite no otter signs being recorded, the habitat assessment at the CP suggests otters might be expected to use the watercourse for commuting and foraging. The site is not likely to be a potential otter resting area or breeding site. No holts were recorded within 100 m of the CP during the survey.

4.6.1.14 *Strimonas River KP 294 (ESIA ref: S1)*

The presence of otters was not recorded at the site during either survey, however the assessment of the site as having potential to contain breeding and resting holts was supported by the presence of otters being confirmed in the vicinity of the survey area.

Habitat connectivity was considered adequate to support all otter functions (breeding sites, resting areas, corridors) and foraging sites could be supported by the stream.

No signs of otters were found, probably due to severe rainfall and flooding in the wider area over the previous three days. Many otter spraints were recorded 2km upstream of the CP at two different sites, under one large and one very small bridge, where a 200m section was surveyed. Overall, based on the habitat assessment and the findings upstream, otters are expected to occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site. No holts were identified within 100m of the CP during the survey.

4.6.1.15 *Gallikos River KP 358-359 (ESIA ref: G1)*

The absence of reference to otters in the initial survey and the noted absence of them in the 2015 survey is further supported by the site being deemed not to contain suitable habitat features for otter holts.

No otter signs were found this is likely to be a result of the severe rainfall and flooding in the wider area on previous days. Given the wide distribution of the species and based on the habitat assessment, otters could be expected to occur in the area and use the watercourse for commuting and foraging. However, this river section is unlikely to support breeding sites or resting areas.

4.6.2 Western survey

4.6.2.1 *Axios River KP 374-375 (ESIA ref: Ax1)*

Despite the site being assessed as containing suitable habitat features to support both breeding and resting holts neither survey recorded the presence of otters within the area, this could be due to sub-optimal conditions for surveying on both occasions (e.g. heavy rainfall/ flooding). The area is located within the Natura 2000 site GR1220010.

Based on the survey conditions and the habitat assessment, otters are expected to occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site, however no holts were recorded within 100 m of the CP during the survey.

4.6.2.2 *Vardarovasi KP 376-377 (ESIA ref: Vr1)*

Otter presence was not confirmed during each site visit and the site was not considered suitable to contain any potential holts.

The habitat could support foraging sites and be used as a corridor. No otter signs were recorded in the site as it was difficult to search for them. Overall, based on the habitat assessment at the CP, otters might be expected to use the watercourse for commuting and probably for foraging. However, the site is not likely to be an otter potential resting area or breeding site.

4.6.2.3 *Loudias River KP 396-397 (ESIA ref: Lu1)*

While no otter presence was recorded on the first survey the suitability of the habitat for otter breeding and feeding holts was supported by evidence of their presence in the survey area in 2015.

Habitat connectivity was considered adequate to support otter functions (breeding sites, resting areas) and the habitat could also support foraging sites and be used as a corridor. No prey presence was observed. Otter spraints were recorded on a trunk lying by the water. Overall, based on the habitat assessment at the CP, it is evident that otters use the watercourse for commuting and foraging. The site is also likely to be an otter potential resting area and breeding site although no holts were recorded within 100m of the CP during the survey.

4.6.2.4 *Canal 66 KP 419-420 (ESIA ref: C66)*

Neither survey recorded the presence of otters within the area however this may be due to sub-optimal survey conditions on both occasions (e.g. heavy rainfall/flooding). The 2015 survey did note the potential for the site to support resting holts and the presence of otters was recorded beyond the survey area.

Habitat connectivity was considered adequate to support otter functions (breeding sites, resting areas, corridors), foraging sites and act as a corridor. No prey was observed. Overall, based on the habitat assessment at the CP, otters might be expected to use the watercourse for commuting and foraging. The site is also likely to be an otter potential resting area and breeding site although no holts were recorded within 100m of the CP during the surveys.

4.6.2.5 *Grammatiko Stream KP 453-454 (ESIA ref: GR1)*

The 2015 survey noted the presence of otters beyond the survey area, which was considered to have potential to contain resting holts, however otter presence was not confirmed at the site during either survey.

The stream connects to Lake Vegoritida, an SAC and Natura 2000 site GR1340004 which is designated for otters. Two old spraints were found at the connection, which is 5.5km from the CP. No presence of prey was observed. No spraints were recorded at the new or the old CPs. The area is unlikely to support breeding sites, but it could support resting areas and foraging sites. Overall, the signs confirm that otters occur in the area and use the watercourse for commuting, foraging and, potentially, resting, although no holts were recorded within 100 m of the CP during the survey.

4.6.2.6 *Kilada Stream KP 464-465 (ESIA ref: Ki2a)*

The 2015 survey listed the site as having potential to contain both breeding and resting holts, however neither survey recorded otter presence within the survey area despite their presence being confirmed outside of the site in 2015. The stream is also connected to the designated Lake Vegoritida.

No prey presence was observed and no otter signs were found at the surveyed section. Overall, based on the habitat assessment at the CP and given the very long riverine territories of the species, otters might be expected to use the watercourse for commuting and foraging. The site is also likely to be an otter potential resting area and breeding site although no holts were recorded within 100m of the CP during the survey.

4.6.2.7 *Kilada Stream KP 473-474 (ESIA ref: Ki2b)*

No evidence of otters, nor suitability of the site to support the presence of holts, was recorded during either survey.

Habitat quality is considered sub-optimum for otter requirements, and habitat connectivity is not considered adequate to support otter functions. The habitat could be used as a corridor between territories for the species. No prey presence was observed. Overall, based on the habitat assessment at the CP, otters might be expected to use the watercourse for commuting. The site is unlikely to be an otter potential resting area and breeding site or used for foraging.

4.6.2.8 *Gioli Canal KP 518-519 (ESIA ref: LK1)*

Neither survey recorded the presence of otters, however the targeted survey identified the site as being suitable for resting holts and evidence of otters was found beyond the

survey area. The stream connects to protected Lake Kastoria, Natura 2000 site GR1320001, 7.5km from the CP.

One old spraint was recorded at the survey site, under a bridge downstream of the CP. Many washed spraints were found at the survey site close to Lake Kastoria. The surveyed section is unlikely to support breeding sites, but could support resting areas, foraging sites and act as a corridor with the lake. Signs confirm that otters occur in the area and use the watercourse for commuting and foraging and as a potential resting area, although no holts were recorded within 100m of the CP during the survey.

4.6.2.9 *Aliakmon River KP 527 (ESIA ref: AL1)*

The presence of otters was confirmed during both surveys and the site deemed suitable to contain breeding and resting holts.

Habitat connectivity is considered adequate to support all otter functions throughout the surveyed area, and the stream could support foraging. Two very fresh otter spraints were recorded on a trunk on the western riverbank. Based on the previous report, the findings of the survey and the habitat assessment at the CP, otters might be expected to use the watercourse for commuting and foraging. The site is also likely to be an otter potential resting area and breeding site, although no holts were recorded within 100m of the CP during the survey.

4.6.2.10 *Aliakmon River KP 534-539 (ESIA ref: AL2)*

Otter presence was confirmed during the initial survey but not during the follow up survey despite the site being assessed as being suitable for breeding and feeding holts.

No otter signs were recorded at the surveyed transect, probably due to recent flooding. The ESIA survey noted “otter prints and scat were present (at least one individual).” Overall, the field signs confirm that otters occur in the area and use the watercourse for commuting and foraging and as a potential resting area and breeding site, although no holts were recorded within 100m of the CP during the survey.

4.6.2.11 *Aliakmon River (Vrachopotamos Tributary) KP 538-539 (ESIA ref: AL3)*

Evidence of otters was recorded during both surveys and the site was deemed to contain habitats suitable for resting holts.

Habitat connectivity was considered adequate to support otter functions throughout the surveyed area, however, the narrow strip of riparian vegetation is not sufficient to support breeding sites from disturbance and flooding. The habitat in the stream could also support foraging sites. Presence of prey was observed including fish. Six old spraints were found on a trunk in the water in the river, downstream of the CP. Overall, the signs confirm that otters occur in the area and use the watercourse for commuting and foraging and as a potential resting area, although no holts were recorded within 100 m of the CP during the survey

4.7 European ground squirrel

The European ground squirrel (*Spermophilus citellus*) is protected under Annexes II and IV of the EU Habitats Directive (92/43/EEC), and Presidential Decree 67/81. It is listed as "Vulnerable" on the IUCN Red List and in the Greek Red Data Book. This ground dwelling species is endemic to central and south-eastern Europe, it favours short-grass steppe pastures and well connected areas of both natural and semi-natural grassland habitats. Forming loosely structured populations known as colonies, they are mainly encountered during the morning and evening. Desk and field based studies were undertaken to collate presence and distribution data for this species along the pipeline route to inform the ESIA, following the re-routing further surveys were also undertaken, see Table 10.

Table 10 Summary of ground squirrel surveys 2011-2014

Broad area	Survey year	Documentation
Western Section Central and west Macedonia	July 2011	TAP ESIA Annexes (West)
Reroutings in central and west Macedonia	May 2012	Internal technical documents to TAP
Eastern section (from Greek-Turkish border IP00001-1 to IP0242 "Fylakas")	October 2012	TAP ESIA Annexes (East)
Eastern Section (km 150-175 & km 329 – 359)	April 2013	
Eastern Section Nestos (Chrysoupoli) area (corresponding to IP 374-1 to IP 374-23), Neos Xerias to Pontolivado from east to west) Drymos area (corresponding to IP 676 to IP 684) Western Section Region of Eordea (corresponding to IP 1173 to IP 1184, and IP 1188 to IP 1196,west of Perdikkas village to Variko)	June 2014	ESIA Amendment

There are three clearly defined, most likely isolated, European ground squirrel sub-populations in Greece; in western Macedonia, central Macedonia and Thrace (Thraki) all of these areas are crossed by the TAP route.

This species has been considered a potentially high impact risk due to its ground dwelling nature, consequently surveys undertaken to inform the ESIA baseline covered

points along the entire pipeline from the east (Greek–Turkish border in the Evros area) to the west (south of Kastoria Lake).

4.7.1 ESIA surveys

Surveys for the presence of European ground squirrel were undertaken along the western part of the pipeline route, from Nea Mesimvria to the Greek–Albanian border (KP364–548) in July 2011 and May 2012. The eastern part of the route, from the Greek–Turkish border to Nea Mesimvria (KP 0–364) was surveyed in October 2012 and April 2013. Due to re-routing additional surveys took place in June 2014 in three locations: the river Nestos floodplain and cultivations (approx. KP152–163), the Drymos area (approx. KP340–349) and the Eordea basin (approx. KP478–484).

4.7.1.1 *Western baseline surveys*

In the western project area colonies were detected in the following locations;

- Nea Mesimvria (northwest of Thessaloniki) to the Axios River valley (north of Gefyra village), between KP361.2 and KP369.8; and
- on the outskirts of Vegoritida Lake to Galateia village, between KP453.8 and KP481.5.

The species was mainly found in meadows, cereal and alfalfa fields, dirt roads and fallow fields. Five sites were thought to be vulnerable to pipeline construction impacts owing to their proximity to the working strip: the colonies at KP454.6 and KP464.9 were found to lie within the project working strip, and the colonies at KP453.8, KP462.6, and KP471.6 were detected within 50m from the pipeline. A second field survey in May 2012 was undertaken to incorporate data from unsearched areas along the route and reassess the population. Surprisingly, checking of colonies or potential colonies revealed a high turnover rate for several of them: more than half of those reported in 2011 were not verified again in 2012. The presence of squirrel could not be confirmed at KP462.6–464.9 near Filotas, at KP474.9 near Perdikas, at KP97 near Drosero or at KP481.5 near Galateia.

4.7.1.2 *Eastern baseline surveys*

Along the eastern extent of the route surveys were conducted in October 2012, from Greek–Turkish border to Filakas (KP0–87) and April 2013 from Nea Mesimvria to Examili (KP333–362) and from Chrissoupoli to Pimni (KP150–165):

- In the Evros region, potential colonies were recorded from the Greek–Turkish border to Kipoi, between KP0 and KP4 and near Kavisos, between KP16 and KP17.
- In Rodopi region, potential colonies were found from Aetolofos to Lofario village, between KP73 and KP76.
- In Central Macedonia, potential colonies were recorded in Drymos village, between KP341 and KP343

No live animals were observed at any of these sites, therefore all sites were considered only potential colonies. The main habitat types comprised meadows, fallow fields and clover fields.

The high turnover rate for colonies in Eordea plateau was also noted in June 2014 during re-routing surveys. In 2014, between IP 1173 and IP 1184 and between IP 1188 and IP 1196, 14 of the initial 17 observation points were re-examined to assess the current status of the 2011 colonies (approx. KP478–484) with only one site close to Filotas village showing evidence of squirrel activity. Anecdotal information confirmed the absence of the species in the Perdikas region in 2013 and 2014, despite observations every year before 2011. However, west of Perdikas village at IP 1176, a new potentially large colony was assumed to exist, due to presence of burrows consistent with the species, less than 50m away from the pipeline.

4.7.2 Post-ESIA surveys

The April 2016 pre-construction survey found evidence for potential occurrence of the species outside the corridor south of KP17, near the village Ferres in Evros region. However no evidence of European ground squirrel colonies was found along the pipeline route, nor were any actual or potential previously recorded colonies found to be present, and no new colonies were found.

It is now considered that the ESIA overestimated the European ground squirrel's range along the TAP corridor. Additionally several potential or expected colonies could actually be inhabited by voles (Microtus) or rats (Rattus). Nevertheless, European ground squirrel colonies have disappeared from sites along the TAP corridor where their status had been previously confirmed by direct observation of the species not just from field signs. This may be a result of a declining trend in local populations or a stochastic event. As a result of the survey findings, commitments GR447 and GR0544, involving temporary displacement of identified colonies, do not need to be implemented.

Survey data suggests this species is highly mobile and can abandon territories rapidly it can therefore be deduced that it also explores new territory rapidly. There is a small risk that new colonies will emerge along the route during the duration of the project. A Burrowing Mammals Briefing Note has been produced to assist the Environmental Field Monitor in identifying burrows and any appropriate mitigation measures during construction.

4.8 Other small mammals

The small mammal surveys focused on European ground squirrel colonies but also led to empirical information on other taxa; voles, moles, badgers and rats, being collected.

4.8.1 Voles

Five species of vole are found in Greece and it is the most commonly encountered burrowing mammal, meaning it is likely to be found along the pipeline route. None of the species are listed under the Habitats Directive and excepting of Felten's vole (*Microtus felteni*) which is listed as Data Deficient by IUCN, all other species (Thomas's pine vole (*Microtus thomasi*); southern vole (*Microtus rossiameridionalis*); pine vole (*Microtus subterraneaus*) and Günther's vole (*Microtus guentheri*)) are classified as Least Concern. However, the Greek Red Data book considers the European pine vole as Near Threatened and Felten's vole as Endangered.

The European pine vole inhabits a wide variety of habitats and is found in northern Greece (corresponding to KP 189-200, 439-550), while Felten's vole is found in mountain forests in north western Greece (corresponding to KP 492-510, 544-550).

4.8.2 Marbled polecat

The marbled polecat (*Vormela peregusna*) is listed in Annex IV of the EU Habitats Directive and is included in the Presidential Decree 67/81. It is listed as Vulnerable by IUCN and the Greek Red Data book considers this species to be Data Deficient. It is mainly diurnal and excavates its own burrows as well as using old European ground squirrel or other small mammal burrows. It is a specialised predator, feeding mainly on desert and steppe rodents such as gerbils, European ground squirrels and birds. The Greek population is limited to the north-eastern part of Greece on the Turkish border (corresponding to KP 0-31, 88-93).

4.9 Birds

Eastern Macedonia and Thrace contain areas with some of the highest bird diversity in Europe as is reflected by the number of national and European protected areas found in the region. Within this relatively small area, bird species from different biogeographical origins can be found breeding, wintering or migrating. As a result, typically Mediterranean species (e.g. Cretzschmar's Bunting (*Emberiza caesia*)) are mixed with common European (e.g. Greenfinch (*Chloris chloris*)) and species of Asiatic origin (e.g. Masked Shrike (*Lanius nubicus*), Isabelline Wheatear (*Oenanthe isabellina*)) in a number of different habitats. The high bird species richness can also be attributed to the diverse variety of habitats in the area, from typically Mediterranean (e.g. pastures with the dwarf scrub phrygana or thermophilous pine forests) to typically temperate habitats (e.g. beech or spruce forests and subalpine meadows) which can be found within a short distance from the sea level to mountainous areas respectively. Bird species richness and diversity also benefits greatly from the existence of large coastal lagoons such as those in the National park of Nestos and Vistonida, river deltas including the Evros, Nestos and Axios rivers and inland freshwater lakes such as Kerkini or Vistonida.

The pipeline working corridor crosses Natura 2000 sites, classified as Special Protection Areas (SPA), most notably Notio Dasiko Symplegma Evrou (GR1110009). The project area lies in close vicinity to four other SPAs (Kompsatos valley - GR1130012; Vistonis and Ismaris lakes, Porto Lagos lagoon, Alyki, Xirolimni and Karatza lagoons - GR1130010; Nestos delta, Keramoti lagoon and Thassopoula island-GR1150001; Nestos gorge - GR1120004), and to Wildlife Refuges (geodata.gov.gr/). Along the pipeline route, dense woodland (Turkish pine, oak and beech forests), riversides with natural or semi-natural vegetation, croplands and agricultural areas also occur, providing important breeding and foraging habitats for bird species of conservation interest outwith officially protected areas.

The Birds Directive (2009/147/EC) is the main legislative instrument for the protection of birds in the European Union and also in Greece, Annex I of the Directive lists species of conservation concern affording them protective provisions. In addition to the ratification of European and international legislation, Greece retains older environmental protection

laws such as Law No. 1650/86 and Law No. 2637/1998 for the establishment of National Parks and Wildlife Refuges, respectively. Greece has recently adopted the Important Bird Areas (IBAs) Programme[23], coordinated by Birdlife International, for the identification, monitoring and protection of key sites for important bird species or highly representative bird assemblages (Portolou et al., 2009).

The Birds Directive and the Greek Red Data Book of Greece identify the following notable species of conservation interest in the project area;

- Booted eagle (*Hieraaetus pennatus*);
- Lesser spotted eagle (*Aquila pomarina*);
- Short-toed eagle (*Circaetus gallicus*);
- Long-legged buzzard (*Buteo rufinus*);
- Black stork (*Ciconia nigra*);
- White stork (*Ciconia ciconia*);
- Western marsh harrier (*Circus aeruginosus*);
- Montagu's harrier (*Circus pygargus*);
- European roller (*Coracias garrulus*) (Plate 3); and
- Various lark species calandra lark (*Melanocorypha calandra*), woodlark (*Lullula arborea*), Eurasian skylark (*Alauda arvensis*).

The most recent version of the European Red List of Threatened Species (BirdLife International 2015) assesses most of these species as "Least Concern", however this is probably a reflection of successful conservation actions and modern population data. Nevertheless, these species remain national priorities within the legal conservation framework. Large raptors and black storks are key species in the study area as their biology and life cycles make them particularly sensitive to disturbances to their nests. This is because they form sparse populations, are monogamous, exhibit high nest fidelity and produce small broods.

The great majority of the birds in the wider area are protected by European and national legislation; the rest of the species can be hunted in compliance with hunting seasons and quotas.

[23] http://www.birdlife.org/worldwide/programme-additional-info/important-bird-and-biodiversity-areas-ibas

Plate 3 European roller

4.9.1.1 *Survey effort*

Due to the large number of bird species in the area, many of which are protected, avifauna have been included in all major ecology surveys undertaken for TAP. During the 2010/2011 corridor selection process the principal aim was to avoid crossing any areas where bird taxa of conservation interest were officially recorded thereby making the site 'important' for birds regardless of any legislative protections. While it was not possible to avoid all protected areas, this process enabled the majority of important bird areas (IBAs), the core Natura 2000 sites and the majority of wetlands to be bypassed. However the pipeline route does still cross a national park, seven wildlife refuges and five Natura 2000 sites.

The next phase of surveying in 2012/2013 comprised of five surveys these began by assessing areas of environmental concern crossed by the pipeline, then areas of conservation concern/designated sites, the third survey of 2012 was extensive and recorded bird species and their associated habitats with a focus on conservation issues. In 2013 a further two surveys were undertaken spanning from KP 224-359 then KP 0-224 again recording bird species, habitats and also breeding sites. The focus was on locating breeding sites along the route as migrating and wintering populations often move opportunistically within the area, and therefore are deemed unlikely to be strongly impacted by a linear project such as a pipeline.

The 2015 surveys were designed based on a desk based assessment of data collected to date and a review of the applicability of the commitments made in the ESIA. These include: route optimisation to minimise impacts on biodiversity (GR0590), establishment of a pre-construction baseline (GR0524), a detailed survey of species of conservation interest within the working strip (GR0534), a walkover survey for nesting species (GR0542), conditional additional surveys for Montague's harrier (GR0448), walkover along the route to identify any site specific issues (GR0605), consideration of construction restriction requirements (GR0434), population assessments of great reed

warbler (*Acrocephalus arundinaceus*) (GR0629)[24] and adoption of appropriate mitigation measures (GR0630).

Three other commitments have been made that apply to the entire route. Where possible clearing of vegetation should be undertaken before 1st March, or after 30th September (GR0431). Should it be necessary to clear vegetation during bird breeding season 1st March -31st July pre-vegetation clearance surveys should be undertaken by suitably qualified ornithologists. Should nests of species of conservation interest be located within vicinity of the working strip, no works will be carried out within a 25m buffer of the nest site until chicks fledge or nest is naturally abandoned (GR0433). On sections of the route (this approach is suitable only for discrete areas) with potentially important breeding habitats warning tape should be used to deter birds from the working area before breeding season starts on 1st March (GR0432).

Table 11 Summary of avifauna surveys along the TAP project area 2010 – 2015

Survey period	Area (western section: from Nea Mesimvria IP1001 westwards) (eastern section: from Evros crossing point IP00001 eastwards to Nea Mesimvria)
November 2010	Western section with all alternative corridor options
February 2011	Western section with all alternative corridor options
May – June 2011 and 2012	Western section of the ESIA base route (including several reroutings such as LARCO rerouting, Kastoria-Korce rerouting, river Axios rerouting)
October 2012	Eastern section (from Greek-Turkish border IP00001-1 to IP0242 “Fylakas”)
September 2012 & May 2013	Eastern section (from Greek-Turkish border to Nea Mesimvria IP1001)
June 2014	Reroutings at: Nestos plain (IP0374-9 to IP0374-25) Kosmio (IP0249 to IP0251-15) Tenagi (IP00445-15 to IP0450-32)
2015	Loutros forest and the Petroto-Faraggi-Almyra wildlife refuge other areas, where required, to confirm need for or to implement various ESIA commitments riparian areas (specifically for Great reed warbler (*Acrocephalus arundinaceus*)) KP520–534 for Montagu’s Harrier.

[24] The 2015 survey of this area has now been carried out and has shown that there is plentiful suitable alternative habitat and that impacts on this species are not likely to the significant. We therefore suggest a full population assessment is not needed.

4.9.2 ESIA surveys

4.9.2.1 *River Evros Section*

During the ESIA surveys few reports of resident/wintering/breeding populations of taxa of conservation interest were recorded at the crossing point with river Evros and the corridor west to KP 0. The most important breeding species in the River Evros Section is the common kingfisher (*Alcedo atthis*) at least one likely resident population was recorded at KP 0, this species is found in wetlands throughout the project area.

4.9.2.2 *Southern Evros Section*

This section crosses part of the Loutros forest which contains a high number and abundance of species of conservation interest and as such is considered to be a regional avifauna hotspot. The main species observed here in the ESIA surveys include black vulture (*Aegypius monachus*), golden eagle (Aquila chrysaetos), imperial eagle (*Aquila heliaca*), lesser-spotted eagle, greater-spotted eagle (*Aquila clanga*), Eurasian eagle owl (*Bubo bubo*), black stork, short-toed snake eagle, Syrian woodpecker (*Dendrocopos syriacus*), griffon vulture (*Gyps fulvus*) and booted eagle.

4.9.2.3 *Lowlands of Evros Section*

The woodlark is a widespread species that favours shrubland and cultivations, hold-ons were recorded within this section for this and potentially other passerines. A potential nesting site for the levant sparrowhawk (*Accipiter brevipes*) was identified in close distance from the working strip. A small colony comprising of 4-7 pairs of European-bee eaters (*Merops apiaster*) were recorded in this section. Other species of conservation interest observed here included common kingfisher, short toed snake eagle and western marsh harrier.

4.9.2.4 *Komotini – Xanthi Plain Section*

Species of conservation interest were only observed on three pipeline sections; at the crossing of the Hatisio wildlife refuge (KP 98 – 100) where they included the Syrian woodpecker, the lesser grey shrike (*Lanius minor*) was recorded at the Kompsatos River (KP 114– 116) and at the Nestos River Kotza Orman forest (KP153 - 156) the red backed shrike (*Lanius collurio*) was observed.

4.9.2.5 *Kavala Mountains Section*

Within this section species of conservation interest were only observed on the Agios Timotheos – Kioupia wildlife refuge (KP 187– 191), namely the red backed shrike and the European honey buzzard (*Pernis apivorus*). Both species were observed in staging/migration.

4.9.2.6 *Filippoi Plain Section*

No significant breeding populations of bird species of conservation interest were recorded in this section of the corridor. However the presence of the long legged buzzard was recorded, and during migration both red backed and lesser grey shrikes were observed.

4.9.2.7 *Serres Plain Section*

The main avifauna features recorded at this site were a potential nesting site for black stork near KP 238, a very dense population of calandra lark round KP 227 to 228 north of Wildlife Refugee-Aistrati Petroto and a breeding pair of European roller 140m near the proposed pipeline routing at KP 281 Provatas area.

4.9.2.8 *Kroussia Mountains Section*

Along the pipeline route several species of conservation interest were recorded, particularly where it crosses the National Park of Koronia – Volvi (KP 312– 329). Within this area near KP 325 an important feature was observed, a potential home range of the lesser spotted eagle. Other species recorded included the wood lark, Syrian woodpecker and red footed falcon (*Falco vespertinus*).

4.9.2.9 *Gallikos Plain Section*

The crossing of the National Park of Koronia – Volvi (KP 318– 351) was the main area of interest in this section during the ESIA where species recorded include; purple heron (*Ardea purpurea*) and pygmy cormorant (*Phalacrocorax phgmeus*), as well as a breeding territory of the long- legged buzzard being recorded between KP 354 and 357.

In summary Southern Evos is identified in literature and through surveys as supporting the most bird species of conservation interest along the eastern extent of the pipeline route, particularly in the Loutros forest (KP 28 – 32) which the pipeline crosses at its easternmost section. The area is used for roosting or nesting, although specific location of nests may well be outside the corridor zone. All riparian forests such as the one in Nestos river are of great importance to bird breeding.

4.9.2.10 *Axios Plain Section*

Important bird species observed here during ESIA surveys include; white stork, black stork, short-toed eagle and common kestrel (*Falco tinnunculus*).

4.9.2.11 *Vermio Mountain Slopes Section*

The short-toed eagle was the most important species recorded here, however it does not require further consideration or special mitigation measures in this area because no evidence of nesting sites were observed along the working strip.

4.9.2.12 *Ptolemaida Basin Section*

The most important species observed was the short-toed eagle which may require further consideration during the construction period.

4.9.2.13 *Askion Mountain Slopes Section*

The Dalmatian pelican (*Pelecanus crispus*), bee-eater, northern wheatear (*Oenanthe oenanthe)* and eastern Bonelli's warbler (*Phylloscopus orientalis*) were all recorded here, however none of them require further consideration or mitigation.

4.9.2.14 *Kastoria-to-Border Section*

Most of the species observed in this section were not deemed to need further consideration or mitigation, with the exception of Montagu's Harriers. The discovery of breeding Montagu's harriers near Agia Kyriaki village was by far the most important finding of the ESIA survey. A pair was observed and a nest was located directly on the route. Another female was also observed in the area suggesting another pair may also have been present. This species is listed as Critically Endangered in the Red Book of Greece, in the past it has been recorded nesting near Olympia, Galatia and Vegora towns.

To summarise the ESIA reported the riparian forests as containing the richest habitats in the western section of the route including; Axios river, Vardarovasi, Loudias river, lowlands west of Mount Vermio, west of Lehovo, Aliakmonas River, northwest of Agia Kyriaki, Mesopotamia, Ampelokipoi), while beech forests (Mount Vermio, Agia Foteini, NW of Kleisoura, Kleisoura, Verga) and oak forests (eastern Mount Vermio, Grammatikon, Mount Vermio north of Agia Foteini, west of Lehovo, west of Kastoria, Loripigi, Kastraki, Kleisoura, Verga), grassland (Kastraki, near Maniaki) and farmland (south of Loutrohorion, Polla near village, near Maniaki, east of Varikon, west of Lehovo, SW of Leropigi, south of Agia Kyriaki, Ampelopikoi, Korystos, Agia Kyriaki, south of Galatia, near Veroia, Loutrohori, Chalkidona, Nea Messimvria) were less rich. The comparative importance of the riparian forests is most likely attributable to them supporting species that inhabit the forests as well as species that simply nest there and feed in the adjacent area.

4.9.3 Realignment survey

In 2014 a study focusing on the presence of avian species and habitats along the Philippoi and Kosmio reroutings was undertaken in order to identify potential adverse effects on them as well as producing preliminary estimates of the local occurrence of bird species of conservation concern.

The surveys were conducted between the following re-routings:

- IP 251-1 – IP251-15: Kosmio rerouting
- 374-1 – IP 374-24 : Nestos rerouting

A total of 79 bird species were recorded in the project area, 22 of which are of conservation concern, according to Annex I of the Birds Directive and/or the Red Data Book of Greece.

While several bird species of conservation interest were recorded within the study area very few are considered likely to be affected by the TAP construction works. This is because occupancy modeling demonstrated resident populations comprised common and widespread species. The remaining taxa were vagrants or foragers (e.g. short–toed snake eagle, western marsh harrier and falcons) or were reported in very small numbers from the project areas. According to the TAP construction plans, stands of trees are not going to be damaged unless it is a necessity. Consequently, the study concluded that a distinction must be made between conservation-concern species. Also of those breeding in the area, priority has been given to ground-nesting species over those with arboreal nesting habits.

4.9.4 Post-ESIA surveys

A 2015 survey was undertaken to address data gaps relating to species of conservation interest along the pipeline route to; determine whether ESIA mitigation commitments are required; identify any additional mitigation requirements; provide a baseline against which any post-construction monitoring can be measured. The survey was very focused and did not update or supplement previous studies of the entire routing.

NB: Since this survey a re-route in the Mount Vermio area has been approved therefore these recommendations only apply to the area that has not been re-routed.

Following a desk assessment of data gathered to date, particularly relating to breeding sites of species of conservation interest and designated sites, ornithological surveys were undertaken at the following locations:

- Loutros forest and the Petroto-Faraggi-Almyra wildlife refuge
- other areas, where required, to confirm need for or to implement various ESIA commitments
- riparian areas (specifically for Great reed warbler (*Acrocephalus arundinaceus*))
- KP520–534 for Montagu's Harrier.

As noted previously large raptors and black storks are among the most important bird species in the study area, therefore considerable time and effort was spent searching for their territories and nesting sites. Several territories were recorded in proximity to, or as being crossed by, the route. Nevertheless, with one exception, the mapped nests of large raptors and storks lie more than 200m away from the route, whereas territories may lie partially or entirely within the corridor.

The field surveys recorded 114 bird species, 38 are species of conservation interest due to their presence in Annex I of the Birds Directive and/or in the Greek Red Data Book and/or in the Birdlife International European Red List. However most of these species do not breed within the vicinity of the pipeline route and many of them are transient species; pygmy cormorant (*Microcarbo pygmeus*), little egret (*Egretta garzetta*), night heron (*Nycticorax nycticorax*), white stork, griffon vulture, black vulture, lesser kestrel (*Falco naumanni*), red-footed falcon and Eleonora's falcon (*Falco eleonorae*). Table 12 below compares the findings of the ESIA surveys, including the Addendum and the 2015 pre-construction survey for taxon of conservation interest.

Table 12 Status of species of conservation interest within the corridor, comparison between ESIA, ESIA Addendum and 2015 data

Areas	KP*	Taxon of conservation interest	Status according to ESIA field surveys and Addendums (years 2011 – 2013)	Revised status in specific area following the June 2015 surveys	Comments
Evros, Kavisos	19.5	*Coracias garrulus*	One breeding pair near IP0046		

Areas	KP*	Taxon of conservation interest	Status according to ESIA field surveys and Addendums (years 2011 – 2013)	Revised status in specific area following the June 2015 surveys	Comments
Evros, Loutros *Pinus* forest	28.5 to 32	*Aquila pomarina*, *Hieraaetus pennatus*, *Circaetus galicus*, *Buteo rufinus*, *Ciconia nigra*, *Aquila clanga***	Spatial features of wintering populations of *A. clanga* with regards to the pipeline unknown One potential (not certified) breeding site of *Hieraaetus pennatus* Status of *A. pomerina* and *Buteo rufinus* in Loutros forest with regards to the pipeline unknown. One potential (not certified) breeding site of *Ciconia nigra* (min. number, perhaps more than one nests)	*Hieraaetus pennatus* territory confirmed and mapped (=one territory partially within the corridor) *A. pomarina* status with regards to the pipeline revised (=one or two territories outside the corridor) *B. rufinus* status with regards to the pipeline revised (=one nest outside the corridor) *Ciconia nigra* status with regards to the pipeline revised (=one nest outside the corridor) *Aquila clanga* possibly winters throughout the area Data on other (previously not assessed) species of conservation interest are provided.	
Filiouris river crossing	77.4 to 77.8	*Accipiter brevipes*	One potential (not certified) nesting site	*Accipiter brevipes* territory confirmed and mapped (=one territory partially within the corridor) Data on other (previously not assessed) species of conservation interest are provided.	
Tributary to Filiouris river	81.6 to 81.9	*Accipiter brevipes, Falco subbuteo*	Potential (not certified) nesting sites for *A.brevipes* and *F.subbuteo* Small colony of *Merops apiaster* recorded close to the pipeline	*Accipiter brevipes* territory confirmed and mapped (=one territory partially within the corridor) No evidence *of Falco subbuteo* nesting site No evidence *of Merops apiaster* colony	
Kosmio rerouting		*Coracias garrulus*		All species excluding *Perdix perdix* verified as	The rerouting

Areas	KP*	Taxon of conservation interest	Status according to ESIA field surveys and Addendums (years 2011 – 2013)	Revised status in specific area following the June 2015 surveys	Comments
(IP0250–IP0251-15)		*Melanocorypha calandra* *Calandrella brachydactyla* *Alauda arvensis* *Perdix perdix*		breeding in the area (June 2014[25] and June 2015 data)	crosses the Chatisio Wildlife Reserve (approx. KP98–101)
Kompsatos river crossing	112.5 to 113	*Coracias garrulus*	*Coracias garrulous* reported as breeding but location of breeding site not indicated Colonies of *Riparia riparia* and *Merops apiaster* in close distance (90–100 m) from the pipeline	The species is found to breed along the Kosmio rerouting some 12 km east of river Kompsatos but not at the river area itself. No evidence *of Merops apiaster* and *Riparia riparia* colonies Data on other (previously not assessed) species of conservation interest are provided.	
Nestos river	153.4 to 154. 158,9 to 159,8	*Acrocehalus melanopogon* *Circus aeruginosus* *Accipiter brevipes* *Ciconia nigra*	Wintering population of *A. melanopogon* Status of *Circus aeruginosus* and *Ciconia nigra* unknown Nesting site of *A. brevipes* in close distance from the pipeline	Status of wintering population of *A. melanopogon* remains unknown, i.e. number of pairs unknown No evidence *of Circus aeruginosus* and *Ciconia nigra* breeding within the project area *Accipiter brevipes* territories confirmed and mapped (=one territory inside the corridor, one outside the corridor) Data on other (previously not assessed) species of conservation interest are provided.	
Tenagi rerouting	205 - 222	*Lanius collurio*	In June 2014, the species was recorded as probably resident	One nest reported inside the corridor	The species is probably more

[25] TAP ESIA Addendum field surveys (unpublished data, June 2014 surveys)

Areas	KP*	Taxon of conservation interest	Status according to ESIA field surveys and Addendums (years 2011 – 2013)	Revised status in specific area following the June 2015 surveys	Comments
			in the area.***		widespread in the area.
Wildlife refuge Area " Petroto – Faraggi-Almyra" (declared in GG 754/ 27 August 1996)	227 to 230	*Melanocorypha calandra*	Apparently high breeding densities of *Melanocorypha calandra* *Buteo rufinus* and *Falco peregrinus* reported but status unknown	Between IP0469 and 0467, eight *Melanocorypha calandra* nests (max. 8), along a 1000 m working strip within the particular habitat. No evidence *of Buteo rufinus* and *Falco peregrinus* breeding within the project area Data on other (previously not assessed) species of conservation interest are provided.	
Nea Zichni area	236.4 to 238.5	*Ciconia nigra*	Potential nesting site of a pair, along two streams crossed by the pipeline Potential (not certified) nesting site of *Ciconia nigra* (between IP 0489 and IP0490)	No evidence *of Ciconia nigra* breeding within the project area Data on other (previously not assessed) species of conservation interest are provided.	
Serres agricultural area	268	*Falco* sp.	Breeding site Species and status not certified		
Serres agricultural area	280,6	*Coracias garrulus*	One breeding pair The population may be much larger and may even reside within the ROW		
Strimonas river crossing point	290-290,6	*Aquila pomarina*	Reported as potentially breeding but location of breeding site not indicated	No evidence *of Aquila pomarina* breeding within the project area Data on other (previously not assessed) species of conservation interest are	

Areas	KP*	Taxon of conservation interest	Status according to ESIA field surveys and Addendums (years 2011 – 2013)	Revised status in specific area following the June 2015 surveys	Comments
				provided	
Hilly area south of Karteres	323.5 to 327.5	*Aquila pomarina*	Breeding territory along the pipeline route Location of breeding territory with regards to the pipeline unknown	No evidence *of Aquila pomarina* breeding within the project area Data on other (previously not assessed) species of conservation interest are provided	
Galikos river crossing	354-357	*Buteo rufinus*	Breeding territory in the vicinity of the pipeline (IP722–IP724)	*Buteo rufinus* territory confirmed as outside the corridor but precise location unknown Data on other (previously not assessed) species of conservation interest are provided	
Gefyra (Axios river)	372-373	*Coracias garrulus*	Status of the species unknown	A colony area with more than four nests confirmed outside the corridor Data on other (previously not assessed) species of conservation interest are provided	
Western section of the TAP		*Lanius collurio, Lullula arborea, Alauda arvensis, Picus viridis*	Range and status of the species along the pipeline not certified	Breeding populations reported with the exception of *Picus viridis* whose presence in the project area is not confirmed.	
Kastoria, Mesopotamia - Agia Kiriaki	538	*Circus pygargus*	One nest in the immediate vicinity of the ROW (IP1288)	Three territories confirmed as outside the corridor, one inside the corridor. The nest reported in the ESIA seems to have been abandoned or the breeding pair has shifted to another location nearby (perhaps one of the territories recorded in June 2015).	

4.10 Aquatic ecology

Greece contains one of the highest proportions of endemic freshwater fish in Europe, with 34% of the 137 species found nationally being endemic (Economou *et al.*, 2007). This endemism is attributed to the combination of the region's complex geology and paleoclimatic history which is coupled with its geographic isolation and environmental diversity.

To inform the ESIA field surveys were undertaken between 2011-2013 along all major water bodies that are crossed by the original TAP pipeline route and data supplemented by a detailed literature review. Following the proposed pipeline re-route in the Tenagi area a further study was undertaken in 2014, this found that of the 16 species found in the area, five required further assessment in 2015.

Fish are known to respond to anthropogenic modification of aquatic ecosystems in a predictable and quantifiable manner. A European Fish Index (EFI)[26] has been developed by the European Commission as a standardised fish based assessment method to assess the ecological status of European rivers under the Water Framework Directive (WFD). A similar approach was undertaken for the ESIA whereby an index of biotic integrity based on fish attributes known to be responsive to environmental degradation was used, along with the WFD five point scale of biotic attributes, against reference conditions.

4.10.1 Eastern section

Within the Eastern Section 15 sites were surveyed in 2012 and 2013 along all major watercourses known to be crossed by the pipeline route. In total 28 species were recorded of which 24 were native and four non-native, three major taxonomic species predominated: Cyprinidae, Cobitidae, and Gobiidae. The abundance and diversity of species found at crossing points varied from one to 17 species. The structure of the fish communities found at both Evros and Apokrimno crossing points suggested some impacts associated water pollution.

At Gallikos, Strymonas, Kosinthos, Aspropotamos, Xiropotamos and Apokrimno evidence of intensive upstream water abstraction was noted during summer. Historically the European eel (*Anguilla Anguilla*) was found in Apokrimno, however none were recorded during surveys this is likely to be due to anthropogenic pressures, such as barriers to migration and water abstraction. The species is now listed as 'Critically Endangered' by IUCN.

Other species of conservation interest recorded include: the cyprinid *Alburnus vistonicus* a species endemic to Lake Vistonis (a coastal lagoon drainage) it is listed as 'Critically Endangered' by IUCN due to the damming of tributaries for irrigation increasing the salinity of the lagoon, and pollution impacts from agricultural run-off. Three other species are listed as 'Vulnerable' in the Red Data Book for Greece are the Aggitis spined-loach (*Cobitis punctilineata*) (Plate 4) which is restricted to the Strymon river basin; wild common carp (*Cyprinus carpio*) and malamida (*Vimba melanops*) the

[26] https://fame.boku.ac.at/downloads/manual_Version_Februar2005.pdf

latter is listed as 'Data-deficient' rather than 'Vulnerable' by IUCN. In total 14 species endemic to the southern Balkans were recorded.

Plate 4 Aggitis spined loach

Following the 2014 survey five species were prioritised for further assessment due to being species listed by IUCN and/or the Greek Red Book as being 'Critically Endangered', 'Endangered', 'Vulnerable' or 'Near Threatened', or listed in the Annexes of the EU Habitats Directive (92/43/EEC). The conservation status report for these five species concluded the Greek brook lamprey (*Eudontomyzon hellenicus*[27]) and Aggitis spined-loach were 'Bad' and 'Inadequate' respectively, whilst a 'Favourable' status was given to the cyprinid *Barbus strumicae*, Bulgarian spined-loach (*Cobitis strumicae*) and European bitterling (*Rhodeus amarus*).

The two species assessed as having a 'Bad' or 'Inadequate' status were deemed to be most vulnerable to impacts associated with the construction and operation of TAP and consequently commitments GR0625, GR0626, GR0627 and GR0628 were made relating to the need for baselines, mitigation and post-construction monitoring for these species at pipeline crossing points. The Third National Report on Directive 92/43/EEC in 2015 classified the conservation status of both species as 'Bad' triggering application of conservation objectives and measurements (Tachos et al., 2015).

A further fish survey of the Philippi River (watercourses 3, 5 and 9) was undertaken in 2015 specifically for the 'Critically Endangered' Greek brook lamprey and 'Vulnerable' Aggitis spined-loach. Their surface range area is estimated to be 112 km^2 and 800 km^2 respectively (Tachos et al., 2015). TAP crosses the known, or likely, ranges of these endemic species in the Tenagi Filipon area which predominately comprises of artificial waterbodies (canals for irrigation and drainage) and is part of the Strymonas river basin.

The June 2014 and October 2015 surveys demonstrated a consistent presence/absence of both species at each site; Aggitis spined-loach was found at all three sites and Greek brook lamprey only at sample site 3, the least modified of the watercourses, during both surveys. This suggests both species probably retain

[27] Taxonomically, this species was recently assigned to the genus *Caspiomyzon* (Barbieri *et al.*, 2015). For reasons of consistency, we have continued to use the scientific name used in previous TAP reports (*Eudontomyzon hellenicus*) in this report.

permanent populations in these locations. Unlike the loach which was present in low numbers at all, lamprey were not found at any of the 3 control sample sites.

In addition to measures to mitigate effects of increased siltation and to avoid aquatic pollution during construction, a detailed mitigation plan will be set out in the Ecological Management Plan (EcMP) which will set out the procedure for open cut sites to translocate fish from the crossing point to avoid injuring or killing fish.

4.10.2 Western section

In 2011 within the Western Section, approximately 2,877 fish specimens were collected from 11 sites comprising of 17 native and non-native species within the following major taxonomic families: Cyprinidae, Cobitidae, Nemacheilidae, Poeciliidae, Percidae, and Gobiidae. Across the four river basin areas approximately 60% of all known native primary freshwater species were recorded. Only three non-native species were observed Prussian carp (*Carassius gibelio*), eastern mosquitofish (*Gambusia holbrooki*) and stone moroko (*Pseudorasbora parva*). At the different rivers crossing points fish species compositions recorded varied from none to 11 species.

Three of the sites that were severely impacted by pollution and/or other anthropogenic pressures were recorded as having one or no fish species present. Electrofishing was used to sample upland river stretches where nearly all fish species known to be present in a river reach were recorded. In the four lowland reaches, a large proportion of the fish species known to be present were caught. The presence of a number of species was anticipated following literature reviews, however some of these were not recorded during surveys these include two species listed as 'Vulnerable' in the Red Book of Data Greece; the Ukrainian stickleback (*Pungitius platygaster*) isolated populations of which have been recorded in the Axios and Aliakmin drainages and *Salmo pelagonicus* which is found in the Aliakmon drainage and is threatened by introduced trout. Malamida was also found in the western survey section.

Based on the Preliminary Index of Biotic Integrity, out of the 24 rivers surveyed for the ESIA seven of them were deemed to be of good aquatic quality. Three of high quality, five of moderate, three of poor and five of bad aquatic quality. For three rivers this index could not be evaluated due to lack of validated data.

4.11 Herpetofauna

The abundance of lushly vegetated, high humidity ecosystems in Macedonia allows it to support a wide range of herpetofauna. It contains the highest number of amphibian taxa in Greece, with 13 of the 23 species found nationally being recorded. Macedonian herpetofauna is diverse and includes 14 snakes, 11 lizards, five turtles, nine anurans and three urodelan amphibians. However no Macedonian endemic species have been described, this is attributed to Macedonia's limited isolation as a result of its geomorphic continuity with the rest of the Balkans.

Most Greek reptiles are protected nationally via the Presidential Decree (PD) 67/1981 some are also recognised as species of community interest and therefore listed within Annexes of the EU Habitats Directive (92/43/EEC). Both tortoise species recorded here are listed in Appendix II of the Convention on International Trade in Endangered

Species of Wild Fauna and Flora (CITES). All Greek reptiles and amphibians are covered by the Bern Convention of European Wildlife and Natural Habitats.

Reptile and amphibian surveys were conducted in 2011 along the western, and in 2013 along the eastern, extents of pipeline route to inform the ESIA, these were supplemented with literature reviews. Surveys focused on the two species of terrestrial tortoise; Hermann's tortoise (*Testudo hermanni*) and spur-thighed tortoise (*Testudo graeca*).

In 2016 a desk based assessment was undertaken to address several commitments made in the ESIA relating to amphibians and reptiles along the pipeline route, primary survey data and published secondary data was used to identify survey requirements and identify mechanisms for implementation of the commitments. A summary of the findings of the surveys and the desk assessment is provided below as the pre-construction baseline.

4.11.1 ESIA surveys

During the survey of the pipeline route a total of 27 species, ten species of amphibians (i.e. 84% of expected species) and 17 reptile species (i.e. 59% of expected species), were recorded. The data range for tortoise presence was found to support findings from similar studies in other Mediterranean countries (Rouag et al., 2007 and references therein; Fernández-Chacón et al., 2011). Additionally in the western part of the study area previously unreported taxa, such as the Balkan wall lizard (*Podarcis tauricus*) and the green lizard (*Lacerta viridis*), were observed.

While no amphibian or reptile species of conservation interest were recorded during the survey of the pipeline project area crossing the River Evros,this does not preclude the potential for them to be found there. Three protected species were found in the Southern Evros; the Marsh frog (*Pelophylax ridibundus*) which along with the green lizard was found in abundance, and the Mediterranean spur-thighed tortoise.

Eight protected species were recorded in the Lowland of Evros. The marsh frog and green lizard were again found in abundance, Hermann's tortoise and the Mediterranean spur-thighed tortoise were both observed, along with Balkan terrapin (*Mauremys Rivulata*), three-lined lizard (*Lacerta trilineata*) and two snake species; Caspian whip snake (*Dolichophis caspius*) and grass snake (*Natrix natrix*).

Within the Komotini – Xanthi Plain, 16 protected species were found; including the green toad (*Bufo viridis*), yellow-bellied toad (*Bombina variegata*), common tree frog (*Hyla arborea*), smooth newt (*Lissotriton vulgaris*) and European grass lizard (*Pseudopus apodus*). Both species of tortoises were recorded as were both the Balkan and European pond terrapin (*Emys orbicularis*). The most abundant species were the Greek marsh frog (*Pelophylax kurtmuelleri*), the marsh frog and the green lizard. Four snake species were observed; Caspian whip snake, grass snake, Montpellier snake (*Malpolon insignitus*) and dice snake (*Natrix tessellata*).

Within the Kavala Mountains seven protected species were observed; green toad, Hermann's and Mediterranean spur-thighed tortoise, and four species of lizard; European grass lizard, three-lined lizard, snake-eyed lizard (*Ophisops elegans*), and again the most abundant was the green lizard. Five protected species were identified in

the Filippoi Plain of which the Greek marsh frog and green lizard were most abundant, the European pond terrapin, Balkan wall lizard, Caspian whip snake and grass snake were also observed.

In the Serres Plain 12 protected species were observed, again the most abundant were the Greek marsh frog and the green lizard. The green toad, yellow-bellied toad, Hermann's and Mediterranean Spur-thighed tortoise, Balkan and European pond terrapin were also recorded, as were four snake species; Caspian whip snake, Montpellier snake, grass snake and nose-horned viper (*Vipera ammodytes*).

The survey of the Kroussia Mountains found 11 protected species; common toad (*Bufo bufo*), fire salamander(*Salamandra salamandra*), Hermann's tortoise, Balkan terrapin, Erhard's wall lizard (*Podarcis erhardii*), Montpellier snake, grass snake, dice snake and nose-horned viper. The Greek marsh frog and green lizard were once again the most abundant species. No species of conservation importance were recorded in the survey area of either the Gallikos Plain or Axios Plain, this however does not preclude them from potentially being found in these areas in the future.

The Vermio Mountain Slopes was found to contain 11 protected species; yellow-bellied toad, Greek marsh frog, Greek brown frog (*Rana graeca*), fire salamander, Hermann's and Mediterranean spur-thighed tortoise, Balkan terrapin, three-lined, common wall (*Podarcis muralis*) and green lizards and grass snake.

Four protected species were found in the Ptolemaida Basin; the Balkan terrapin and three-lined lizard, green lizard and common wall lizard. In the Askion Mountain Slopes six protected species were recorded; Hermann's and Mediterranean spur-thighed tortoise, three-lined lizard, green lizard, common wall lizard and Caspian whip snake.

During the field study along the Kastoria-to-Border section ten protected species were observed, yellow-bellied toad, Greek marsh frog, Hermann's and Mediterranean spur-thighed tortoise, Balkan terrapin, three-lined, common wall, Balkan wall and green lizard, as well as the Caspian whip snake.

4.11.2 Summary

Hermann's tortoise and the Mediterranean spur-thighed tortoise, together with the European pond terrapin are the key species that were found within the study area. Hermann's tortoise was observed in 19 different locations and the Mediterranean spur-thighed tortoise in 21. Both species were more abundant in non cultivated areas that contained native plant species than in cultivated areas where the vegetation had been cleared. The European pond terrapin was recorded in eight different locations all of which were cultivated areas with a water body close by.

Although not recorded during the survey the Balkan Crested Newt (*Triturus karelinii*) is another key species, and its presence has been verified by research activities performed by the Management Body of the Koronia – Volvi National Park during 2013 (Strahinis 2013, unpublished data). It is listed in Appendix II of the Bern Convention, Annexes II and IV of the Habitats Directive and is a "Near Threatened" species in the Greek Red Data Book. The Balkan crested newt is also thought to be threatened by predation from the introduction of fish into local ponds where it reproduces.

Overall the poor species richness of the lowlands in the west section of the surveyed area was found to be contrasted by the diversity found within the mountainous sites, wetlands and rivers in the study area. Only two of the species recorded in the baseline survey, Herman's tortoise and the Balkan crested newt, are listed in the Greek Red Data book.

4.11.3 Post-ESIA assessment

The recent desk based assessment agrees that it is highly likely that important amphibian and reptile species occur in regions crossed by the TAP pipeline, both within an outwith of designated sites. A range of generic, and where necessary designated site specific, mitigation and habitat manipulation measures have therefore been identified to help ensure these species are not present within the working area during construction. Consideration has been given to the lack of existing data on pond locations along the route, their ephemeral nature and the requirement for flexibility in the final route selection and it has been deemed unrealistic to survey a true meaningful baseline for the entire route. Instead a mitigation strategy is being produced in the form of a method statement, complying with commitments GR0451, GR0452 and GR0476, which will be provided to the contractor for their Ecological Clerk of Works to implement. It will focus on per-construction surveys, vegetation clearing/right of way preparation and watercourse crossings. Where possible ponds encountered in the ROW will be microsited around, where avoidance is not possible ponds will slowly be dewatered outside of the breeding season and any amphibians translocated to a suitable receptor site as per Company Reptile and Amphibian Method Statements.

In order to meet commitments in GR0450, GR0453, GR0540 relating to establishment of a pre-construction baseline for the tortoises to support the Before-After-Control-Intervention (BACI) programme, observations/recordings are proposed to be undertaken by the contractor immediately prior to construction during preparation of the working width. This approach has been taken as baselines for mobile species will shift in the interim between the surveys and construction works commencing. The sex and GPS location of each tortoise encountered and moved will be recorded thus creating a meaningful baseline against which the success of mitigation can be measured.

5 BIODIVERSITY BASELINE - ALBANIA

A more detailed description of the survey methodologies applied along the pipeline corridor in Albania is provided in Appendix 7.

5.1 Habitat baseline

The eastern section of the pipeline corridor (KP0 to KP52) mostly comprises agricultural land plus some forest and scrub. Sites of conservation importance include the Trestenik Reservoir (dragonflies, fish, amphibians, aquatic reptiles and water birds), the Devolli River (otter, fish and birds) and the transboundary area (brown bear).

The central eastern section of the pipeline corridor (KP52 to KP102) is comparatively small with high species diversity owing to the available habitats (complex topography, variable soil types and hydrological conditions). There are three distinct types of climax vegetation: sclerophyllous broadleaf oaks and mixed broadleaf deciduous oak forests often degraded to transitional woodland scrub dominated by oriental hornbeam; mesophyllic broadleaf forests represented by beech forest; and sub-alpine grasslands. Other key habitat types include coniferous forests and riparian vegetation along the Osumi River.

There is good habitat for fauna, with good representation from all groups. Large mammals and carnivores, woodpeckers and other communities linked with old-growth forests are of special conservation interest nationally, regionally and internationally. This section is still considered part of transboundary area and hence is of special conservation interest.

There is sub-alpine natural grassland throughout but especially KP77–79 (habitat critical for rare, vulnerable or endangered species). This is a fragile ecosystem and, although modified by summer grazing, is still in good condition. Medium to high habitats of importance are provided by the Gjanci Reservoir (KP55-56) and a smaller reservoir at KP64, which support dragonflies, fish, amphibians, aquatic reptiles, water birds and otter. A large woodland area (stands of old-growth broadleaf forest) and grassland between KP89 and KP97 is of high importance, as it provides a wildlife corridor for large carnivores and habitat for protected and European priority species, e.g. five species of woodpeckers. Mature beech forest between KP68–79 is some of the most natural forest along the pipeline. Albania's Biodiversity Strategy and Action Plan (1999) proposes that the entire area between Vithkuqi and Ostrovica should be protected as an IUCN Category V Protected Landscape. Coniferous forest at KP63, KP65–67 and KP75 is of medium or high interest owing to the confirmed presence of a European Priority Habitat (Mediterranean pine forest with endemic black pine). The Terpollar re-route crosses mountain ridges in this region and also includes calcareous rocky screes on the mountain ridges, which is a highly sensitive habitat.

The central western section of the pipeline corridor (KP102 to KP171) also has high species richness owing to a diversity of habitats. Areas of special conservation importance are limited to

- forests dominated by evergreen oak (KP119–121)
- river habitat of the Osumi River with oriental plane, white willow, wig tree, mastic tree, prickly juniper and pennyroyal forming old-growth riparian forest of high ecological value
- canyons of the Osumi River near Corovoda city
- Bogova managed nature reserve (KP121)
- forests of significant interest for local communities, especially as a source of firewood.

This section is especially important for otters, with multiple confirmed sites including holts (protected under European legislation). Wolves are also a key species, although they are not as prevalent here as in the central eastern section.

The western section of the pipeline corridor (KP171 to KP211.5) comprises three ecosystem types: coastal, riverine and terrestrial. Coastal ecosystems have a rich diversity of habitats including lagoons, salt marshes, sand dunes, coastal coniferous forest dominated by *P. halepensis*, drainage channels and agricultural land. The dune systems are mostly eroding with sparse vegetation cover, so some of these ecosystems are becoming endangered in the region (such as European marram grass and sea daffodil). In an effort to halt coastal erosion, maritime species were planted 30–40 years ago and have had a significant impact on the dune landscape. These *P. halepensis* and *P. pinea* ecosystems are now considered a European Priority Habitat. Salt marshes support a variety of specialist plant communities and associated fauna, e.g. breeding and wintering birds, and often have high conservation value. The adjacent coastal plain now comprises poor-quality agricultural land criss-crossed by drainage channels (which have high vegetation richness). Although very much altered, the western section does support some natural and semi-natural habitats that host a relatively high number of species, some of which have commercial value. Water birds and other animals associated with wetlands are present in this section.

Coastal habitats at KP 207–211.5 are part of Corine biotopes, reflecting their ecological importance. Coastal lagoons and Mediterranean pine forests are of special interest and correspond to priority habitats in the Habitats Directive. Water bodies are of key significance for fauna, including the Semani River and Petrova Reservoir (providing habitat for otter, birds and other aquatic fauna). The pipeline passes between a mosaic of wetlands to the north and south that are of global importance (including a Ramsar wetland).

5.2 Flora and vegetation baseline

Data has been combined from the ESIA and post ESIA surveys to present the flora and vegetation baseline along the eastern and western sections of the TAP route.

Eastern section

Corine mapping indicates several European habitats within the eastern section, with seven nationally threatened flora species observed. Thirty-four species of plant with medicinal or aromatic value were observed, some of which are listed in the Albanian Red Data Book.

Approximately 374 plant species (>10% of Albanian higher plant total) are found within the central eastern section. Habitats include natural, semi-natural and modified habitats, including those used intensively for firewood collection and grazing. One mapped priority European habitat (Mediterranean pine forests with endemic black pine) and 16 other European habitats are noted within this section; field surveys also identified one further habitat. At KP 76-83[28] there are stands of primary beech forest that are considered of 'high-forest' condition, with glades of ungrazed alpine meadow within the forest. Both habitat types are known to support protected and European priority species. The beech forest at KP 69–83[29] is also notable as it includes high forest but also pollarded and coppiced woodland. Twenty-two flora species of national conservation concern were recorded, two of which are endemic. Two critically endangered species are associated with beech forest, of which one is threatened by unsustainable harvesting for use in natural remedies. This area supports 50 species of medicinal or aromatic value (11 of which are listed in the Albanian Red Data Book); the local population has a long history of harvesting these plants.

Western section

Within the western section there are two European priority habitats, plus 10 other European habitats. There are eight nationally threatened flora species, five of which are associated with beaches and sandy dunes. Thirty-nine flora species of medicinal or aromatic value were recorded, four of which are listed in the Albanian Red Data Book. The local population has a long history of harvesting these plants.

The natural and semi-natural habitats of greatest biodiversity value along the pipeline ROW are the European habitats identified in the ESIA[30], as listed in Table 13.

Table 13 European habitats along the pipeline ROW

Habitat code	Habitat description
1150*	Coastal lagoons
1310	*Salicornia* and other annuals colonising mud and sand
1410	Mediterranean salt meadows (*Juncetalia maritime*)
1420	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
2110	Embryonic shifting dunes
2270*	Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation
5110	Stable xero-thermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* pp)

[28] Note there has been a realignment of the pipeline between KP78 and KP90 since the ESIA was prepared, into less biodiverse habitat

[29] See previous

[30] These are habitats considered to be of European interest, as listed and described in Annex 1 of the Habitats Directive. Although not yet a member state, as a candidate EU country Albania is required to 'maintain favourable conservation status' of these habitats

Habitat code	Habitat description
5130	*Juniperus communis* formations on heaths or calcareous grasslands
5210	Arborescent matorral with *Juniperus* spp
6170	Alpine and sub-alpine calcareous grasslands
6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)
6520	Mountain hay meadows
72A0[31]	Reed beds (Phragmito-Magnocaricetea)
8120	Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)
8210	Calcareous rocky slopes with chasmophytic vegetation
8220	Siliceous rocky slopes with chasmophytic vegetation
9110	Luzulu-Fagetum beech forests
9130	Asperulo-Fagetum beech forests
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli
9170	Galio-Carpinetum oak-hornbeam forests
91F0	Riparian mixed forests of *Quercus robur, Ulmus laevis* and *Ulmus minor, Fraxinus excelsior* or *Fraxinus angustifolia,* along the great rivers (*Ulmenion minoris*)
91M0	Pannonion-Balkanic turkey oak-sessile oak forests
92A0	*Salix alba* and *Populus alba* galleries
92D0	Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*)
9340	*Quercus ilex* and *Quercus rotundifolia* forests
9530*	(Sub) Mediterranean pine forests with endemic black pine
9540	Mediterranean pine forests with endemic Mesogean pines

* denotes a Priority European Habitat, as included in Annex 1 to Directive 92/43/EEC

The following flora and vegetation surveys were undertaken post-ESIA:

- general pre-construction ecological walkthrough to ground-truth areas of the project that were not surveyed in detail as part of the ESIA and to confirm sites of ecological sensitivity
- surveys for early-flowering plants such as alpine plants in high-altitude areas were undertaken in spring 2015
- surveys for threatened flora species requiring translocation or seed collection prior to site clearing, for use in reinstatement were also undertaken in 2015

A total of 119 species that were not reported in the ESIA were recorded during the early-flowering plant surveys in 2015. Of these, 32 are considered exclusively early flowering. Ten species of Orchidaceae were recorded in the surveys. All orchids are

[31] Note this habitat type no longer appears on the EUNIS list of European Habitat codes

protected under Albanian law. No new Red List species were recorded, but additional populations of some species listed in the ESIA were recorded.

Flora species which appear to trigger critical habitat within Albania include:

- mountain tea (*Sideritis raeseri* subsp. *raeseri*), a perennial species endemic to the Balkans found in rocky habitats and open grassland. It is listed as Endangered on the Albanian Red List (2013). Surveys identified the presence of mountain tea within sub-alpine meadows between KP72 and KP97
- yellow monk's-hood (*Aconitum lamarkii*) is a tall, clump-forming, perennial herb native to southern Europe and occasionally found in cultivation. The species is listed as Critically Endangered in the Albania Red List (2013). Surveys identified the presence of yellow monk's-hood within beech forests from KP70 to KP90
- deadly nightshade (*Atropa belladonna*) is a perennial herb, perhaps most famous for its deadly-poisonous berries. It is listed as Critically Endangered in the Albania Red List (2013). The National Herbarium in Tirana has details of thirteen populations of this species which was confirmed within beech forests along the pipeline corridor in Albania
- Albanian lily (*Lilium albanicum*) is endemic to the Balkans and typically occurs in sub-alpine grasslands over 1,500 m a.s.l. It is a specialist of serpentine soils. Data in the National Herbarium in Tirana shows there are 28 known populations in Albania and it is listed as Endangered on the Albanian Red List (2013), having been downgraded from 1995 when the species was classified as Critically Endangered. Surveys identified the presence of Albanian lily in sub-alpine meadows between KP72 and KP97
- serpentine false-brome (*Festucopsis serpentine*) is endemic to Albania although it is not listed as a threatened species. It typically occurs in sub-alpine grasslands over 1,500 m a.s.l, and is a specialist of serpentine soils. Data in the National Herbarium in Tirana shows there are 18 known populations in Albania. Surveys identified the presence of serpentine false-brome in sub-alpine meadows between KP72 and KP97

5.3 Terrestrial fauna baseline

Eastern section

This is the least sensitive in terms of fauna diversity and ecological sensitivity, as it is a highly disturbed area. One hundred and thirty-three vertebrate species were recorded, of which 22 are nationally threatened and six are globally threatened. Herpetofauna is relatively poor: ten amphibians and 11 reptiles were expected to be present (three and six were observed during field surveys). Thirteen (ten and three) are aquatic; the remainder are terrestrial. The most important habitats within this section are watercourses and bare rock (KP 22–23). Two reptiles are globally threatened; one amphibian is nationally vulnerable.

There were a low number of birds, with 63 species likely to be present (45 observed during field surveys). Those not observed but likely to be present are mostly wintering or migratory species. One species is globally threatened, while 14 are nationally threatened. The pygmy cormorant is considered critically endangered in Albania. Habitat preference for bird species varies between forest/woodland habitat, scrubby terrain, wetlands (including dams) and human settlements. The largest number of species was associated with open grassland, which is the largest habitat in this section.

Thirty-nine mammal species were likely to be present (22 observed during field surveys); mostly bats and rodents, followed by carnivores, and including one aquatic

(otter) species. Most species prefer forests and shrubs, then grasslands and caves (no caves on pipeline route but several within 1–3 km, and bats do use pipeline corridor for foraging). One species is globally threatened; five are nationally threatened (including bear and jackal). Large carnivores include brown bear and wolf, with the former in particular causing damage to crops and livestock (partly due to an increase in population in the Greek part of the transboundary area). Cangonji gorge crossing apparently acts as a wildlife corridor for large carnivores although no evidence of this was observed. Otters were observed in two locations; this is a primary focus species in national nature conservation strategies.

Central eastern section

This richest in terms of fauna diversity, with 243 species recorded, of which ten are globally threatened and five are regionally threatened. There is relatively rich herpetofauna: 12 amphibian and 19 reptile species are likely to be present (of 16 and 37 in the country, respectively), with 11 and four directly observed during field surveys. This is the only section where alpine newts have been observed and where there is presumed presence of European viper. Fifteen species (13 + 2) are aquatic and two reptiles are globally threatened (IUCN Vu).

A range of habitats provides food and shelter for birds during winter, breeding season or migratory stop-overs. One hundred and fifty-two species are likely to be present, of which 114 were observed during field surveys. Forty-seven species are closely linked with high forest fragments, 61 with open grassland and scrub, 29 with wetland habitat, 13 with rocks and cliffs, and seven with human settlements. Two species are globally threatened; 27 species are nationally threatened. Most of the threatened species are birds of prey, including golden eagle. Old growth forests and reservoirs in this section are considered sensitive and critical habitats for birds. KP 65–81[32] is particularly important for birds.

A total of 56 mammal species (out of 69 terrestrial species known in Albania) were recorded, of which 28 were observed during field surveys. Most were rodents, followed by bats and carnivores. Two species, lynx and snow vole, are considered extinct or very rare. One bat species is globally threatened, there are regionally threatened and nine are nationally threatened. Almost half the species present favour forests and shrubs, followed by caves, grasslands and urban areas; two are aquatic. There is special conservation interest (nationally and regionally) owing to the presence of large carnivores (brown bear, wolf and wildcat). Old-growth stands, dominated by beech forests and mixed stands of beech and fir, and sub-alpine meadows, are important habitats for large mammals and carnivores. Lynx are very unlikely to be present now but were still noted ~20 years ago. The central eastern section represents the south-eastern part of brown bear distribution in Albania, and the southern Balkans are very important in the national and regional (Balkan) context. Within this section, otters were found in Osumi River and Gjanci Reservoir. Regenerating beech forests in this section are a refuge for large mammal populations (especially KP 65–81). Brown bears are actively reproducing in this area.

Central west section

[32] See previous

Herpetofauna in the central west section is relatively rich: 12 amphibians and 23 reptiles likely to be present, of which 11 and 15 were observed during field surveys. The same 15 species as in the central eastern section are considered aquatic; the remainder is terrestrial. The bare rock habitat is particularly important for reptiles. Two reptile species are globally threatened and two are threatened nationally.

With regards to birds, 136 species are likely to be present, of which 113 were directly observed. Forty-two species are closely linked with forests, 62 with open grassland and shrub, 16 with wetlands, nine with rocks and cliffs, and seven with human settlements. Two species are globally threatened and 24 nationally threatened. Two species are considered critically endangered in Albania, associated with cliffs and bare rock in the Osumi River valley. Most threatened species are birds of prey.

Fifty species of mammal likely to be present, of which 29 were confirmed during field surveys. Half prefer forests followed by caves, grassland and human settlement, with one aquatic species. The area has special conservation interest owing to the confirmed presence of wolf, otter and wildcat; brown bear is possible but was not observed. There were no signs of otters at the only crossing of the Osumi River in this section. No mammals are globally threatened, but nine are nationally threatened. Threatened species are mostly associated with forests or aquatic environments.

Western section

Here 254 vertebrates were recorded, making this the second highest richest of all sections. The section is also particularly noted for its bird diversity. Seven species are globally threatened and two are regionally threatened; 50 vertebrates and 17 invertebrates are nationally threatened.

Herpetofauna is relatively rich: nine amphibian and 22 reptile species are likely to be present, with nine and 14 observed during field surveys. Thirteen species are aquatic, the remainder terrestrial. Habitats of particular importance include pine forest (KP 207–209), farmland, olive groves and grassland are also of importance, more so for reptiles than amphibians which favour the numerous ditches and drainage channels throughout the study area. The same two globally threatened reptile species as the central western section, one amphibian and two reptiles are nationally threatened.

Of the 175 bird species present 106 were observed during field surveys. Almost half of these are linked directly to wetland habitats, followed by grassland, forests and human settlements. Three species are globally threatened and forty-one are nationally threatened. Seven species are considered critically endangered in Albania, most of which are linked with coastal ecosystems. Sensitive habitats for birds include coastal lagoons north and south of the pipeline, marshland (KP 207–209) and reservoir at KP 190.

An estimated 33 mammal species are likely to be present, dominated by rodents, bats and carnivorous species; 23 species were observed during field surveys. There is relatively poor diversity compared with other sections, probably due to the highly modified and relatively homogenous nature of habitats. Habitats in the section of importance for mammals include forests, grassland, military tunnels (bats) and human settlements, with one aquatic species present. No species are globally threatened, but five are nationally threatened. Otter were confirmed at both crossings of the Semani

River as well as at several reservoirs. Jackal and badger were both confirmed. No large carnivore survey was undertaken, as they were not considered likely to be present.

5.4 Post ESIA terrestrial fauna baseline

Following submission of the ESIA a number of terrestrial ecological surveys have been undertaken in Albania to fulfil commitments made in the ESIA. The purpose of the surveys was to provide supplementary data perceived to be missing from the ESIA (e.g. surveys at the optimum time of year) or to validate data currency (with five years generally being accepted as the maximum age for reliability). The surveys undertaken include the following:

- general pre-construction ecological walkthrough to ground-truth areas of the project that were not surveyed in detail as part of the ESIA and to confirm sites of ecological sensitivity
- large carnivore surveys for brown bear and wolf were undertaken in 2015 in areas of the pipeline corridor mapped as potentially suitable habitat, in both spring and autumn
- surveys to identify locations where wildlife currently cross the pipeline corridor in order to identify locations where contractor should install fauna crossings during reinstatement
- targeted otter surveys were undertaken in 2015 in locations considered to be potentially important for otters to confirm their presence/abundance and suitability of pipeline crossing locations.
- bat surveys of military tunnels, caves and other potential roost sites within proximity to the pipeline, particularly in areas where rock blasting may be required were undertaken in 2015
- migratory and breeding bird surveys in 2015 in order to record any important assemblages and identify any particular areas of interest.
- surveys to identify important feeding areas for pygmy cormorant and little egret were also undertaken in 2015

5.4.1 Large carnivores

The pipeline route between the village of Floq in Korça and Poliçan in Skrapar passes through mountainous terrains characterised by prevalence of natural forests, scrublands and open landscapes (pastures). These natural and semi-natural habitats are home to a number of wildlife species and in particular have documented presence of large carnivores. Three large carnivore species are present in Albania, namely brown bears (*Ursus arctos*), wolves (*Canis lupus*) and lynx (*Lynx lynx*). According to the existing literature at least two of them, brown bears and wolves, occur in the central and eastern sections of the TAP pipeline route in Albania (Bego et al., 2002; Chapron et al., 2014; Kaczensky et al., 2013; Trajçe et al., 2008). The presence of lynx in the region remains unlikely as thus far, including the 2015 surveys detailed here, there isn't any hard evidence from field-surveys and literature.

The TAP field surveys carried out in 2009, 2011 and 2012 for the ESIA preparation as well as the large carnivore-specific surveys undertaken in autumn 2013 and spring 2014, confirmed the presence of bears and wolves in the region. Specifically, for the final pipeline route, the ESIA field assessments in 2011 and 2012 found a series of large carnivore signs in the eastern, central eastern and central western sections as considered in the ESIA. These were further supported by signs found during the 2013-

14 surveys for the assessment of access roads, campsites and pipeyards in these sections.

Previous work conducted in the frame of ESIA surveys and large carnivore specific surveys assessed the suitability of habitats along the TAP pipeline for presence of bears and wolves. Areas of interest for large carnivores are considered to be the sections between KP 0 – KP 5 and KP 51 – KP 123, where presence of large carnivores has been consistently documented during all surveys from 2009 to 2014. In addition, a potential corridor for large carnivores movements, between KP 21 – KP 23, has been identified through previous surveys, based on the geographical proximity of two larger distribution areas of large carnivores (Morava and Mali i Thatë/Prespa) known through published research.

The 2015 surveys were conducted in order to re-assess the suitability of habitats evidenced so far for large carnivores throughout the TAP pipeline in Albania. One of the most important aims was to clearly identify sections along the route that are of importance for the reproduction of bears and wolves, such as denning and hibernation sites. As such, assessment was focused not only on habitat evaluations of suitability for reproduction on a landscape macro-level but also on a landscape micro-level to identify possible dens and denning areas. In these surveys, a camera-trapping methodology was employed as a novel approach compared to previous surveys. The use of camera-traps improved the identification and classification of probable core areas for wolves and bears and represented a clear methodological advantage compared to surveys conducted in the past. Results for the 2015 large carnivore surveys are presented in Table 14.

Plate 5 Brown bear captured on camera in 2016

In terms of overall habitat quality, the section between KP 78.4 and KP 84 provided better opportunities for foraging, commuting and denning. A possible denning site was identified at the rocky formations near and around KP 65.

A newly opened road along the ridge between KP 73 and KP 77, which follows the latest route of the pipeline and leads directly to the start of the 2015 re-route in this section, plus logging activities at the end of it, had significantly reduced the habitat quality along this section of the pipeline. This road was opened in summer 2014 (according to accounts from locals) and for opening it large parts of the forest were bulldozed through. In this regard, the importance of these habitats for large carnivores had significantly dropped compared to findings from previous surveys.

Habitats along the 2015 re-route were assessed on their suitability for large carnivores during ecological walkovers earlier that year. The majority of the area was considered sub-optimal for large carnivores due to the abundance of open areas, active erosion areas and degraded scrubland. However, there were denser patches of vegetation between KP 85 and KP 86 which could provide sheltering or foraging opportunities for both species. Given the proximity of this part of the route to known areas of importance for large carnivores (i.e. KP 74 – KP 85 of the old route) it was unsurprising that evidence of wolf and bear activity was found along the new route.

Table 14 Habitat assessment for bear (B) and wolf (W) in 2015

Section	Brief description	Foraging suitability		Commuting suitability		Denning suitability		Potential sites for dens found		Existing human disturbance
		B	W	B	W	B	W	B	W	
KP 0-5	Open agricultural area close to human settlements. Arable land planted with perennial crops, cereal and fruit tree plantations. Constant presence of livestock from nearby villages	High	High	Low	Low	Low	Low	No	No	High
KP 61-63.5	Mountainous habitats with mixed pine, oak and beech forests and meadows/sub-alpine pastures. Beech is largely coppice and regenerating from previous logging. Constant presence of livestock grazing.	Med.	High	High	High	Low	Low	No	No	High
KP 63.5-65.5	Mountainous habitats characterised by beech coppice and open rocky areas. Steep rocks and rocky formations at Kp.65	Med.	Med.	High	High	High	High	Yes	Yes	Medium
KP 65.5-70.2	Largely alpine and sub-alpine grasslands with small patches of pine & beech forests. Pastures largely grazed by livestock during summer.	Low	High	Med.	Med.	Low	Low	No	No	Medium
KP 70.2-71.5	Dense beech coppice with limited accessibility. High	Med.	High	High	High	Med.	Med.	No	No	High

Section	Brief description	Foraging suitability		Commuting suitability		Denning suitability		Potential sites for dens found		Existing human disturbance
		B	W	B	W	B	W	B	W	
	human disturbance due to presence of quarry nearby.									
KP 71.5-72.6	Largely alpine and sub-alpine grasslands. Pastures largely grazed by livestock during summer.	Low	High	Med.	Med.	Low	Low	No	No	High
KP 72.6-73.3	Dense beech coppice with limited accessibility particularly between 73-73.3.	Med.	High	High	High	Med.	Med.	No	No	Low
KP 73.3-74	Beech coppice. Newly opened forest road for logging has destroyed much of the previous good habitats and goes along the pipeline route. No suitable areas for dens due to road opening, but slopes (particularly N slope) might have potential sites nearby. Presence of grazing livestock during summer.	Med.	High	High	High	Low (but slopes have med. Suit.).	Low (but slopes have med. Suit.).	No	No	High
KP 74-74.5	Open beech coppice. Regenerating forests that have been logged ca. 20-30 years ago.	Med.	High	High	High	Med.	Med.	No	No	Medium
KP 74.6-77.2	Beech coppice. Newly opened forest road for logging has destroyed much of the previous good habitats and goes along	Med.	High	High	High	Low (but slopes have med.	Low (but slopes have med.	No	No	High

Section	Brief description	Foraging suitability		Commuting suitability		Denning suitability		Potential sites for dens found		Existing human disturbance
		B	W	B	W	B	W	B	W	
	the pipeline route. No suitable areas for dens due to road opening, but slopes (particularly N slope) might have potential sites nearby. Presence of grazing livestock during summer.					Suit.).	Suit.).			
KP 77.2-77.9	Extensively logged beech forests / almost clear cut. This parcel was cut after the opening of the new road along the ridge. Used to be primary beech forest habitat before logging	Low	Low	High	High	Low	Low	No	No	High
KP 123-127	Largely open agricultural hilly area with perennial crops, cereal, and fruit tree plantations. Mediterranean scrubland surrounding agricultural fields. Constant presence of livestock.	High	High	Med.	Med.	Low	Low	No	No	High

5.4.2 Otter

During preparation of the TAP Albania ESIA, literature review and general ecological walkovers identified sites in proximity to the pipeline that could potentially support otters however targeted otter surveys were not undertaken. In August 2015, specific surveys for otters were undertaken in watercourses and water bodies (such as reservoirs) identified in the ESIA as likely to provide habitat for otters, in addition to all watercourses crossed by the pipeline that could support otters throughout the year. The main purpose of the 2015 surveys was to confirm otter presence (or likely absence) and, more importantly, to identify whether any of the pipeline watercourse crossing locations are likely to support otter holts (underground resting sites) and/or couches (day nests). The results of the surveys are presented in Table 15.

Table 15 Otter survey results

Survey ref. from ESIA	Watercourse /water body	Otter presence confirmed in ESIA (Y/N)	Otter presence confirmed in 2015 (Y/N)	Suitability for holts within survey area (Y/N)
Z-019 and Z-067	Gjanci water reservoir (near KP57)	Yes: key habitat for otters with 42 excrement sites and 89 excrements observed **Update (November 2011 survey):** Otters are present, although reservoir water level has dropped significantly. Otter marking activity is still high.	Yes, otter spraints indicate that the reservoir is still used (and used in June/July).	No (only possible day nesting, but reservoir not crossed by route)
Z-011	Small water reservoir near Markeze Forest (near KP62)	Yes: important site for otter including high density of territorial markings	No	No
Z-013	Large water reservoir near Markeze forest (near KP61)	Yes: very important site for otter including high density of territorial markings	Yes: single fragment of old spraint	No
Z-015	Upper Osumi River (near KP59)	Yes: important site for otter including otter spraints	No	No (only possible day nesting on western bank)
Z-016 and Z-017	Dunaveci River (near KP52)	Yes: otter footprints and excrements observed in two places along the river from the crossing point towards south (upstream)	Yes: evidence of otter activity on the river, but outside survey area	No
Z-061	Devolli River watercourse (Bilisht) (near	Yes: otter habitat including otter signs observed	Yes	No (only possible day nesting, but not at pipeline crossing point)

Survey ref. from ESIA	Watercourse /water body	Otter presence confirmed in ESIA (Y/N)	Otter presence confirmed in 2015 (Y/N)	Suitability for holts within survey area (Y/N)
	KP9)			
Z-065	Devolli River watercourse (Zemblaku). (near KP22)	No: otter habitat grade 2	Yes	No (only possible day nesting, but not at pipeline crossing point)
Z-034	Osumi River crossing (south of Corovoda). (near KP104)	Yes: otter habitat grade 3 **Update (November 2011 survey):** otter presence confirmed	Yes	No
Z-036	Vokopola River crossing (near KP127)	Yes: otter habitat grade 2 **Update (November 2011 survey):** otter presence confirmed	Yes	No (only possible day nesting outside of survey area)
Z-037, Z-038, Z-039, Z-041	Osumi River crossing (near Fushe-Peshtan village) (near KP138)	Yes: otter habitat grade 3 **Update (November 2011 survey):** otter presence confirmed). Highest marking activity for otters. Most important section for feeding and breeding	Yes	No
Z-029	Osumi River crossing (near Hoxhaj village) (near KP140)	No: otter habitat grade 2. No otter signs observed	Yes, but outside of survey area	No
Z-022, Z-023, Z-026, Z-025, Z-024, Z-028	Osumi River-Otllak (near KpP161)	Yes	Yes, but outside of survey area	No
Z-045 and Z-046 (Z-042, Z-043, Z-047, Z-044 now outside 500 m corridor)	Semani River crossing (near Suk i Poshtem and Kallmi villages) (near KP185)	Yes	Yes, but outside of survey area	No
Z-057, Z-056, Z-054, Z-055	Semani River crossing (near Libofshe	Yes	Yes, but outside of survey area	No

Survey ref. from ESIA	Watercourse /water body	Otter presence confirmed in ESIA (Y/N)	Otter presence confirmed in 2015 (Y/N)	Suitability for holts within survey area (Y/N)
	village) (near KP198)			
Z-053	Main drainage channel (near Topojan village) (near KP213)	Yes: confirmed during 2011 surveys	Yes	No (but suitable holt habitat in nearby dunes is connected to the drainage channel by secondary channels)

5.4.3 Bats

Specific surveys for bats were not carried out during preparation of the TAP Albania ESIA and the document contained few references to bats overall. Little research has been undertaken on bats in Albania however EUROBATS lists 32 confirmed species in Albania (Bego and Théo, 2014), almost half of which are cave-dwelling bats. Bats are protected under the Albanian Law on Biodiversity (no. 9587 of 2006) and the Albanian Red List contains 16 species of bat. Several caves in Albania that are important bat roosts have been designated as Natural Monuments.

It was noted during the ecological walk-through undertaken for TAP in March 2015 that the large quantity of former military bunkers and tunnels surrounding the pipeline route, in addition to cave formations within extensive areas of limestone, could provide ideal roosting habitat for bats. Between June and December 2015, underground structures in proximity to the proposed pipeline between Skrapar and Fier were surveyed on a number of occasions covering the maternity, swarming and hibernation seasons. Surveys were undertaken by Dr Philippe Théo (University of Tirana) accompanied by local and UK-based ecologists.

Twenty-nine structures were surveyed in total, of which 22 contianed evidence of bats (Table 16). Two confirmed maternity sites were identified, with a possible third maternity site unconfirmed. In addition, 10 hibernation sites and one swarming site were identified.

One former military tunnel (#8) near KP 166 (near the village of Pashalli, in the Berati region) is considered to be a site of national importance for bats in Albania. Seven species of bat were identified, including Mediterranean horseshoe bat (*Rhinolophus euryale*) which is listed as Vulnerable on the Albanian Red List (Bego and Théo, 2014) and Blasius's horseshoe bat (*R. Blasii*), which is listed as Lower Risk – Near Threatened. The site also supports important assemblages of Schreiber's bat (*Miniopterus schreibersii*) and long-fingered bat (*Myotis capaccinii*), which are listed as Vulnerable on the IUCN Red List (IUCN, 2015).

One military tunnel is directly intersected by the pipeline route and another three sites (one military tunnel and two bunkers) are within 100 m of the pipeline (Plate 6).

Plate 6 Military tunnels

Table 16 Bat survey results

Name	Region	Grid coordinates and nearest pipeline KP[33] / access road	Species present (number) and month	Description
Military bunker 1	Berat	N 40.78144 E 19.82429 KP169	**June** 55 *R. ferrumequinum* 1 *R. hipposideros* **July** No survey **September** 80 *R. hipposideros* **December** 18 *R. ferrumequinum*	This site comprises a network of tunnels linking several bunkers. A large quantity of guano (droppings) was observed, highlighting the use of the site over a long period as a maternity roost and a hibernation roost.
Military bunker 2	Berat	N 40.74092 E 19.89776 KP159	**June** 1 *R. ferrumequinum* No further surveys	From the six former bunkers identified in this zone, only one was not destroyed. Considering the quantity of guano found on the floor, this site is

[33] Based on the pipeline alignment dated 06-11-2015

Name	Region	Grid coordinates and nearest pipeline KP[33] / access road	Species present (number) and month	Description
				only used by individual bats.
Military bunker 4	Berat	N 40.77025 E 19.86702 KP165	**June** 3 *R. hipposideros* No further surveys	This bunker is partially destroyed. However, a 10cm access allows bats to use the large rooms in another part of the bunker.
Military bunker 5	Berat	N 40.78392 E 19.79444 KP172	**June** 2 *R. hipposideros* No further surveys	This bunker is part of a network of nine bunkers, on the road to Fier.
Military bunker 6	Berat	N 40.78404 E 19.79582 KP171	**June** 9 *R. hipposideros* **September** 3 *R. hipposideros* 1 *R. ferrumequinum* **December** 1 *R. hipposideros*	This bunker is part of a network of nine bunkers, on the road to Fier.
Military bunker 7	Berat	N 40.78382 E 19.79586 KP171	**June** 1 *R. ferrumequinum* **September** None **December** 1 *R. ferrumequinum*	This bunker is part of a network of nine bunkers, on the road to Fier.
Military bunker 10	Lapardha, Berat	1st bunker N 40.755077 E 19.951685 4th bunker N 40.755361 E 19.952053 KP154	**June** 1 *R. hipposideros* in 1st bunker 1 *R. ferrumequinum* in 2nd bunker **July** 1 *R. ferrumequinum* in 1st bunker	This site comprises four bunkers in a row.
Military bunker 11	Fier	1st bunker N 40.791423 E 19.590522 4th bunker N 40.792241 E 19.590771 KP193	**June** 1 *M. myotis OR M. blythii* (in 1st bunker) 1 *Pipistrellus* sp. in 3rd bunker **July** 1 *M. myotis OR M. blythii* in 4th bunker	This site comprises four bunkers in a row.

Name	Region	Grid coordinates and nearest pipeline KP[33] / access road	Species present (number) and month	Description
Military bunker 15	Skrapar	N 40.500372 E 20.226142 KP104 / AR304	**July** 2 *R. ferrumequinum* 1 *R. hipposideros* 8 *R. euryale* **December** 2 *R. ferrumequinum* 4 *R. hipposideros* 7 *R. euryale/blasii*	This site comprises four bunkers in a row. It is close to the Osumi River, which is used by local people for swimming.
Military bunker 16	Skrapar	N 40.519055 E 20.250523 KP100 / AR439	**July** 1 *R. hipposideros* No further surveys	This site comprises 11 bunkers in a row, all of which are blocked by doors. However, a single bat was observed in one of the tunnels connecting the different bunkers.
Military bunker 17		N 40.783994 E 19.795339 KP171	No previous survey **December** 2 *R. ferrumequinum* 1 *R. hipposideros*	
Military bunker 18	Skrapar	N 40.501549 E 20.226100 KP104 / AR304	No previous survey **December** 1 *R. euryale/blasii*	A *R. hipposideros* was recorded in early October by local people.
Military tunnel 1	Fier	N 40.779378 E 19.793894 KP171	1 *R. ferrumequinum*	This tunnel is built directly on the sandy rock and is approximately 100 m long.
Military tunnel 2	Berat	N 40.77508 E 19.84570 KP166	**June** None **September** 1 *R. ferrumequinum* **December** None	A 50 m tunnel mainly used by micro-mammals and badger.
Military tunnel 3	Berat	N 40.77541 E 19.84558 KP166	**June** 1 *R. ferrumequinum* **September** 1 *R. ferrumequinum* **December** None	This tunnel is 100 m long. The site could be used as a hibernation site by a small number of bats.
Military	Lapardha,	N 40.753429	**June**	This tunnel is important

Name	Region	Grid coordinates and nearest pipeline KP[33] / access road	Species present (number) and month	Description
tunnel 4	Berat	E 19.939583 KP155	3 *R. ferrumequinum* 2 *R. hipposideros* **July** 2 *R. ferrumequinum* **September** 11 *R. ferrumequinum* 1 *R. hipposideros* **December** 2 *R. ferrumequinum* 1 *R. hipposideros*	for *Rhinolophus* species all year round, including as a hibernation site.
Military tunnel 5	Fier	Entrance one : N 40.78068 E 19.79378 Entrance two: N 40,78204 E 19,79506 KP172	**July** 2 *R. ferrumequinum* **September** 15 *R. ferrumequinum* 1 *R. hipposideros* **December** 1 *R. hipposideros*	This tunnel is composed of three entrances. One is totally blocked by the vegetation, one is blocked by fallen rocks, and the last one is still accessible. The tunnel is at least 400 m long. This tunnel is important for *Rhinolophus* species all year round, including as a hibernation site.
Military tunnel 6	Skrapar	N 40.629168 E 20.0632660 KP132 /AR471	**September** None **December** None	Small tunnel on the entrance to Mbrakull village. Data from other sources identify one *R. ferrumequinum* in early September.
Military tunnel 7	Skrapar	N 40.486111 E 20.3722222 KP89 (AR460)	**September** 1 *R. ferrumequinum*	Data from other sources identify one *R. ferrumequinum* in early September.
Military tunnel 8	Berat	N 40.77141 E 19.84602 KP166	**June** 8 *M. myotis/blythii* scattered in cave Small *Myotis* heard but not seen **July** No internal survey, only mist netting **September** *c.*300 middle size *Rhinolophus*. Likely to be both *R. euryale* and *R.*	This tunnel is important for bats all year round, including as a hibernation site and a swarming site. This site supports seven species of bat and significant numbers of rare species for Albania.

Name	Region	Grid coordinates and nearest pipeline KP[33] / access road	Species present (number) and month	Description
			blasii *c.*400 *M. capaccinii* *c.*500 *M. schreibersii* 1 *R. hipposideros* 10 *R. ferrumequinum* 12 *M. myotis/blythii* **December** 7 *M. schreibersii* 64 *R. euryale/blasii* 2 *R. ferrumequinum*	
Pirogosh cave	Skrapar	N 40.524972 E 20.259642	**June** *c.*200 *R. ferrumequinum* *c.*150 *R. euryale* *c.*1000 *M. schreibersii* *c.*200 *M. capaccinii* **July and September** No survey **December** 19 *R. euryale/blasii*	This site is well documented as an important bat roost in the centre of Albania. This site will not be directly affected by the TAP route but it was visited in order to gain some knowledge of the bat population diversity in the local area.

5.4.4 Birds

At Petova Reservoir, the only species recorded during the breeding bird survey in 2015 that could be affected through disturbance (given the distance between the pipeline and the reedbed) was marsh harrier (*Circus aeruginosus*). A single individual was recorded coming to roost within the reedbed. At Petova Reservoir, the wetland habitat is rare within the locality and supports a wide range of breeding bird species.

At Topoja-Seman, several migratory species were recorded. The majority of water birds were recorded as flyover species e.g. egrets and pelicans flying north and south along the coastline. Only limited numbers were recorded at the site, probably because there are more open areas of water approximately 1 km to the north (part of the Semani River delta). Within the pipeline corridor, passerines such as wheatears, larks and wagtails were recorded feeding. The breeding birds species identified at Topaja-Seman are limited by the coastal vegetation present (typically salt marsh with scattered scrub, beach and sand dune and pine trees). However, the Topaja-Seman site does support some interesting and nationally rare species such as great spotted cuckoo (*Clamator glandarius*) and European nightjar (*Caprimulgus europeus*).

Based on the survey, it was apparent that the coastal habitat acts as a corridor to migratory species as expected in the Adriatic flyway. However, numbers within the site are limited compared to more expansive areas such as open water to the north (Semani

River delta) and the known ornithological hotspots of Karavasta Lake (12 km north) and Narta Lagoon (22 km south).

No pygmy cormorant (*Microcarbo pygmeus*) roosts or congregations of little egret (*Egretta garzetta*) were observed at the thirteen river crossings surveyed.

5.5 Aquatic ecology baseline

The majority of watercourses in Albania have been poorly studied and relatively little is known of their ecology and the flora and fauna residing in them. It is widely accepted that anthropogenic activities have been detrimental to many watercourses in Albania, with river mining (e.g. gravel extraction) and other construction activities resulting in high suspended sediment loads and siltation of gravel areas, which may offer spawning habitat for many fish species. The following sections are from the ESIA surveys.

Eastern section

The Devolli River catchment is within intensively cultivated areas and rural settlements. There was limited flow during the surveys, with the natural habitat being altered by agriculture and use of water for irrigation. River mining in Devolli/Bilishti Rivers has resulted in flow modification with the creation of pools and backwaters. Only the Dunaveci stream is not affected by anthropogenic activities, and has high diversity and abundance of benthic communities compared to the Bilishti and Trestenik sections. Nonetheless, the overall river system had high diversity of aquatic plants and is considered a habitat of high ecological value. Benthic diatoms are dominated by pollution-tolerant species and are generally indicative of running waters. Fish are affected by human activities, particularly river mining: 10 species were observed. Both the Devolli/Bilishti River and Dunaveci stream are considered of high importance.

Central eastern section

The Osumi River is narrow with clear flowing water. It has a gravel bottom and is heavily shaded by riparian vegetation (common alder and white willow). There is good representation of aquatic plants. Some erosion is present, most likely to be due to livestock, but otherwise the bank is relatively undisturbed. There is high diversity and abundance of macroinvertebrates.

Qafa Creek is a tributary of the Osumi with highly seasonal flow and a stony/clayish riverbed. No aquatic macrophytes were found but banks support European hop hornbeam and Turkey oak. There are also several watercourse channels within the Potom area, all tributaries of the Osumi River, and a reservoir within 200 m at KP 84. Watercourses recorded low flows during the survey, with riparian vegetation dominated by oaks, hornbeam and willow and surrounded by mosaic agricultural plots on both sides. Fish diversity is poor (only two species recorded), with salmonids at limit of existence due to human intervention and illegal activities (such as fishing with chlorine and dynamite). Both pipeline-crossing points are rated as medium importance for the high-quality habitat for macroinvertebrates and plants, and ecological services for large carnivores.

Central western section

Two distinct habitat types belong to the Osumi River and its tributary Vokopola stream. There is turbid water and no true macrophytes. Riparian vegetation is dominated by Oriental plane, tamarix, willow and mastic trees. There is average species richness and abundance of macroinvertebrates. This is a slightly to moderately impacted environment, perhaps relating to agricultural activities in the area. Sixteen species of fish were caught, with a further two species likely to be present. Eel is present, which is critically endangered according to the IUCN Red List. Some non-natives species such as Chinese carp (possibly escaped from aquaculture nearby) are present. Gudgeon was recorded in the Semani River for the first time. The presence of protected fish species, the diversity and abundance of fish in Osumi River and the relatively intact macroinvetebrate community means that all four river crossings in this section are considered of high importance.

Western section

This section of the Semani River is a typical lowland river that is wide, turbid and deep with moderate flow and muddy sediments. Surrounding land use (agriculture) has affected riparian vegetation, which is restricted to a narrow strip dominated by white poplar and white willow. Macrophytes are generally scarce. The phytobenthic community is indicative of highly polluted habitats, including nutrients such as phosphorous (possible discharge of waste from Fier). Only one site was sampled for fish, with five species found and a further eight likely to be present. Eel was recorded but is considered to be in decline, particularly due to fishing (dynamite, chemicals, poisoning), pollution and habitat loss (gravel extraction). The Semani River in this section is assessed as low quality but still considered high importance to nature conservation as a major conduit for fish species in southern Albania.

5.5.1 Aquatic ecology

The surveys undertaken as part of the ESIA (detailed above), included assessments for fish, macroinvertebrates, macrophytes and diatoms at 13 of the more ecologically sensitive pipeline watercourse in Albania. However, detailed habitat mapping was not undertaken during this exercise or aquatic ecological surveying at any of the pipeline road crossings. Post ESIA:

- aquatic ecology and fish surveys for pipeline and/or access road crossings of sensitive watercourses were undertaken in 2015 to inform mitigation measures required for sensitive ecological features.

Eighteen watercourse crossing points (pipeline or access road) were surveyed in September 2015 and habitats mapped in detail along a 1km stretch (250m upstream and 750m downstream). In addition, electro-fishing was carried out at five crossing points where endemic fish species were known or considered likely to occur, based on the literature review. The aim of the surveys was to provide information on the potential sensitivity of the watercourses to guide construction activities and potential mitigation to minimise environmental disturbance. The information gathered will also provide a baseline against which the future recovery of habitats following construction activities can be evaluated.

The results of the aquatic ecology surveys are presented in Table 17 (pipeline crossings) and Table 18 (access road crossings). Habitat quality was ranked as A (high ecological importance), B (medium ecological importance) or C (low ecological importance).

Table 17 Aquatic ecology characteristics at pipeline crossings

Site name	Watercourse	Crossing point reference and approximate KP point	Crossing type	Aquatic habitat assessment
PC1	Devolli	CRO-0041-RV-1 KP 9	Open cut	B – some habitat diversity including functional habitats.
PC2	Stermort stream	CRO-0239-RV-4 KP 51	Open cut	A – good habitat diversity and presence of functional habitats. Several fish species caught including species of conservation interest and a range of size/age classes
PC3	Galina stream	CRO-0248-RV-2 KP 59	Open cut	C – poor habitat diversity and evidence of existing pollution issues
PC4	Osumi River	CRO-0352-RV-1 KP 104	Open cut	B – poor quality/heavily impacted habitat, but fish species of conservation interest were present
PC5	Vokopala River	CRO-1525-RV-1 KP 122	Unknown	B – moderate quality habitat
PC6	Osumi River	CRO-0418-RV-1 KP 131	Open Cut	A – high habitat quality due to diversity of habitat types and presence of functional habitats, e.g. backwaters/ shallow marginal bays
PC7	Vërtop stream	CRO-0425-RV-1 KP 133	Open cut	B – moderate quality habitat with some degree of habitat diversity
PC8	Vodicë stream	CRO-0425-RV-1 KP 140	Open cut	B – diverse habitat types but evidence of significant pollution
PC9	Zagorie/ Zagoria River	CRO-0461-RV-2 KP 146	Open cut	C – poor aquatic habitat diversity and presence of barriers to fish. However, site appeared to be good quality for terrestrial invertebrates and probably other terrestrial wildlife
PC10	Ullinjas stream	CRO-1217-RV-4 KP 152	Open cut	C – poor habitat diversity and significant pollution and litter
PC11	Osumi River	CRO-0498-RV-1 KP 158	Open cut	B – poor quality habitat and significant litter/pollution. However, species of

Site name	Watercourse	Crossing point reference and approximate KP point	Crossing type	Aquatic habitat assessment
				conservation interest were observed in 2011 (e.g. migratory eel).
PC12	Semani River	CRO-0590-RV-1 KP 182	HDD	B – poor quality habitat. However, species of conservation interest were observed in 2011 (e.g. migratory eel).
PC13	Semani River	CRO-0670-RV-1 KP 195	HDD	B - poor quality habitat. However, species of conservation interest were observed in 2011 (e.g. migratory eel).

Table 18 Aquatic ecology characteristics at access road crossings

Site name	Watercourse	Crossing point reference and approximate KP point	Construction details	Aquatic habitat assessment
RC1	Osumi River	454 - temporary detour 0.18 km KP 125	**Unknown -** Falls within strip of 454_1	B – moderate quality habitat with some degree of habitat diversity
RC2	Vokopola	454 - 1.94 km KP 125	**Intensive -** Repair or replacement of most of the bridge including extensive concrete works	B – moderate quality habitat with some degree of habitat diversity
RC3	Osumi River	308 - 0.36 km KP 104	**Intensive -** Replacement bridge, span approx. 32 m, founded on bored piles and concrete	B - moderate quality habitat with some degree of habitat diversity and several fish species caught including species of conservation interest
RC4	Osumi River / Corovode	479 - 0.3 km KP 105	**Light -** Minor repairs and ongoing monitoring	A – High quality habitat and diverse range of habitats. Several fish species caught including species of

Site name	Watercourse	Crossing point reference and approximate KP point	Construction details	Aquatic habitat assessment
				conservation interest
RC5	Osumi River	455 - 0.26 km KP 110	**Light -** Renewal/ reinforcement of steel elements and other small repairs	B – poor quality habitat, but fish species of conservation interest were present

6 BIODIVERSITY BASELINE - ITALY

A more detailed description of the survey methodologies applied along the mirco-tunnel exit point / pipeline corridor in Italy is provided in Appendix 8.

6.1 Summary Overview

The natural habitats of Salento have been reduced and fragmented by agriculture, including olive plantations which are a key landscape feature lcoally. Despite this many native species of plant and natural or semi-natural vegetation remain today including oak, mastic and myrtle plants.

Floral diversity is greatest in the area extending from the wetland area of Palude di Cassano to the coast; faunal biodiversity tends to be found within in remaining patches of natural habitat. The project footprint does not encroach into any protected conservation areas. A number of migratory, breeding and residential bird species are found within the vicninity of the micro-tunnel exit point including some Annex I listed species. There are some good amphibian habitats in the form of wetland areas and the abundace of dry stone walls provides good reptile habitat, surveys found some species listed in Annex D of the Habitats Directive.

6.2 Ecological context

The project occurs in the north-east of the Lecce province. The topography is predominantly flat, with the proximity to the Adriatic Sea the most influential factor on the typically Mediterranean climate. The pipeline route in Italy predominantly occurs within horticultural plantations of olive trees and other semi-natural ruderal grasslands.

The sub-region of Salento has been affected by extensive farming and other activities, reducing and fragmenting its natural habitat and resulting in a loss or alteration of the biodiversity. Extensive clearing for agricultural development (>80% of ESIA study area) has removed most of the natural vegetation. This highly dissected landscape has resulted in the remaining natural and semi-natural habitats (<15% of ESIA study area), the limited fauna species recorded in the wider area tend to congregate in these remaining pockets of natural habitat. Nonetheless, the area has managed to retain many native species of plant with a high conservation value, and natural or semi-natural vegetation can still be identified today.

The coastal areas are considered to hold greater environmental importance than the agricultural plain area inland, which contains greater cultural and social importance. The project area is within an area of considerable floral diversity due to geology and geographical location.

The Ministry of Environment Scoping Advice (Advice prot. DVA-2011-0029847 dated 29 November 2011) required three protected sites within <5km of the project to be considered in the screening process. The project footprint was not found to encroach on any protected conservation areas; the closest designated site, Le Cesine SCI and SPA,

is found 2.3 km away. Le Cesine is a wetland of international interest and strategic importance for the protection of wild birds. It comprises of brackish lagoons separated from the sea by sand dunes. The SCI Palude dei Tamari is a coastal wetland approximately 3 km south of the pipeline route at the landfall characterised by hygrophilous monophyletic forest with tamarisks and reeds. Torre dell'Orso is an SCI 5km from the comprising of an artificial coastal pinewood with *Pinus halepensis* on sand, separated from the beach by a dune bank with juniper vegetation.

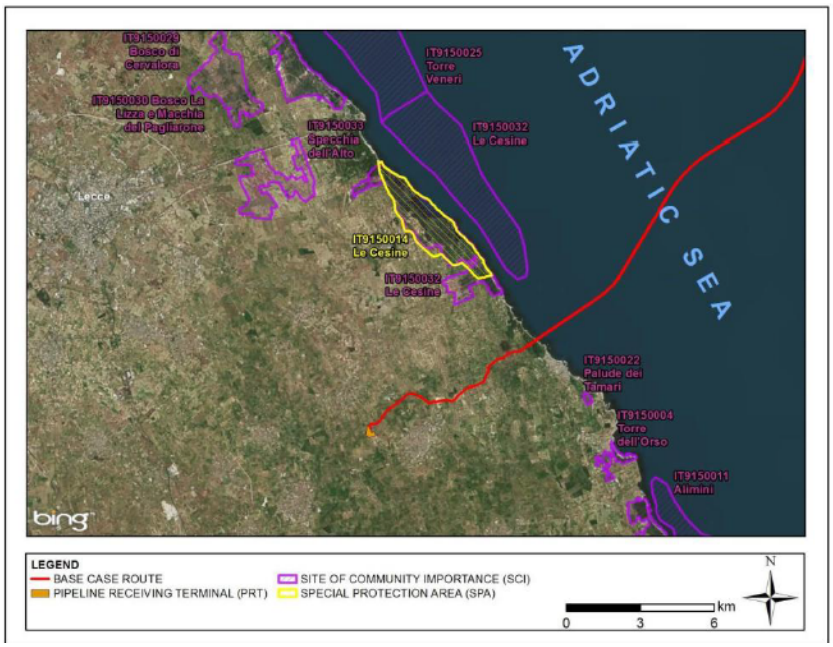


Plate 7 Natura 2000 sites and project location

(SCI/SAC in violet and SPA in yellow)

6.3 Threatened and endemic flora

The greatest diversity of flora, and that of conservation interest, mostly extends from the wetland area of Palude di Cassano to the coast, where endemics and rare plant species can be found. This area is not crossed directly by the pipeline. Several Important Plant Areas (IPAs) are close to, but not within the project area. It is estimated there are up to 45 endemic flora species in the Salento area.

The ESIA surveys found 47 flora species to be of high conservation value in the region. The greatest floral biodiversity was found in the Palude di Cassano wetland and the coastal vegetation extending to the east. The planned route does not cross any permanent or seasonal watercourses. The route passes within 100 m of the wetland “Palude di Cassana” at KP 0.7.

Only five threatened flora species were confirmed to occur within the study area, with a further three considered likely to occur based on desktop assessments (Table 19). In addition there were eight threatened flora species considered to probably be present. Floristic surveys also identified a number of invasive weed species across the study area.

Table 19 Threatened flora species within study area

Scientific name	Occurrence in study area[34]
Erica forskalii Vitm.	Recorded during survey
Ophrys fuciflora subsp. candica	Recorded during survey
Ophrys fuciflora subsp. apulica	Recorded during survey
Plantago subulata L. var. grovesii Beg.	Recorded during survey
Serapias orientalis subsp. apulica	Recorded during survey
Isoëtes todaroana	Most likely present
Ophrys fuciflora subsp. parvimaculata	Most likely present
Ophrys tardans	Most likely present
Hydrocotyle vulgaris L. (Marsh pennywort)	Probably present
Ipomoea sagittata Poir. (Saltmarsh morning glory)	Probably present
Nymphaea alba L. subsp. alba	Probably present
Orchis palustris Jacq.	Probably present
Ornithogalum adalgisae	Probably present
Periploca graeca L.	Probably present
Stipa austroitalica subsp. appendiculata (Celak.) Moraldo	Probably present

Whilst the majority of the pipeline route traverses through modified environments such as olive groves, there are ten coastal and continental habitat types within the study area, as listed in Table 20:

Table 20 Natural habitats in the study area

Habitat type	EU Habitat description (Natura 2000 Code)	Significance
Coastal communities		
Sand dune vegetation	Shifting dunes along the shoreline with *Ammophila arenaria* ("white	-

[34] Based on ESIA Table 6-61

Habitat type	EU Habitat description (Natura 2000 Code)	Significance
	dunes") (2120)	
Cliff vegetation		-
Coastal garrigues and maquis – Juniper scrubland	Coastal dunes with *Juniperus spp*. (2250)	EU Priority habitat
Coastal garrigues and maquis – Pine woodland	Cisto-Lavenduletalia dune sclerophyllous scrubs (2260)	
Coastal woodland – Pine woodland	Wooded dunes with Maritime pine *(Pinus pinea)* and/or *Pinus pinaster* (2270)	EU Priority habitat
Continental communities		
Swamp	Mediterranean temporary ponds (3170)	EU Priority habitat
	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (7120)	EU Priority habitat
Pseudo-steppe	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea (6220)	EU Priority habitat
Continental garrigues and maquis	Rosemary scrubland	-
	Inland scrubland	-
Continental woodland – Holly Oak woodland	*Quercus ilex* and *Quercus rotundifolia* forests (9340)	-

Of these habitats, the coastal vegetation contains the greatest biodiversity value.

6.3.1 Olive Trees

Olive plantations are a key agricultural landuse and, while olive trees are not strictly a valuable type of vegetation they are considered an important element of the local landscape.

A census to map all individuals of the European olive (*Olea europea*) in the micro-tunnel area (lot 1 and 1b) was undertaken April – September 2015 as part of the Olive Tree Management plan which aims to ensure the safeguarding of olive specimens during the construction phase. In total 16 olive trees in Lot 1B have been identified as Monumental Olive Trees. A further 28 olive trees with monumental characteristics have been identified in Lot 3 of the TAP construction site and along a stretch of the south access road to the Pipeline Reception Terminal (PRT) that await assessment by Apulia Monumental Olive Tree Committee.

The Monumental Olive Trees will be translocated and replanted in the location of origin (each specimen being geo-referenced and given a unique ID code before being moved)

following the completion of construction works in accordance with the following documents, which include specifications for post reinstatement monitoring:

- Management Plan for the Monumental Olive Trees of Lots 2 and 3 and the Access Roads to the PRT (IAL00-OFR-643-Y-TAE-0016)
-
- Monumental Olive Tree Management Plan Lots 1 & 1b (IAL00-OFR-643-Y-TAE-0004)

The removal of these trees will only be permitted following approval by the Apulia Monumental Olive Tree Commitee.

There are no UNESCO-protected olive trees or other features within the Project area and there are no UNESCO-related conditions included in the EIA Decree. There is a proposal to include 'Apulia's Plain of Olive Trees' on UNESCO list, but this site is located approximately 80 km north-west of TAP RoW

6.3.2 Natural vegetation

Natural vegetation within lot 1b of the micro-tunnel area consists of 14 specimens of the oak *Quercus ilex*, 13 individuals of mastic and 2 myrtle plants. Transplantation in locations close to the study area for specimens of *Quercus ilex* with stem diameter larger than 30 cm and for the remaining vegetation have been put into place after construction flora reinstatement activities will be carried out.

The study identifies some nuclei of native vegetation which are part of the habitats of Community interest included in Directive 92/1993/EC: which are intercepted by the project (Plate 8):

- priority habitat 6220 *, sub-steppic paths of grasses – *Thero-Brachypodietea* Mediterranean plant communities typical of the study area, consisting of natural meadows rich perennial grasses of substeppic character
- habitat, 9340 *Quercus ilex* and *Quercus rotundifolia* forests: forests of oaks, rare in the study area. Including plants such as *Quercus ilex, Myrtus communis, Pistacia lentiscus, Phillyrea latifolia, Prasium majus, Rhamnus alaternus, Asparagus acutifolius, Rubia peregrina, Rosa sempervirens, Smilax aspera and Cyclamen neapolitanum*.

The surveys identified the following vegetation in the areas of:

- Lot 2:2 linear vegetation formations with a total of 53 native trees;
- Lot 3: 53 linear formations with a total of 991 native trees, including individuals 1 specimen of holm oaks with a trunk diameter larger than 30 cm, and 17 areal formations with a total of 1216 native trees and shrubs (of which 86 belong to habitat 9340);
- Access road north to PRT: 3 linear formations with a total of 9 native trees, including 1-specimen of Terebinth with trunk diameter larger than 30 cm;
- Access Road South to PRT: 1 linear formation with a total of 52 native trees, including 2 holly oak specimens with a trunk diameter greater than 30 cm.

Concerning the herbaceous vegetation, the area occupied by priority habitat 6220 * was surveyed and 4 spatial formations were identified along the working width in Lot 3, hosting specimens of *Hyparrhenia hirta*, santureja, *Dactylis glomerata,* Stipa and *Teucrium chamaedrys*.

All native vegetation subject to translocation will be monitored after reinstatement for five years after translocation (three times per year during January-April, May-August and September-December).

Plate 8 Area of interference of pipeline route with habitats of community interest

6.4 Threatened fauna

Fauna surveys were undertaken to record species distribution and richness using stratified sampling within areas identified through desk-top review on the basis of habitat requirements and preferences of key species of conservation interest.

ESIA surveys were conducted during October 2011 and April 2013 in a 2km corridor (1km either side of centreline); however surveys were not undertaken in optimal survey season. In 2015 another desk top review followed by site visits was undertaken for protected species associated with designated sites in the wider area.

A range of mitigation and reinstatement measures have been identified and will be applied during and post construction, along with post-construction monitoring.

6.4.1 Mammals

No mammals are considered potentially present in the study area; European badger (*Meles meles)*, beech marten *(Martes foina),* weasels (*Mustela spp.*) and hedgehog *(Erinaceus europaeus)* are species included in the Annex II and/or IV of the Habitats Directive (92/43/EEC). Specific mitigation measures will be taken as described in the ESIA, in case of presence of mammals in the project area.

As required by the Environmental Monitoring Project (Prescription A.31 of Ministerial Decree 223/2014) during the site activity the environmental monitoring activities will continue, including fauna monitoring. If further species of conservation interest should be found, the appropriate mitigation measures will be adopted to minimize the potential interference of the project.

6.4.2 Birds

During the 2013 surveys, the Montagu's harrier (*Circus pygargus*) was observed in the study area. It is considered a migratory bird of prey, as there are not any nesting sites known to be in the Apulia region.

Further surveys have been carried for the ante-operam phase following the Environmental Monitoring Plan along the 1km buffer zone on both sides of the microtunnel construction, Palude di Cassano and the phytopurification plant:

- Nesting and Residential Birdlife (April, May, June and October).
- Migratory Birdlife (March, April, May, September and October).

Surveys for the monitoring of nesting, residential and migratory birdlife have also been planned during the construction phase and commissioning/operation.

In 2015 spring surveys (March) of migratory species recorded only one Annex I species, the western marsh harrier (*Circus aeruginosus*), Breeding season (mid-April to early June to avoid transient migrants) surveys also recorded the presence of this species, along with little bittern (*Ixobrychus minutus*), little egret (*Egretta garzetta*), European honey buzzard (*Pernis apivorus*) and peregrine falcon (*Falco peregrinus*). Of which only the little bittern was recorded as possibly nesting in the area (to a distance about 1 km from the route of the project). The 2015 overwintering survey (October), like the spring survey only recorded the presence of the western marsh harrier.

Desk based studies indicated that the phytodepuration plant of Melendugno and Palude di Cassano may support some Annex I species found in protected areas in the region including; little bittern, black-winged stilt (*Himantopus himantopus*), purple heron (*Ardea purpurea*) and Eurasian bittern (*Botaurus stellaris*). Nesting surveys were undertaken to establish the presence of any breeding or potentially breeding pairs of these species.

6.4.3 Herpetofauna

Olive groves present across the study area provide the most widespread habitat for reptiles and birds as does the network of dry stone walls. The Italian wall lizard (*Podarcis sicula*) was the only listed species (Habitats Directive - Annex D) to be observed within the study area.

The species included in Annex II of the Habitat Directive confirmed to be absent from the project area of influence during 2015 pre-construction surveys are: European pond turtle (*Emys orbicularis*); Four-lined snake (*Elaphe quatuorlineata*); Leopard snake (*Elaphe situla*); Italian crested newt (*Triturus carnifex*) and Hermann's tortoise (*Testudo hermanni*).

The species and abundance of amphibians was recorded in a 1km buffer either side of the TAP onshore route in Italy using GPS in March/April and September 2015. Edible frog (*Pelophylax esculentus klepton*), Italian tree frog (*Hyla intermedia*) and European green toad (*Bufotes viridis*) were recorded in spring the latter two species are listed in Annex D of the Habitats Directive. Both species of frog were again recorded in the autumn surveys.

Abudance and species of reptiles were recorded using GPS within a 1km buffer of the route within >500m linear georeferenced transects containing or in proximity to dry stone walls or similar features.

Four species were recorded: Italian wall lizard (*Podarcis siculus*), European common gecko (*Tarentola mauritanica*), Grass snake (*Natrix natrix*) and Green whip snake (*Hierophis viridiflavus*),of which only the Green whip snake is listed in Annex D of the Habitats Directive.

7 OFFSHORE BIODIVERSITY BASELINE

A more detailed description of the survey methodologies deployed along the offshore pipeline route is provided in Appendix 9.

7.1 Summary Overview

TAP follows a carefully selected route that is designed to avoid environmentally sensitive areas, and ensure it runs through the shortest and shallowest offshore route across the southern Adriatic. The pipeline will span 105 km offshore, with approximately 60 km in Albanian and 45 km in Italian waters.

The Adriatic is a sub-area of the Mediterranean Sea and is a semi-enclosed waterbody over 800 km long and 150-200 km wide with an area of over 138,600 km^2, the coastlines of six countries border all but its southern extent. The southern Adriatic is connected to the Ionian, and the Mediterranean, via the narrow, deep Strait of Otranto. Its northern and central parts are characterised by a relatively shallow shelf <100 m and influenced by numerous rivers that discharge into it. By comparison the southern Adriatic has a relatively narrow continental shelf, and a steep slope down to depths of >1,000 m, it is characterised by high salinity and significant depths making it a pelagic oceanic habitat. The western coastline (Albania) is flat and predominately comprises of sandy beaches whereas the eastern coastline (Italy) is rocky (UNEP-MAP, 2015). Despite some endemic marine species occurring and bony fish such as red mullet (*Mullus barbatus*) demonstrating a degree of isolation from other Mediterranean subpopulations (Maggio *et al*., 2009), the Adriatic is not geographically isolated nor does it contain high levels of endemism.

Both Albanian and Italian waters contain a number of protected and designated sites, including the South Adriatic Ionian Strait Ecologically or Biologically Sensitive Area (EBSA), associated habitats include *Posidonia* meadows, marine megafauna species of conservation importance including the striped dolphin and loggerhead turtle, deep sea cold water corals (*Lophelia* pertusa) and large pelagic fish such as Atlantic bluefin tuna (*Thunnus thynnus*). A variety of benthic fauna typical of the southern Adriatic and its coastal waters were observed in patchy distributions during seabed surveys along the TAP route. A range of demersal and pelagic fish species occur within the diverse range of habitats within the Adriatic, many of which are commercially exploited. Fisheries comprise predominantly of small scale fleets using static nets, pots, traps and longlines, while the larger commercial fleets are dominated by trawlers.

Approximately 21 species of marine mammal have been recorded in the Mediterranean and Adriatic region. A number of the species that occur, or potentially occur, along the offshore pipeline route are endangered, threatened or protected species. Three turtle species are found in the Adriatic; the loggerhead, green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*). Marine and coastal ornithological knowledge is rather limited for the Adriatic and Ionian Seas despite a diverse abundance of species being present. The offshore TAP pipeline does not intersect any national or

international sites designated for birds; however the Italian landfall is close to three designated sites.

7.2 Surveys

The offshore biodiversity baseline has been informed by a variety of sources since 2012, these include:

- Project-specific marine surveys to sample the benthic (seabed) environment along and around the proposed TAP offshore route. A range of survey techniques were used, including geophysical (such as side-scan sonar), benthic grabs (to sample benthic infauna present in sediments) and drop-down video (DDV) to record seabed habitat types
- the survey data was supplemented with an extensive desk-based review of available literature, including scientific papers, research reports and other publicly available information
- in 2012/2013 both a reconnaissance and detailed route geophysical survey were undertaken and an environmental survey report produced
- in 2013/2014 a geophysical survey of the Italian nearshore waters was undertaken followed by the production of a habitat assessment report and an environmental baseline report
- Review of the above 2012-14 geophysical data (in 2015) by OGS of the Italian component of the route specifically with the aim of identifying 'bioconstructions' for further investigation. This identified 5 locations for further investigation by ROV, all within approximately 15 km of the Italian coast

As part of the Environmental Monitoring Project and Preliminary Environmental Study for the Micro tunnel for the Italian section of the project a number of marine pre-construction monitoring surveys were undertaken in Italy. During 2016/2017 these included:

- remotely operated vehicle (ROV) video mapping of the potential bioconstructions at five areas within a ca.55m corridor centered on the pipeline route to verify and classify them, then characterisation of their conservation status
- geophysical surveying to improve data coverage and quality of route in Italian water and to inform habitat classifications and confirm locations of sensitive habitat
- ROV video mapping of a pre-identified seagrass survey area around the micro-tunnel exit to assess quality and extent and determine whether they could be described as 'meadows'. A further dive survey was undertaken in June 2017 which verified the findings of the 2016 survey
- OGS marine ecologists reviewed the December 2016 data to determine whether bioconstructions in addition to those noted above could be identified using revised regulatory survey data specifications. This study confirmed that no additional areas required ROV investigation in Italian nearshore waters
- water quality (including phytoplankton sampling) was undertaken in November 2016 and May 2017
- sediment sampling (vibrocores for particle size analysis and grabs for infaunal analysis)

- installation of a continuous monitoring system in November 2016 for water turbidity and sea currents (ADCP) on the seabed adjacent to the dredging works associated with the micro-tunnel exit
- seagrass dive survey June 2017 to verify species, density and distribution

Desk based reviews:

- A broad review of seabed geophysical data (2012/13) was carried out by an RSK geophysicist experienced in pipeline routing and identification of sensitive environmental features, to identify any areas for potential further investigation, such as pock marks, gas seeps etc. (summer 2017)
- A deep water habitat review was then undertaken comprising of a literature review, a review of TAP commissioned environmental survey data (including video imagery) and TAP commissioned geophysical data as noted above. The outputs inform the need for further investigation of benthic habitat features and species including potential Annex I habitat features such as reefs (autumn 2017, on-going)
- As deemed necessary and informed by the above reviews, a further review of 2012/13 geophysical data by OGS ecologists will be undertaken

The baseline biodiversity information is used to inform the project's engineering design process to enable embedded and adaptive mitigations to be identified to avoid or reduce impacts associated with TAP on the environment. Examples of this include the selection of the Italian landfall location to avoid designated nature conservation sites and the use of microtunnelling there to avoid impacting the intertidal habitats, as well as extension of the tunnel exit location to further reduce potential impacts on benthic habitat features.

7.3 Ecological context

7.3.1 Protected habitats and species

The Adriatic contains a series of marine protected areas (MPAs), the closest of which to the TAP offshore route is the Torre Guaceto MPA. It is located approximately 55 km north of the Italian landfall and contains a notable *Posidonia oceanica* meadow which supports a diverse array of marine fauna. A number of Natura 2000 sites are also found in close proximity to the Italian landfall namely: Le Cesine a Site of Community Importance (SCI) 2.3 km away; Palude dei Tamari (SCI) 2.8 km away and Le Cesine Special Protection Area (SPA) 3.2 km away.

Only one national protected site currently exists in Albanian waters, the Karaburun-Sazan National Marine Park which is approximately 30 km south of the landfall location. However the South Adriatic Ionian Strait EBSA incorporates both Albanian and Italian waters and a further six areas in Albanian waters have been proposed as MPAs.

The southern Albanian coast contains some habitats of conservation interest due to the presence of *Posidonia oceanica* meadows and rare and/or endangered benthic species. However these are found in the southern portion of Albanian coast, south of

Vlore, an area characterised by rocky shores and cliffs unlike the landfall area which is characterised by soft sediments and sands.

The Adriatic's warm waters combined with high light penetration, sandy seabeds and shallow coastal waters create ideal seagrass habitats. *Posidonia oceanica* meadows are among priority habitats (Habitat Type 1120: *P. oceanica* beds - *Posidonion oceanicae*) listed under the Habitats Directive (92/43/ CEE). They are also protected under the Marine Strategy Framework Directive (2008/56/EC) and have a specific action plan under the "Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean", a framework of the Barcelona Convention. EU Member States are required to evaluate the health status of *P. oceanica* meadows in accordance with the Water Framework Directive (2000/60/EC). *Cymodocea nodosa* is also common throughout the Mediterranean and down along the coast of West Africa, IUCN also list this species as 'Least Concern' and despite the same anthropogenic threats the population is thought to be stable. *Cymodocea* meadows are provided for under Annex I of the Bern Convention and Annex I of the EU Habitat's Directive, the latter via inclusion in the following habitat types: 1110 Sandbanks which are slightly covered by sea water all the time and 1140 Mudflats and sandflats not covered by seawater at low tide (*Cymodocea nodosa* populations of the intertidal zone).

Several species of seagrass are common throughout the Mediterranean. They create nursery grounds for a range of fish through the provision of biodiversity and refuge, provide feeding grounds for turtles and are used as a bio-indicator for determining health of coastal ecosystems. Seagrass meadow roots stabilise sediments by reducing sedimentation and turbidity in the water column thus aiding photosynthesising coral species.

The Adriatic contains another Annex I habitat "submarine structures made by leaking gas", this habitat may be present in the form of submarine mud volcanoes, which can form due to the rise of methane from fluidised sediments along existing fault lines forming seeps. Such submarine mud volcanoes may indicate petroleum or gas potential in the deep subsurface or indicate deep geological or tectonic activity.

Reefs are listed as a non-priority habitat under Annex I, the name encompasses bedrock, stony and biogenic variants the latter being of biogenic or geogenic origin. The formation of the construction can be via active or passive collection and cementation of material, e.g. by tube-building worms, or the direct production of mineral matter such as the secretion of skeletal calcium carbonate by corals. Areas of outcrops potentially containing such seabed features in the form of bioconstructions were identified in Italian waters during the 2013 offshore surveys and investigated further in 2016. Three prominent habitat classifications were identified: circalittoral oyster beds (*Neopychnodonte cochlear*), facies with sponges, and rocky outcrops with coralligenous assemblages. Coralligenous is an endemic Mediterranean underwater habitat (UNEP-MAP-RAC/SPA, 2008) that forms on hard rocky outcrops or mobile sediments at depths of 20- 120m (Gatti et al., 2012). Coralligenous reefs are produced by the dynamic equilibrium between bioconstruction (mainly encrusting red algae, with an accessory contribution by serpulid polychaetes, bryozoans and scleractinian corals), and destruction processes (by borers and physical abrasion) (Cerrano, et al., 2001). Circalittoral oyster beds (*Neopychnodonte cochlear*) create thick mantles serving as

hard substrata for species including hydrozoans, bryozoans and sponges. These form on both on hard and mixed substrates at between 50 -150m depths.

Both types of bioconstruction could potentially be classified as 'Reefs' under the broad Annex I non priority habitat category. No specific definition is provided, but a number of parameters are used to assess the 'reefiness' of potentially reef-forming species to determine whether or not an aggregation constitutes an Annex I reef habitat. In the case of biogenic reefs these parameters can include the spatial extent/cover and density of an aggregation as well as its topography/elevation/thickness and persistence. The characterisation of the bioconstructions in relation to their conservation value is discussed further in Section 9.4.7.

Other key taxa and habitats of conservation interest include those on the OSPAR list of threatened and/or declining species and habitats, such as sea-pen and burrowing megafauna habitats (Norwegian lobster (*Nephrops norvegicus),* mantis shrimp *(Squilla mantis)* and *callianassid* shrimps; these are commercially targeted species). As well as any taxa on the IUCN Global Red List of Threatened Species, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Barcelona Convention of 1976 for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.

7.3.2 South Adriatic and Ionian Strait Ecologically or Biologically Sensitive Areas (EBSA)

The South Adriatic and Ionian Strait EBSA which is located in the central southern part of the southern Adriatic basin and the northern Ionian Sea is intersected by the offshore pipeline route within the offshore DMU. The area is characterized by steep slopes, high salinity and a maximum depth of up to 1500 m. As outlined previouisly the EBSA supports an array of marine megafauna including the striped dolphin and loggerhead turtle, both of which are listed in Annex II of the Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD) Protocol under the framework of the Barcelona Convention. Benthos includes deep-sea cold water coral communities such as *Lophelia pertusa* and deep-sea sponge aggregations. Bluefin tuna, swordfish (*Xiphias gladius*) and a variety of sharks and rays such as the giant devil ray (*Mobula mobular*) are also found within the region. Each of the qualifying features of the ESBA have been individually assessed in the CHA and are dealt with separately.

As a key area for marine biodiversity in both isolation; based on its qualifying species and habitats, and as part of a network of marine protected areas the EBSA is in its own right considered to trigger critical habitat under Criterion 4 as a site containing unique assemblages of species including assemblages or concentrations of biome-restricted species.

7.3.3 ESIA benthic ecology survey

A Habitat Assessment Survey and Environmental Baseline Survey at pre-determined locations along the pipeline route from the Albanian to Italian coastline (encompassing the different geomorphological areas of the Albanian shelf, Albanian slope, the Adriatic basin, the Italian slope and the Italian shelf) were undertaken in 2013 to identify species and habitats of conservation interest. From the Albanian landfall to 28 km from shore,

seabed imagery showed a low diversity of megafauna. At all stations within this section bioturbation of sediment was observed, the sea-pen *Pennatula* sp. was recorded at two stations, at one of these, coverage levels surpassed the OSPAR threatened and/or declining habitat threshold. A single individual of the rare and large predatory nudibranch *Tethys fimbria*, was also found at both stations however this is not a listed species.

The surveyed area from 28-58 km from the Albanian coast was found to contain widespread bioturbation at every station, likely to derive from burrowing arthropods, particularly Caridea Galatheoidea and Paguridae, which were all observed on the seabed. Other megafauna included Echinodermata (*Cidaris* sp., Echinoidea and Holothuroidea), an individual Octopoda and Chordata (Pleuronectiformes and Osteichthyes). Isolated Octocorallia were recorded and the echiuran green spoon worm *Bonellia viridis* was also observed.

The third section surveyed extended from 58-96 km from the Albanian landfall, over the median line into Italian waters. Once more bioturbation was abundant at all stations, and although a few sparse individual sea-pens (*Funinculina quadrangularis*) were observed these were not at abundances sufficient to suggest the presence of OSPAR listed sea-pen and burrowing megafauna habitat.

Other observed fauna included the annelid peacock worm *Sabella* sp. which was found across a band of stations all at the same distance from shore, arthropods in the form of Caridea and Decapoda and echinoderms, including *Echinaster* sp., Holothuroidea, Asteroidea, Ophiuroidea and Crinoidea. Cnidarians such as the anemones *P. axinellae* and *Condylactis avantiaca* as well as other individuals from the taxonomic groups Octocorallia, Anthozoa and Hydrozoa were also observed. Several molluscs, notably Turritellidae were seen observed in addition to occasional *T. fimbria*, Bivalvia and Scaphopoda. Scattered Porifera were also seen within the Italian nearshore stations, with Corallinales seen encrusting hard substratum, such as boulders.

From 96-103 km from the Albanian coast (up to the Italian coast) bioturbation was observed at every station but one. The only indications of any species or habitats of importance were found at the four stations located furthest from shore within this route section where numerous dead fragments of seagrass (Alismatales) were observed. At some stations these fragments had aggregated into large masses or balls, known as egagropili, which are associated with Mediterranean tapeweed. However, no live seagrass beds or isolated patches were identified.

A variety of marine fauna typical of the southern Adriatic and its coastal waters were observed in patchy distributions along the TAP route. At the time of this survey (2013/2014) no Annex I habitats were identified, nor were any IUCN listed species found. However a potential OSPAR listed habitat, seapens and burrowing megafauna habitat, was found at one station (Gardline, 2013). Since this survey the offshore route has been altered slightly, most notably in Italian waters therefore further surveys have been undertaken in this area as summarised above in Section 7.2.

7.3.4 Fish and shellfish

A range of demersal and pelagic species occur within the diverse range of habitats within the Adriatic many of which are commercially exploited. Along the continental shelf at depths of 10-50m red mullet, poor cod (*Trisopterus minutus*), flatfish such as sole (*Solea solea*) are found along with gobies and pandoras (*Pagellus spp.*). Moving into the deeper waters offshore waters 50 to 100 m deep anglerfish (*Lophius spp.*), European hake (*Merluccius merluccius*), bream (*Sparus aurata*) and whiting (*Merlangius merlangus*) are found. A diverse array of invertebrates are also found including cuttlefish (*Sepia officinalis* and *S. elegans*), octopuses (*Eledone moschata, Eledone cirrhosa* and *Octopus vulgaris*), squids (*Loligo vulgaris* and *Alloteuthis media*), mantis shrimps, deepwater rose shrimp (*Parapenaeus longirostris*), Norway lobster and scallops (*Pecten jacobaeus* and *Chlamys opercularis*) *(UNEP, 2014a)*.

The key small pelagic fish species include sardine (*Sardina pilchardus)*, anchovy (*Engraulis encrasicolus)*, Atlantic mackerel (*Scomber scombrus*), chub mackerel (*Scomber japonicas)* and sprat (*Sprattus sprattus)*. Less frequently caught species include horse mackerel (*Trachurus trachurus)* and Mediterranean horse mackerel (*Trachurus mediterraneus) (UNEP, 2014a)*.

The IUCN 'critically endangered' Adriatic salmon (*Salmo obtusirostris)* is found in only four locations in the Adriatic region, all of which are rivers as it is the only salmon species that spends all of its time in freshwater habitats. The Adriatic sturgeon (*Acipenser naccarii*) is also 'critically endangered' and is now thought to be extinct in the wild.

Long term studies of fish landings data for the region show declines in large marine species, such as elasmobranchs, as well as large demersal species. A number of previously common fish taxa have disappeared from trophic webs in the region an example of which is the European eel (*Anguilla anguilla*) which is now absent in areas where it was once hand-fished. Declines are also apparent in commercially targeted species with a negative trend in many demersal and pelagic species (UNEP, 2015).

There are a number of anthropogenic pressures on marine species in the Adriatic of which commercial and artisanal fisheries have the greatest influence on fish ecology. It is the most intensively bottom trawled region within the Mediterranean, and purse seiners, pelagic pair-trawlers, longliners and artisanal vessels also have a high level of activity in the region all of which have significant impacts on the ecosystem (UNEP, 2014a).

Unsustainable fishing practices, poor management strategies and illegal, unreported, unregulated (IUU) fishing activities can result in overfishing of fish stocks to levels that exceed their maximum sustainable yield (MSY), leading to declines in stocks. This can result in a lack of available prey for other species including fish, marine mammals and birds. Bycatch of non-target fish species or individuals of commercial fish species that are below minimum landing size are often discarded, usually dead or injured, which can impact population sizes and the biodiversity of marine ecosystems. Many fishing gears (e.g. bottom trawls) come into direct contact with benthic habitats and remove/damage/destroy key ecological features of those habitats such as sponges, deep sea cold water corals, seagrass beds etc. (UNEP, 2014a).

The scope of the pre-construction fish ecology surveys, scheduled for 2017/2018, is currently being developed.

7.3.5 Marine mammals

Approximately 21 species of marine mammal have been recorded in the Mediterranean and Adriatic region. A number of the species that occur, or potentially occur, along the offshore pipeline route are endangered, threatened or protected species. These include:

- species on the IUCN Red List[35] assessments, as follows:
- endangered species: Mediterranean monk seal (*Monachus monachus*), fin whale (*Balaenoptera physalus*) and Mediterranean subpopulation of the short-beaked common dolphin (*Delphinus delphis*).
- vulnerable species: sperm whale (*Physeter microcephalus*), the Mediterranean subpopulation of the common bottlenose dolphin (*Tursiops truncatus*), the Mediterranean subpopulation of the striped dolphin (*Stenella coeruleoalba*) and the Mediterranean fin whale population.
- a number of species listed in Annex II of the Barcelona Convention[36] as 'endangered or threatened species', including:
- Cuvier's beaked whale (*Ziphius cavirostris*), fin whale and common bottlenose dolphin.

The Mediterranean population of Cuvier's beaked whale is genetically distinct and is thought to contain less than 10,000 mature individuals, it is one of the species included in Annex I (endangered with extinction) of the Convention on Migratory Species (to which Italy and Albania are signatories): This states that '*Parties that are a Range State to a migratory species listed in Appendix I shall endeavour to strictly protect them by... conserving and where appropriate restoring their habitats; preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them*'.

The South Adriatic Ionian Strait EBSA defined under the Convention on Biological Diversity (CBD) encompasses much of the offshore pipeline route and is identified as containing important habitats for Cuvier's beaked whale, as well as supporting significant densities of striped dolphin.

The spatial extent of an 'Area of Special Concern for Beaked Whales (ASC-BW)' identified by ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic) also overlaps with the offshore pipeline route.

The common bottlenose dolphin, is recorded as being regularly present throughout the Adriatic Sea, contrastingly however the short-beaked common dolphin, once present in the entire Adriatic is now considered regionally extinct due to overfishing, culls and habitat degradation (UNEP, 2014). The most abundant cetacean species in the Adriatic is the striped dolphin where it is found primarily in association with the deep waters of

[35] iucnredlist.org/search

[36] rac-spa.org/sites/default/files/annex/annex_2_en_2013.pdf. Italy & Albania are both signatories to the convention

the Strait of Otranto which is crossed by the pipeline at depths exceeding 300m. Here groups of this species can reach hundreds of individuals whereas further north only lone individuals and small groups are found (UNEP, 2014).

Cuvier's beaked whale is a deep diving species and is consequently often associated with deep slope habitats as is reflected in its presence in the deep southern, i.e. in the vicinity of the Strait of Otranto, rather than the comparatively shallow northern Adriatic. Risso's dolphin also associates with deep pelagic waters and steep shelf foraging grounds, the Mediterranean subpopulation is currently listed as being "Data Deficient". Fin whales are commonly found in deep waters (400 to 2,500 m) but will also occur in areas with slope and shelf habitats, recent research suggests fin whales enter the southern and central Adriatic while foraging for krill (UNEP, 2014).

The sperm whale is a largest Odontocete in the Mediterranean region and the population here is genetically distinct, this species also prefer deep continental slope waters with abundant prey (cephalopods). Vagrant individuals are occasionally seen in the deep southern Adriatic (UNEP, 2014) but it is not considered of importance for this species (Holcer *et al*., 2014).

The Mediterranean monk seal (*Monachus monachus*) is one of the most threatened species in the world (White *et al*., 2005), it is assessed as CR in Albania, EN globally, and Data Deficient for Italy. The global population of Mediterranean monk seal is currently estimated at <700 individuals (Karamanlidis *et al*., 2016a) and their critical habitats are well documented, with the Aegean and Ionian Seas being known hotspots, particularly for breeding (Lüber *et al*., 2015). Karamanlidis *et al*. (2016b) were the first to clearly identify three genetically distinct subpopulations of this species: one in the North Atlantic Ocean, the others in the Ionian and the Aegean. Approximately 350–450 monk seals inhabit these seas in the eastern Mediterranean along the coasts of mainland Greece, Cyprus and western and southern Turkey (Gücü *et al*., 2004, 2009; Güçlüsoy *et al*., 2004; Anonymous, 2007). The monk seal is a coastal species and is known to remain in close proximity to haul out and pupping sites (Lüber *et al*., 2015) demonstrating high site fidelity (Gazo *et al*., 1999).

Signs of population recovery in the eastern Mediterranean have been recorded recently by monitoring of key pupping sites in Greece, with information provided by the Hellenic National Monk Seal Rescue and Information Network (Anonymous, 2007), and sporadic extra-limital sightings of vagrant individuals in the eastern Mediterranean Basin from Libya to Croatia and the Balearic Islands (Karamanlidis *et al., 2016* in press). Karamanlidis *et al*. (2016a) suggest such sightings in areas, including Albania (Anonymous, 2012) and Croatia (Gomerčić *et al*., 2011) are due to this population recovery. However in the absence of recurrent sightings of different individuals, ongoing monitoring and recovery initiatives, the monk seal should still be regarded as recently extinct in these countries (Karamanlidis *et al*., 2016a).

Marine mammals are under increasing pressure from anthropogenic influences; including ambient underwater noise levels, exposure to sediments and contaminants and collision risk with vessels, throughout their home ranges and the Adriatic is no exception.

There are a number of anthropogenic pressures on marine species in the Adriatic. It is the most intensively bottom trawled region within the Mediterranean, and purse seiners, pelagic pair-trawlers, longliners and artisanal vessels also have high levels of activity in the region all of which have significant impacts on marine ecosystems. Key issues for marine mammals include reduced prey abundance due to overfishing, loss or destruction of key habitats, and injury or death due to capture as bycatch in fishing gear (UNEP, 2014a).

Oil and gas exploitation began in the 1960s and now >130 extraction installations are present within the Adriatic; the focal point for these activities is the western coast. As the prospecting for new areas to exploit continues so do the seismic surveys which produce significant underwater noise impacts. Given the semi-closed nature of the Adriatic the pressures on benthic habitats and noise impacts associated with surveying and drilling the cumulative impacts of these activities on marine mammals should not be underestimated (UNEP, 2014a).

One of the busiest commercial shipping routes in the world is found in the Mediterranean. The Adriatic is quieter although ports are found in both the north and south, and four of the northern ports are being expanded which will lead to increases in marine traffic in the future. Traffic within the Adriatic comprises of tankers containing oil, gas and dry cargo, container ships, ferries, fishing vessels, recreational boats and military vessels. Vessel collisions are a particular issue for large marine mammals as they have slower avoidance rates than smaller more manoeuvrable species and these can result in fatalities. Unsurprisingly the highest rates of collision are found in the north and west where vessel traffic is heaviest (UNEP, 2014a).

Toxic chemicals such as polychlorobiphenyls (PCBs) are common in marine environments, and they have been found in the tissue of cetaceans in the Adriatic. Marine litter/debris is also an issue for marine mammals and has been found in the stomachs of stranded dolphins in the Adriatic (UNEP, 2014a).

No project-specific marine mammal monitoring surveys are proposed, as aside from the potential underwater noise impacts associated with installation of sheet piling at the landfalls, any impacts on marine mammals are from the offshore pipelaying are deemed to be insignificant. However marine mammal mitigation protocols (MMMP) shall be developed for the coastal and nearshore works in Albania and Italy. During the implementation of these the marine mammal observers shall record all sightings of marine mammals and share these with the appropriate authorities, and regional researchers to improve regional databases.

7.3.6 Turtles

Turtles have a high biodiversity and conservation value which is reflected in the international, regional and national legislation and policies that are in place to protect them. Three turtle species are found in the Adriatic, namely the loggerhead (*Caretta caretta*), the green (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*). However the hawksbill (*Eretmochelys imbricata*) and Kemp's Ridley (*Lepidochelys kempii*) turtles, both critically endangered globally, are rare vagrants in the Adriatic.

The Italian ESIA states that very occasional turtle nesting has occurred on or near the Italian landfall, intertidal works here will involve a micro-tunnel to connect the offshore and onshore pipeline sections thus avoiding significant impacts on these beaches. Less detail was provided in the Albanian ESIA and while the beaches near the landfall are subject to anthropogenic influence and are not in a pristine state, the potential for nesting cannot be excluded.

IUCN lists green turtles as 'endangered' globally, with leatherback and loggerhead being listed globally as vulnerable globally, however the Mediterranean loggerhead population is classed as 'least concern'. Turtles are listed in several international conventions, including:

- the Convention on International trade in Endangered Species of Wild Fauna and Flora (CITES) (Italy has ratified this, Albania is in accession),
- the Convention on Biological Diversity (CBD),
- the Bern Convention (Italy and Albania are contracting parties),
- Barcelona Convention (Italy & Albania both signatories),
- the Convention on Migratory Species (Italy & Albania both signatories), under Appendix I.

Albania has an 'Action plan for the conservation of sea turtles in Albania[37]', which includes four priority objectives: Sea turtle conservation is established as a national priority; Monitoring of sea turtle population and habitats; Identification and mitigation of threats to sea turtles and their habitats; Identification of critical habitats, legal protection and establishment of a functional network of marine, coastal and estuarine protected areas'. The CBD EBSA 'South Adriatic Ionian Strait' (overlaps with much of the offshore route) is identified as supporting significant densities of loggerhead turtle.

The most abundant turtle species in the Mediterranean is the loggerhead, and several distinct populations and reproductive sub-populations are found regionally. Greece, Turkey, Cyprus and Libya contain the main nesting beaches although occasional nesting events have been recorded in Italy, Spain, France and Albania. Loggerheads utilise the pelagic habitats of the southern Adriatic as well as the extensive neritic habitats in the centre and north, demonstrating high levels of philopatry in relation to functional habitats. Despite most of the nesting beaches in the Mediterranean being protected to some degree loggerhead turtles are still under significant anthropogenic pressure, they account for a high level of bycatch in fisheries particularly pelagic longline fisheries, and in trawl and trammel nets within neritic habitats with substantial interaction rates throughout the region. The central and northern Adriatic is an established loggerhead neritic habitat utilised by juveniles and adults from Greece (75.3%), Turkey (19.5%) and to lesser extent Cyprus, Israel and Libya (UNEP, 2014).

Loggerhead turtle sightings have been recorded along the whole Albanian coast but the highest frequency of sightings is along the north-western coast. Tagging studies and interviews with fishermen suggests a seasonal use of foraging grounds along the entire coastline. The nearest regionally and nationally important habitat used by turtles for

[37] medasset.org/technical-reports-position-papers-policy-recommendations/action-plan-for-the-conservation-of-sea-turtles-and-their-habitats-in-albania-english/

foraging, refuge and as a habitat corridor lies approximately 50 km north of the Albanian landfall area. Leatherbacks are considered to be a rare visitor to the region.

The two other species present in the Mediterranean region are leatherback and the green turtle. Whilst being present year round in the Mediterranean area leatherbacks do not nest in the region, they migrate here from the Atlantic to forage and are only found in the Adriatic through the summer months.

The Mediterranean green turtle population is one of the smallest and most endangered of this species globally, it is all that is left of a once thriving population decimated by anthropogenic pressures. They primarily nest on a limited number of beaches in Turkey, Syria and Cyprus. Although habitats supporting juvenile individuals are present in the southern Adriatic Sea their primary neritic habitats are found along the coastline of northern Africa (UNEP, 2014). It has been suggested that there is a habitat corridor for green turtles between the reproductive habitats found in the eastern Mediterranean and the feeding grounds of the shallow, northern Adriatic, and Lazar *et al*., (2004) suggest that the Ionian–Adriatic loggerheads form an important management sub-unit of the nesting population.

Marine turtles are under increasing pressure from anthropogenic influences; including ambient noise levels, exposure to sediments and contaminants and collision risk with vessels, throughout their home ranges and the Adriatic is no exception. Key issues for marine turtles include reduced prey abundance due to overfishing, loss or destruction of key habitats, and injury or death due to capture as bycatch in fishing gear (UNEP, 2014).

Oil and gas exploitation began in the 1960s and now >130 extraction installations are present within the Adriatic, the focal point for these activities is the western coast. As the prospecting for new areas to exploit continues so do the seismic surveys which produce significant underwater noise impacts. Given the semi-closed nature of the Adriatic the pressures on benthic habitats and noise impacts associated with surveying and drilling the cumulative impacts of these activities on turtles should not be underestimated (UNEP, 2014).

One of the busiest commercial shipping routes in the world is found in the Mediterranean, the Adriatic is quieter however ports are found in both the north and south and four of the northern ports are being expanded which will lead to increases in marine traffic in the future. Traffic within the Adriatic comprises of tankers containing oil, gas and dry cargo, container ships, ferries, fishing vessels, recreational boats and military vessels. Turtles can be injured by collisions with vessels, unsurprisingly the highest rates of collision are found in the north and west where vessel traffic is heaviest (UNEP, 2014).

Toxic chemicals such as polychlorobiphenyls (PCBs) are common in marine environments, and they have been found in the tissue of dead sea turtles in the Adriatic Sea. Marine litter/debris is also an issue for turtles and has been found in the stomachs of stranded dolphins and turtles in the Adriatic (UNEP, 2014).

A pre-construction nesting turtle survey is being undertaken in Albania during summer 2017, to internationally recognised survey protocols by appropriately trained and experienced regional experts.

7.3.7 Marine and coastal ornithology

Marine and coastal ornithological knowledge is rather limited for the Adriatic and Ionian Seas, however species found in the region include typical Mediterranean species such as the black headed gull (*Larus ridibundus*), Mediterranean gull (*Larus melanodcephalus*) and yellow legged gull (*Larus michahelli*). The Annex I (Directive 79/409/EEC) listed little tern (*Sterna albifrons*) and sandwich tern (*Sterna sanvicensis*) are also present.

While the offshore TAP pipeline does not intersect any national or international sites designated for birds, the landfall is close to three designated sites in Italy. The closest is Le Cesine, a Site of Community Importance (SCI) and a Ramsar site, 2.3 km from the landfall. Le Cesine coastal lagoon supports a number of overwintering species including small numbers of the great cormorant (*Phalacrocorax carbo sinensis*), as well as nesting species such the little grebe (*Tachybaptus ruficollis*). Other species known to occur include the Eurasian bittern (*Botaurus stellaris*), black necked grebe (*Podiceps nigricollis*), black winged stilt (*Himantopus himantopus*) and greater white fronted goose (*Anser albifrons*).

In Albania the Karaburuni peninsula-Sazani Island, which is part of the Karaburun-Sazan National Marine Park, lies 30 km south of the landfall. This is Albania's only marine national park and was established in 2010; the peninsula itself is also a managed nature reserve. Karaburuni peninsula-Sazani Island contains high rocky coasts with preserved vegetation and isolated gravel and sandy beaches that provide sheltering and nesting habitats for many sea bird species in the falconiform and charadriforms (waders, gulls, auks) orders. A survey in the area confirmed the site's importance for both the yelkouan shearwater (*Puffinus yelkouan*) and Cory's shearwater (*Calonectris diomedea*). The region is also important as a migratory corridor for birds of South Albania and generally for the aquatic birds crossing the northern Ionian Sea over the South Western Balkans. This migratory corridor is termed the Adriatic Flyway and is one of the three main north-south migration pathways for birds in Europe.

7.4 Italian surveys post ESIA

In 2014 TAP produced a Preliminary Environmental Study and the Front End Engineering Design for the Microtunnel project at the Italian landfall, to fulfil the requirements of paragraph A5 of the Environmental Compatibility Decree (Ministerial Decree no. 0000223 of September 11, 2014) relating to the Italian section of the TAP (Trans Adriatic Pipeline) project.

Through provision A5 of the above-mentioned Decree, the Italian Ministry for Environment and Land and Sea (MATTM in Italian) requested the following:

"*In consideration of the operating procedure for the Microtunnel construction and related works being acceptable in its general aspects but drafted in a qualitative form, the relevant front end engineering design for all works at the landing point will have to be submitted and verified for exclusion from the scope of the Environmental Impact Assessment prior to proceeding to perform any operation. […]*"

The selection of a micro tunnel was to avoid the need to open trench through maquis covered areas, the coastal dunes, beach and to minimise interference with sensitive offshore habitats such as seagrass.

The executive design allowed to:

- avoid any interference with the local water table by providing for the construction of a perfectly watertight launch shaft (thrust pit)
- eliminate any direct interference with the existing *Cymodocea nodosa* meadow by locating the MT offshore outlet along the same line and by minimizing sediment transport through the installation of provisional sheet piles
- reduce embankment volumes in the transition zone at sea.

In 2015 an Environmental Monitoring Project (EMP) was produced for the Italian section of the project to meet the requirements of prescription A.31 detailed in Italian Ministerial Decree no. 223 of 11/09/2014 concerning the environmental compatibility of the project. It also complies with the requirements of prescription A41a) of Italian Ministerial Decree 223/2014, which specifies that an ante-operam and post-operam Monitoring Plan of the sedentary and migratory birdlife must be undertaken.

The EMP objectives are:

- to check the baseline included in the ESIA and to characterize the environmental conditions (ante operam monitoring) to be compared with the subsequent monitoring
- where technically possible, to check the forecast environmental impacts presented in the ESIA and changes in the ante operam conditions by measuring the parameters taken as a reference for the various environmental components subject to a significant impact following the construction of the work in its various stages (during the works and post construction)
- Where possible, to check the efficacy of the mitigation measures proposed in the ESIA to reduce the size of the environmental impacts identified during the construction and operation stages. To identify any unpredicted or greater environmental impacts and to plan appropriate corrective measures to handle or resolve them
- to communicate the results acquired during the monitoring activities to the competent authorities

7.4.1 Bioconstructions

The 2016 bio-construction[38] survey in Italy focused on five areas with greatest potential to contain bio-constructions, determined using geophysical data which identified areas with outcrops. Three prominent habitat classifications were identified: circalittoral oyster beds (*Neopychnodonte cochlear*), facies with sponges, and rocky outcrops with coralligenous assemblages. At four of the five sites the bioconstructions were found to be oyster shell beds of *Neopychnodonte cochlear* which is not a species considered to qualify as Annex I habitat, nor did the bed formations meet the required reefiness criteria. The beds tend to form cobble to small boulder size clumps associated with a very low biodiversity, in many places they were recorded to be inundated with sediment.

[38] Both the coralligenous assemblages and circalittoral oyster beds recorded during the Italian nearshore surveys are bioconstructions. The term “bioconstruction”, geologically refers to a “*bioconstructed limestone*” (Fox, 2005).

The only site containing bioconstructions of conservation interest was Area 5, the site closest to shore, where structures were found which comprised predominately of coralligenous assemblages. These were assessed using indices and expert judgement to determine their status in relation to "Good Environmental Status (GES)". The field survey investigations were performed using a ROV on 5 transects (50m and 25m north of the pipeline; 50m and 25m south of the pipeline; and along the pipeline itself). Of the 13 coralligenous bioconstructions identified in this area as being of 'good' or 'moderate' status, only one 'good' and two 'moderate' were recorded along the pipeline alignment.

Overall within the surveyed site the majority of outcrops were classified as 'scarce' or 'poor'. Notably these were all found within water depths of approximately 31 – 49m. In addition to coralligenous bioconstructions two protected species of sponge were also identified; *Axinella polypoides* and *A. Cannabina*. Both of these are listed in Annex II of the Bern Convention, with the former also being listed in Annex II of the Barcelona Convention. These were found in Area 1 and most notably in the offshore outcrops in Area 5. They display a tolerance to sedimentation load. Bioconstructions are discussed further in Section 9.4.3 in relation to application of the mitigation hierarchy by TAP during offshore route selection.

7.4.2 Seagrass

Previous surveys identified that the areas adjacent to the microtunnel exit are characterised by patches of *Posidonia oceanicae* and continuous fields of slender seagrass (*Cymodocea nodosa*) both species are classified by IUCN as being of Least Concern. The 2016 seagrass surveys estimated seagrass density and found that while category allocation was dominated by 'dense', transects were a mixture of sparse to dense seagrass occurring as a mosaic throughout. As was found in previous surveys, slender seagrass was the dominant species, with sparse patches of *Posidonia* in locations where coarser sediments were present. The 2016 survey findings were verified by a dive survey in June 2017. The coverage of *Posidonia* was insufficiently dense or extensive to qualify as the priority EU habitat (1120) *Posidonia* beds. Seagrass is also discussed further in Section 9.4.3 in relation to offshore route selection and application of the mitigation hierarchy.

7.4.3 Other benthic surveys

Further geophysical surveying of the entire Italian offshore pipeline and fibre-optic cable route, extending 200 m either side of each and approximately 47 km in length, was been undertaken in 2016 using multi-beam echo sounder (MBES), side scan sonar (SSS) and sub-bottom profiler (SBP) to acquire datasets.

In addition to this a continuous seabed turbidity and current monitoring system was installed to monitor the baseline natural variations of turbidity. It shall also record turbidity peaks and currents associated with extreme metocean events, thus determining the peaks and ranges of turbidity fluctuations the marine biocenosis are naturally exposed to. This will enable turbidity thresholds to be set for construction to ensure seabed works cease once thresholds are reached. The monitoring station was installed in 15 m deep water in the proximity of the microtunnel and will record near-seabed turbidity and currents pre, and during construction. It is equipped with a multi-

parameter probe (including sensors for conductivity, temperature, density, pressure and turbidity) and an Acoustic Doppler Current Profiler (ADCP).

A vibrocoring and environmental survey was undertaken to investigate the physico-chemical and biological characteristics of the surface sediments and waters within the survey area. Two sediment cores were taken for lab analyses to evaluate the options for disposal and/or re-utilisation of the sediments during construction based on their chemical content. The samples will also be analysed for benthic infauna, and particle size data will be used to inform suspended sediment modelling in relation to seagrass meadows.

7.5 Albanian surveys post ESIA

7.5.1 Sediment and water quality surveys

Water and sediment quality sampling (including benthic infaunal sampling) will be undertaken in Albanian waters in 2017. The following parameters will be tested in addition to drop down video deployment at 20 sampling stations.

The following water quality parameters will be sampled for at 5 stations with samples taken at 3 depths per station.

- Chemical – physical: Temperature; salinity; pH; dissolved oxygen; chl a (fluorescence); transparency (Secchi disk); turbidity.
- Organic matter and nutrients: Total Organic Carbon TOC; Nitrate N-NO3; Nitrite N-NO2; Ammonium N-NH4; Orthophosphate P-PO4; Total Nitrogen TN; Total Phosphorus TP; Total Dissolved Inorganic Nitrogen (computed as sum of N-NO3+N-NO2+N-NH4).
- Solvents: Benzene; Methylbenzene; Ethylbenzene; m+p-xilene; o-xilene; Chlorobenzene; 1,1,1-Trichloroethane; 1,2-Dichloroethane; Trihalomethanes; Methylene chloride; Tetrachloroethylene; Trichloroethylene; Trichloroethane;1,2-dichloropropane; Vynil chloride.
- Hydrocarbons: Hydrocarbons C6 – C10; Hydrocarbons C10-C40; Polycyclic Aromatic Hydrocarbons (PAH).
- Heavy metals: As; Cd; Cr; CrVI; Cu; Hg; Ni; Pb; Zn; Fe; Al; V; CrVI.
- Phytoplankton

The following benthic sediment parameters will be sampled for at 20 stations.

- Granulometry
- Organic matter and nutrients: Total organic matter; Total carbon; Total nitrogen; Total phosphorus.
- Hydrocarbons: Benzo(a)pyrene; Benzo(b)fluoranthene; Benzo(k)fluoranthene;Benzo(g,h,i)perylene; Indenopyrene; Anthracene; Fluoranthene; Naphthalene;Total Polycyclic Aromatic Hydrocarbons (PAHs).
- Heavy metals: Cd; Ni; Pb; As; Total Cr; Cu; Hg; Zn; Fe; Al; V; Cr VI
- Macrozoobenthic communities (3 replicate samples per station)

The following parameters will be sampled for at 5 stations:

- Pesticides: Aldrin; alfa –Hexachlorocyclohexane; beta-Hexachlorocyclohexane; gamma-Hexachlorocyclohexane; DDT; DDD; DDE; Dieldrin; Hexachlorobenzene.
- Other chemical components: Tributyltin; Polychlorinated dibenzo-p-dioxins;(PCDD); Polychlorinated dibenzofurans (PCDF); Polychlorinated biphenyls (PCBs) dioxin likes; Total PCBs.

7.5.2 Turtle nesting surveys

The Adriatic Sea coast is not known to be of importance for turtle nesting activity, with only occasional reports of single individuals in recent years. However, some areas of the coast remain unsurveyed. A presence / absence marine turtle nesting survey was undertaken in the vicinity of the Albanian landfall in summer of 2017 by local experts from the Herpetofauna Society of Albania and Tirana University. The beach containing the TAP landfall and adjacent beaches were surveyed for loggerhead turtle nesting activity and all relevant data (any turtle sightings (marine and onshore), tracks and nesting opportunities, species and where possible sex, where possible GPS co-ordinates of any nesting sites) recorded.

Surveys primarily focused on two 'core' areas (1km either side of the proposal TAP landfall), but also surveyed 'buffer' areas (approximately 2 km north and south of the core areas) at a lesser frequency. Core areas were surveyed at both night (for nesting females) and daylight (for tracks). Frequency of survey was staggered such that the start and end of the season (approximately June and Sept) had lower frequency, with the greatest frequency in peak season (July and August).

The survey was visual and did not involve any interference with nesting turtles, egg sampling, nest protection, or hatchling assistance. Beach signage was installed to inform public of the beach turtle survey and a contact number provided for any chance sighting by the public. No turtle nesting activity or signs of turtle nesting activity were recorded during the survey period. The outputs of the survey will be used to inform the turtle mitigation and management measures in the EcMP.

8 BIODIVERSITY FEATURES

There are subtle differences between Lender standards in relation to the definition of potential critical habitat triggers and classifications of biodiversity features. The TAP critical habitat assessment has therefore adopted a consolidated list of critical habitat criteria that generally reflect the more stringent requirements in any areas of discrepancy (and therefore, for example, includes consideration of VU species in addition to CR and EN species).

8.1 Biodiversity features qualifying for critical habitat

8.1.1 Terrestrial critical habitat

The critical habitat criteria adopted by the project comprise:

- **Criterion 1**: habitat of significant importance to CR, EN or VU species, as defined by the IUCN Red List of threatened species and in relevant national legislation
- **Criterion 2**: habitat important to the survival of endemic or restricted-range species, or unique assemblages of species
- **Criterion 3**: habitat supporting globally significant migratory and/or congregatory species
- **Criterion 4**: highly threatened or unique ecosystems
- **Criterion 5**: areas associated with key evolutionary processes
- **Criterion 6**: habitat of key scientific value.

Based on screening of approximately 215 terrestrial or aquatic biodiversity features known to occur or potentially occurring within the project AOI, 61 biodiversity features (15 mammals, seven birds, three amphibians, one reptile, 13 freshwater fish, two freshwater invertebrates, eight vascular plants, nine ecosystems and three areas of evolutionary importance) were identified that could qualify for critical habitat under the adopted criteria. These critical habitat triggers are noted in Table 21. Additional detail is provided in the Critical Habitat Assessment report (CAL00-C5577-640-Y-TRB-0001).

The Discrete Management Units (DMUs) for these critical habitat triggers are presented in Figure 13, Appendix 1.

Table 21 Terrestrial critical habitat triggers

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
Criterion 1 – threatened species			
Ursus arctos	Brown bear	IUCN LC Greece EN Albania VU Italy CR	Criterion 1 Tier 2, Subsection (b)

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
Canis aureus	Golden jackal	IUCN LC Greece EN Albania EN	Criterion 1 Tier 2, Subsection (a)
Felis silvestris	Wildcat	IUCN LC Albania EN	Criterion 1 Tier 2, Subsection (b)
Lutra lutra	Otter	IUCN NT Greece EN Albania VU Italy EN	Criterion 1 Tier 2, Subsection (b)
Aquila clanga	Greater spotted eagle	IUCN VU Albania CR Greece EN	Criterion 1 Tier 2, Subsection (a) and (c)
Clanga pomarina	Lesser spotted eagle	IUCN LC Greece EN Albania CR	Criterion 1 Tier 2, Subsection (c)
Hieraaetus pennatus	Booted eagle	IUCN LC Greece EN	Criterion 1 Tier 2, Subsection (a)
Milvus migrans	Black kite	IUCN LC Greece CR	Criterion 1 Tier 2, Subsection (c)
Circus pygargus	Montagu's harrier	IUCN LC Greece CR Italy VU	Criterion 1 Tier 2, Subsection (c)
Bubo bubo	Eagle owl	IUCN LC Albania CR	Criterion 1 Tier 2, Subsection (c)
Pelecanus crispus	Dalmatian pelican	IUCN VU Albania CR	Criterion 1 Tier 2, Subsection (a) and (c)
Anguilla anguilla	European eel	IUCN CR Italy EN	Criterion 1 Tier 2, Subsection (a)
Cobitis punctilineata	Aggitis spined loach	IUCN VU Greece EN	Criterion 1 Tier 1, Subsection (a)
Eudontomyzon hellenicus	Greek brook lamprey	IUCN CR Greece CR	Criterion 1 Tier 1, Subsection (a)
Pelasgus prespensis	-	IUCN EN	Criterion 1 Tier 1, Subsection (b)
Salmo pelagonicus	Pelagos trout	IUCN VU Greece VU	Criterion 1 Tier 2, Subsection (b)
Oxynoemacheilus pindus	Pindus stone loach	IUCN VU	Criterion 1 Tier 2, Subsection (d)

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
Cobitis puncticulata	Brown spined loach	IUCN EN	Criterion 1 Tier 1, Subsection (a)
Alburnus vistonicus	-	IUCN CR	Criterion 1 Tier 1, Subsection (a)
Turcorientalia hohenackeri	-	IUCN VU	Criterion 1 Tier 2, Subsection (b)
Unio crassus	Thick-shelled river mussel	IUCN EN	Criterion 1 Tier 2, Subsection (a)
Bombina bombina	Fire bellied toad	IUCN LC Greece EN	Criterion 1 Tier 2, Subsection (a)
Elaphe quatuorlineata	Four-lined snake	IUCN LC Albania VU	Criterion 1 Tier 2, Subsection (a)
Pelophylax shqipericus	Albanian pool frog	IUCN not assessed Albania EN Endemic to Albania	Criterion 1 Tier 2, Subsection (b) Also Criterion 2, Tier 2
Triturus macedonicus	Macedoniancrested newt	IUCN LC Greece EN	Criterion 1 Tier 2, Subsection (a)
Sideritis raeseri	Mountain tea	IUCN not assessed Albania EN Endemic to Albania	Criterion 1 Tier 2, Subsection (a) Also Criterion 2, Tier 2
Aconitum lamarkii	Yellow monk's-hood	IUCN not assessed Albania CR	Criterion 1 Tier 2, Subsection (a)
Atropa belladonna	Deadly nightshade	IUCN not assessed Albania CR	Criterion 1 Tier 2, Subsection (a)
Lilium albanicum	Albanian lily	IUCN not assessed Albania EN Endemic to Albania	Criterion 1 Tier 2, Subsection (a) Also Criterion 2, Tier 2
Criterion 2 – endemic or restricted-range species			
Cobitis punctilineata	Aggitis spined loach	Single location in Greece	Criterion 2, Tier 1
Eudontomyzon hellenicus	Greek brook lamprey	Two river basins in Greece	Criterion 2, Tier 1
Alburnoides devolli	Devoll riffle minnow	Only known from the Devoll River	Criterion 2, Tier 1

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
		system in Albania	Also Criterion 6
Alburnoides fangfangae	Osum riffle minnow	Osumi River catchment in Albania	Criterion 2, Tier 1 Also Criterion 6
Salmo pelagonicus	Pelagos trout	South Balkans	Criterion 2, Tier 2
Alburnus vistonicus	-	Single catchment in Greece	Criterion 2, Tier 2
Oxynoemacheilus pindus	-	Restricted to Aoos river basin (Greece), Semanit, Shkumbini and Erzeni basins (Albania)	Criterion 2, Tier 2
Pelasgus minutus	-	Restricted to Lake Ohrid basin (Albania and Macedonia)	Criterion 2, Tier 1
Pelasgus prespensis	-	Restricted to the Prespa Lakes in NW Greece, Albania and Macedonia	Criterion 2, Tier 2
Alburnoides sp. volvi	-	Endemic to lakes Volvi and Koronia (including Richios River) and lower stretch of the Strymon River including Lake Kerkini (Greece)	Criterion 2, Tier 2
Barbus macedonicus	-	Restricted to the Axios,Pinios, Loudias and Aliakmon river basins (Greece and Macedonia)	Criterion 2, Tier 2
Cobitis puncticulata	-	Occurs in Lower Matiza/Evros river in Greece and Turkey and two other locations in Turkey	Criterion 2, Tier 2
Turcorientalia hohenackeri	-	Seven locations in Greece	Criterion 2, Tier 2
Dianthus formanekii	n/a	Balkan endemic	Criterion 2, Tier 2
Dianthus tenuiflorous	n/a	Balkan endemic	Criterion 2, Tier 2
Verbascum dingleri		Endemic to Greece	Criterion 2, Tier 2

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
Sideritis raeseri	Mountain tea	Endemic to Albania	Criterion 2, Tier 2
Festucopsis serpentini	Serpentine false-brome	Endemic to Albania	Criterion 2, Tier 2
Pelophylax shqipericus	Albanian pool frog	Endemic to Albania	Criterion 2, Tier 2
Criterion 3 – migratory or congregatory species			
Rhinolophus euryale	Mediterranean horseshoe bat	Congregatory IUCN VU (Med) Greece Albania & Italy VU	Criterion 3 Tier 2, Subsection (a)
Rhinolophus blasii	Blasius's horseshoe bat	Congregatory IUCN VU (Europe)	Criterion 3 Tier 2, Subsection (a)
Rhinolophus ferrumequinum	Greater horseshoe bat	Congregatory Italy VU	Criterion 3 Tier 2, Subsection (a)
Rhinolophus hipposideros	Lesser horseshoe bat	Congregatory	Criterion 3 Tier 2, Subsection (a)
Rhinolophus mehelyi	Mehely's horseshoe bat	Congregatory IUCN VU	Criterion 3 Tier 2, Subsection (a)
Miniopterus schreibersii	Schreiber's bat	Congregatory IUCN VU Italy VU	Criterion 3 Tier 2, Subsection (a)
Myotis capaccinii	Long-fingered bat	Migratory, congregatory IUCN VU Italy EN	Criterion 3 Tier 2, Subsection (a)
Myotis bechsteinii	Bechstein's bat	Congregatory	Criterion 3 Tier 2, Subsection (a)
Myotis blythii	Lesser mouse-eared bat	Congregatory	Criterion 3 Tier 2, Subsection (a)
Myotis emarginatus	Geoffroy's bat	Congregatory	Criterion 3 Tier 2, Subsection (a)
Myotis myotis	Greater mouse-eared bat	Congregatory	Criterion 3 Tier 2, Subsection (a)
Criterion 4 – highly threatened and unique ecosystems			
EU Annex 1 priority habitats assessed as critical habitat			
6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea			Triggers Critical Habitat

Latin name	Common name	Conservation status	Criteria and tier of critical habitat (if relevant)
7210* Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae			Triggers Critical Habitat
2270 * Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*			Triggers Critical Habitat
3170* Mediterranean temporary ponds			Triggers Critical Habitat
91E0*Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion Incanae, Salicion Albae)			Triggers Critical Habitat
9530 * (Sub-)Mediterranean pine forests with endemic black pine			Triggers Critical Habitat
2250 *Coastal dunes with *Juniperus* spp.			Triggers Critical Habitat
EU Annex 1 habitats (non-priority) identified as priorities by stakeholders and assessed for critical habitat in the CHA report			
9110 Luzulo-Fagetum beech forests			Triggers Critical Habitat
9540 Mediterranean pine forests with endemic Mesogean pines			Triggers Critical Habitat
Criterion 5 – key evolutionary processes			
Macedonian and Western Crested Newt interaction zone			Triggers Critical Habitat
Vithkuq-Ostrovice serpentine outcrops			Triggers Critical Habitat
Prespa Lakes			Triggers Critical Habitat
Criterion 6 – key scientific value			
Devoll riffle minnow (*Alburnoides devolli*)			Triggers Critical Habitat
Osum riffle minnow (*Alburnoides fangfangae)*			Triggers Critical Habitat

8.1.2 Offshore critical habitat

Based on screening of approximately 188 marine biodiversity features known to occur or potentially occurring within the project AOI, three Annex I habitats (*Posidonia oceanica* seagrass beds, reefs and submarine leaking gas structures[39]), and seven higher-order species (European eel, bottlenose dolphin, striped dolphin, fin whale, Cuvier's beaked whale, Risso's dolphin and loggerhead turtle) were identified that qualify for critical habitat.

Table 22 Summary of offshore critical habitat determinations

Taxa/habitat	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6
Taxa						
European eel (*Anguilla anguilla*)	Tier 2		Tier 2			

[39] This is a habitat type listed in Annex 1 of the Habitats Directive and refers to natural underwater vents rather than man-made structures

Loggerhead turtle (*Caretta caretta*)	Tier 2		Tier 2			
Fin whale (*Balaenoptera physalus*)	Tier 2		N/A			
Bottlenose dolphin (*Tursiops truncatus*)	Tier 2		Tier 2			
Striped dolphin (*Stenella coeruleoalba*)	Tier 2		Tier 2			
Cuvier's beaked whale (*Ziphius cavirostris*)	N/A		Tier 2			
Risso's dolphin (*Grampus griseus*)	N/A		Tier 2			
Habitats						
Posidonia beds	N/A			Yes	No Critical Habitat determined	No
Reef (inc. bioconstructions[40])				Yes		Yes
Submarine structures made by leaking gases				Yes		Yes
South Adriatic and Ionian Strait EBSA				Yes		

The Discrete Management Units (DMUs) for these critical habitat triggers are presented in Figure 13, Appendix 1.

8.2 Priority biodiversity features

EBRD PR6 requirements for priority biodiversity features state that the client will not implement any project-related activities unless all of the following are demonstrated:

- there are no technically and economically feasible alternatives
- the overall benefits outweigh the project impacts on biodiversity
- stakeholders are consulted
- the project is permitted under applicable environmental laws, recognising the priority biodiversity features

[40] Both the coralligenous assemblages and circalittoral oyster beds recorded during the Italian nearshore surveys are bioconstructions. The term "bioconstruction" geologically refers to a "*bioconstructed limestone*" (Fox, 2005).

- appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to ensure no net loss and preferably a net gain of priority biodiversity features over the long term, to achieve measurable conservation outcomes.

8.2.1 Habitats

The biodiversity features of habitats, protected and designated areas[41] have been considered in relation to the interpretation and application of EIB's (natural and semi natural habitats) and IFC's (natural and modified habitats) requirements which broadly align with EBRD's priority biodiversity features (PBFs), which have been applied to fauna. Habitats associated with protected areas were considered separately in relation to natural habitats, to remain consistent with the CHA approach whereby the qualifying features of protected sites were considered individually.

Habitats are discussed in more detail below, the assessment of potential impacts on these habitats are provided in Section 10. A summary table of all priority biodiversity features is presented in Appendix 10.

8.2.2 Protected and designated areas

The pipeline intersects or is close to a number of protected sites and designated areas, these are listed and described in Section 3.2. These internationally and nationally recognised areas have not been classified as critical or natural habitats, or priority biodiversity features by default based on their status. Although many of the DMUs in the CHA overlap with such areas, it is their qualifying features that have been considered under the relevant criteria and it is these habitats and species that the requirement for net gain/no net loss (for crtical habitat and PBFs/natural habitats respectively) applies to, these are discussed throughout this document.

8.2.3 Threatened habitats

Thirty habitats considered PBFs were identified within the project AOI across Greece and Albania. These are all the EU Annex 1 habitats and Greek protected habitats not triggering critical habitat. No PBF habitats were identified in Italy. These habitats are included as 'natural' habitats (including 'semi-natural' habitats as per the EIB definition) as explained in Section 3.3. The only habitats screened out were those that are clearly anthropogenic, namely intensive arable land (including sown grasslands) and urban areas (as mapped in the ESIA).

The thirty habitats are:

- **Annex 1 Habitat '1310 Salicornia and other annuals colonising mud and sand'**. In Albania this habitat is largely found in abandoned agricultural fields at the coast, where saline conditions have caused abandoned fields to return to salt-tolerant, semi-natural vegetation. The EU Article 17 reporting lists habitat 1310 as being in unfavourable-Inadequate condition around the Adriatic Sea.

[41] Internationally and/or nationally protected areas and designated sites were not included as critical habitat criteria in their own right, however all such sites within an ecologically relevant distance of the pipeline and associated infrastructure were screened into the CHA in relation to their qualifying features and the potential for those features to also occur within the project AOI.

The main threat to the habitat is likely to be coastal development for tourism and agriculture, disturbance by vehicles and recreational activities.

- **Annex 1 Habitat '1420 Mediterranean and thermo-Atlantic halophilous scrubs'**. In Albania this habitat is largely found in abandoned agricultural fields at the coast, where saline conditions have caused abandoned fields to return to salt-tolerant, semi-natural vegetation. The habitat is present on coastlines around Europe although it is considered to have been significantly reduced by human activity. The 1420 habitat is considered to be in 'unfavourable-bad' condition in the Mediterranean in the latest EU Article 17 report. The main threat to the habitat is likely to be coastal development for tourism and agriculture, disturbance by vehicles and recreational activities.
- **Annex 1 Habitat '2110 Embryonic shifting dunes'**. Habitats classified as 2110 are formations representing the first stages of dune construction, constituted by ripples or raised sand surfaces of the upper beach or by a seaward fringe at the foot of the tall dunes. They are found on coasts across Europe and are characterised by the presence of organic material washed up by the sea, transient dunes with a height of less than 1 m and sparse vegetation cover. The EU Article 17 reporting lists habitat 2110 as being in 'unfavourable-bad' condition around the Mediterranean. The main threats to the habitat are coastal development for tourism and agriculture but also disturbance from tourists and bathers using and crossing the sand.
- **Annex 1 Habitat '3280 Constantly flowing Mediterranean rivers with *Paspalo-Agridion* species and hanging curtains of *Salix* and *Populus*'**. The habitat refers to large Mediterranean rivers with nitrophilous annual and perennial grass and sedge formations on their alluvial banks and has been recorded scattered throughout Greece, especially in the east. The habitat refers to large Mediterranean rivers with nitrophilous annual and perennial grass and sedge formations on their alluvial banks. Species include *Paspalum paspaloides*, *P. vaginatum*, *Polypogon viridis*, *Cyperus fuscus*, in addition to hanging curtains of *Salix* spp and *Populus alba*. The habitat is limited to but spreads across the south of Europe and is scattered across Greece, Italy, France, Spain and Portugal. Common threats include changes in river conditions, river canalisation, mining and quarrying, urbanisation and human habitation as well as soil pollution and alien invasive species.
- **Greek habitat '32B0 Annual River Communities'**. This habitat occurs only at the crossing of the Kosinthos (Xanthis) and the Xiropotamos (Kompsatos), and refers to communities dominated by annual species in river beds. This habitat is common throughout Europe. Common threats include changes in river conditions, river canalisation, mining and quarrying, as well as soil pollution and alien invasive species.
- **Annex 1 Habitat '5110 Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes'**. Habitats classified as 5110 are stable, upland, xerothermophilous and calcicolous scrubs dominated by thickets of *Buxus sempervirens* with fringe associations of the *Geranion sanguinei* alliance (such as *Juniperus oxycedrus*, *Pyrus amygdaliformis*, *Quercus pubescens* and *Fraxinus ornus*). They also constitute the natural woodland edge of calcareous dry forests rich with *Buxus*. In Albania, the habitat has a scattered but broad distribution. This is also the case in Greece, although the TAP project does cross any areas of it. Article 7 reporting shows 5110 habitat is in an 'unfavourable-inadequate' condition around the Mediterranean. The habitat occurs on land that is inherently unsuitable for agriculture, so does not face the general threat from land conversion, but uncontrolled wildfires and high grazing

pressures are likely to reduce the extent of the habitat, particularly for the slow-growing *Buxus sempervirens* (Box).

- **Annex 1 Habitat '5130 *Juniperus communis* formations on heaths or calcareous grasslands'**. They are located on upland areas in the centre of Albania. Habitats classified as 5130 are formations with *Juniperus communis* (Common Juniper) of plain to montane levels. This habitat is widespread in Albania and across the rest of central and western Europe. This extent of this habitat is considered to have been significantly reduced by human activity. EU Article 17 reporting shows that habitat 5130 is a 'favourable' condition around the Mediterranean. Pressures and threats are numerous but the abandonment of traditional grazing regimes, allowing succession is a common problem.
- **Greek scrub habitats: 5160 "South-eastern sub-sub-Mediterranean deciduous thickets", 5340 "Garrigues of Eastern Mediterranean", and 5350 "Pseudomaquis"**. These three habitats comprise stands of sclerophyllous and spiny shrubs, particularly *Quercus coccifera*. These habitats are widespread throughout Greece and the Mediterranean as a whole. The main threat to this habitat is conversion of wooded land to agriculture and through fire. The tough species are normally grazing-resistant, although transitions between the three types of scrub are likely to occur when the grazing intensity is altered.
- **Annex 1 Habitat '5210 Arborescent matorral with *Juniperus* spp'**. They are patchily distributed in the centre of Albania and the north-west of Greece. Habitats classified as 5210 are primarily formed of Mediterranean and sub-Mediterranean evergreen bush and scrub (matorral) organized around arborescent junipers. These species are important species for soil retention and consolidation. This habitat is scattered across both Albania and Greece. The total range of this habitat is restricted to Mediterranean Europe. This extent of this habitat is considered to have been significantly reduced by human activity. Article 17 reporting shows habitat 5210 is in a favourable condition around the Mediterranean although the total area of occurrence is declining. Fires, overgrazing, urbanisation and tourist pressure present the main threats to the habitat. Habitat loss is also frequently due to the clearing of areas for stock raising or agriculture.
- **Greek habitat '6290 Mediterranean subnitrophilous grassland'**. This Greek habitat type refers to communities of nitrophilous and synanthropic species that consist mainly of annual grasses of the genera *Bromus*, *Aegilops*, *Avena*, *Vulpia* with crucifers and legumes. They develop in road embankments, between cultivated fields, grazed areas and abandoned cultivations. They were recorded between KP 445.0 and KP 454.8, in the northwestern foothills of Vermio Mt. and in the Eordea plain section northeast of Variko village and throughout the eastern sections in abandoned fields. The main threat to this habitat is from land conversion for agriculture, although conversely this is one of the main habitats that develops on abandoned agricultural land.
- **Greek habitat '62A0 Eastern sub-Mediterranean dry grasslands (*Scorzonetailia villosae*)'**. This Greek habitat type refers to thermophilous grassland communities found in foothills and mountainous areas. They are abundant and scattered across the north of Greece. 62A0 habitat is threatened by agricultural intensification, succession, fertilisation and urban development.
- **Annex 1 Habitat '6420 Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion'**. They are patchily distributed across the north of Greece. This habitat comprises rush- and grass-dominated vegetation of seasonally water-logged soils, both base rich and acidic. It is widespread throughout the entire Mediterranean basin, extending along the coasts of the

Black Sea, particularly in dune systems. The main threats to this habitat are from development of settlements, associated infrastructure and the consequences of habitation such as pollution, together with, in some places, intensification of farming. The impact has been patchy, locally intensive but overall moderate.

- **Greek Habitat '6450 Greek hyper-Mediterranean humid grasslands'**. They are scattered across north-eastern Greece. This Greek habitat type refers to communities of nitrophilous and synanthropic species of high humidity. It is usually found in old abandoned fields. 6450 habitat is threatened by agricultural intensification, a lack of mowing or grazing linked to succession, fertilisation, urbanisation and forest planting on open ground.
- **Annex 1 Habitat '6520 Mountain hay meadows'**. They are scattered across central and eastern Albania. Habitats classified as 6520 are hay meadows at higher altitudes (usually 600m or higher), often in mountain valleys. These meadows, traditionally managed for hay production, are often very species-rich. Some areas of former agriculture land near the villages of Trestenik, Vranisht, Cangonj, Zemblak, which were abandoned 15 - 20 years ago, now support a semi-natural assemblage of this habitat. These areas support a less varied flora than lowland natural grasslands and are often subject to intensive grazing or mowing for livestock feed. This habitat is found across Europe at appropriate elevations but is concentrated on the hills and mountains of central Europe. EU Article 17 reporting shows 6520 habitat is in an 'unfavourable-bad' condition around the Mediterranean. The major threats include agricultural intensification, a lack of mowing or grazing linked to succession, fertilisation, urbanisation and forest planting on open ground.
- **Greek habitat '72A0 Reed beds'**. They are patchily distributed across the north-east of Greece. This habitat type is widespread in Greece and is the most common riparian habitat type along the route developing in temporary streams and standing or slow flowing waters. It is dominated by *Phragmites australis* and *Typha* sp. This habitat is found all over Europe and along with many wetland habitats, it is considered to have been significantly reduced by wetland drainage. The two main threats to reed beds are the drainage of wetlands for urban development and agriculture and the natural succession of the habitat where silt is able to collect and allow other vegetation including trees to dominate. Alteration to hydrology is also an issue since a change in flow or volume of water being put into the reedbeds can cause a change in habitat.
- **Annex 1 Habitat '8210 Calcareous rocky slopes with chasmophytic vegetation'**. This habitat type is found in the mountainous regions in western Greece and central Albania. This habitat naturally occurs on steeper rocky slopes and unstable substrates and is characterised by species-rich assemblages of stress-tolerant species such as *Astragalus sirinicus*, *Juniperus oxycedrus* (Prickly juniper), *Staehelina unifloscula* and *Pyrus pyraster* (Wild Pear). In addition some areas of serptine rock support species specially adapted to the conditions, such as *Festucopsis serpentini.* These species are often uncommon in other habitat types and can be of conservation significance. This type of habitat has is widespread but scattered in mountain regions of Albania as a mosaic with other habitat types. Although there is little direct information on this habitat in Albania or Greece, the steep slopes and unstable substrate mean the habitat is unlikely to be converted to other land use. Grazing from goats is a potential threat. The biggest threat may come from slope stabilisation allowing conversion to woodland, although the extent of this is probably very limited.

- **Annex 1 Habitat '8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)'**. This habitat is found only along the Terpollar re-route in Albania in several locations between KP1.3 and KP5.0 and along the access track associated with the re-route. These open rocky habitats support a unique flora capable of tolerating cold winters and short growing seasons and often includes the species most vulnerable to warming climate. The slow-growing species are likely to be very sensitive to disturbance.
- **Annex 1 Habitat '8220 Siliceous rocky slopes with chasmophytic vegetation'**. This habitat type is found across small parts of the study area at the northern end of the Morave-Gramoz protected area and in the Vithkuq-Ostrovice mountains. This habitat naturally occurs on steeper rocky slopes and unstable substrates and is characterised by stress-tolerant species such as *Astragalus sirinicus*, *Juniperus oxycedrus* (Prickly juniper), *Staehelina unifloscula* and *Pyrus pyraster* (Wild Pear). These species are often uncommon in other habitat types and can be of conservation significance. This type of habitat has is widespread in mountain regions of Albania as a mosaic with other habitat types. Although there is little direct information on this habitat in Albania, the steep slopes and unstable substrate mean the habitat is unlikely to be converted to other land use. Grazing from goats is a potential threat. The biggest threat may come from slope stabilisation allowing conversion to woodland, although the extent of this is very limited.
- **Annex 1 Habitat '9130 *Asperulo-Fagetum* beech forests'**. Beech forest count among the rarest forest types in Greece, providing 5% of the forest cover of the country. They are restricted in the northern and central mountainous parts of the mainland, at about 800-1700 m. Beech forests in Greece are managed by Forest Agencies and do not face severe threats like fires, grazing or illegal felling. The main area of this beech forest along the TAP route in Greece occurs in the Vermio Mountains between KP438 and KP445.
- **Annex 1 Habitat '9170 Galio-Carpinetum oak-hornbeam forests'**. This habitat type, generally dominated by *Carpinus orientalis* (Oriental Hornbeam) is found across small parts of the study area in the Vithkuq-Ostrovice mountains and parts of the Osumi valley. Within the project area this woodland community is typically limited to areas with poorly-developed soils so many trees are small and the woodland has an open structure. This type of habitat has is widespread in Albania. Although there is little direct information on this habitat in Albania, it grows in areas with poorly developed soils so the land is not suitable for agriculture. The main threat is likely to relate to grazing inhibiting natural regeneration of the trees.
- **Annex 1 Habitat '91M0 Pannonian-Balkanic turkey oak-sessile oak forests'**. These are woodlands dominated by a mix of deciduous oak species including *Quercus pubescens* (Pubescent Oak), *Quercus cerris* (Turkey Oak) and *Quercus frainetto* (Hungarian Oak) are found across small parts of the study area on the hill slopes along the Osumi River valley. The forests are often fragmentary and low-growing sometimes only shrubby. Most of the forests are managed as coppice, used by the local population for fire wood and for grazing (especially goats) and branch cutting for livestock food during the winter. Although there is little direct information on this habitat in Albania, it is likely to suffer from land conversion for agriculture and quarrying. It will also suffer where regeneration of young trees is inhibited by grazing.
- **Greek Habitat '924A thermophilous oak woods of Eastern Mediterranean and the Balkans'**. Thermophilous forests are widespread in Greece. They comprise the most common deciduous forests in the project area occurring in south-west of Kirki village and in the Krousia mountains, Vermio mountains,

Askion mountains and in the Kastoria to Albanian border area. Small oak forest stands are found among agricultural areas throughout the route. They are dominated by numerous oak species, such as *Quercus frainetto*, *Q. pubescens, Q. cerris, Q. petraea*, as well as other deciduous trees, e.g. *Carpinus orientalis, Crataegus monogyna, Castanea sativa, Ostrya carpinifolia, Coryllus avellana, Acer* spp. The main threat to this habitat is conversion of wooded land to agriculture. The habitat is likely to persist under traditional woodland management practices, such as coppice for timber, and small stands remain in agricultural areas often for this purpose.

- **Annex 1 Habitat '9250 *Quercus trojana* woods''**. *Quercus trojana* is one of the rarest oak species in Greece, growing exclusively in the north-west continental part of the country. It forms forests with restricted occurrence in Greece and their conservation is a priority. They were recorded along the route in mostly loose stands in the western slopes of Mt. Vermio. They form a mosaic with agricultural land and *Juniperus oxycedrus* shrubland, at elevations ca. 600-850 (-1050) m (TAP Greece ESIA). The *Quercus trojana* woods along the TAP route have a naturally open structure with species-rich grasslands between the trees. These woods are therefore less sensitive than others to removal of trees due to limited impact of edge effects and fragmentation. *Quercus trojana* wood is considered to be in favourable condition in Greece based on the 2001-2006 Article 17 reporting. However, the woodland faces significant pressures from land conversion to agriculture, changes to grazing regimes and exploitation for timber.
- **Greek Habitat '925A Mixed theromphilous forest with *Ostrya* and *Carpinus*'**. Hornbeam and mixed thermophilous forest are widespread in Greece; they are not threatened but probably extend to abandoned agricultural areas. It has been recorded along the route in Krousia mountains and in mountains of Palaia Kavala, forming dense stands dominated by several tree and shrub species, such as *Carpinus orientalis*, *Fraxinus ornus*, *Acer monspessulanum.* No specific threats are identified for this habitat, and it is likely to persist under traditional woodland management practices, such as coppice for timber. This habitat is one of the woody communities that most commonly develops of abandoned agricultural areas.
- **Annex 1 Habitat '92A0 *Salix alba* and *Populus alba* galleries'**. This habitat occurs along most of the riparian corridors in Greece and Albania. This habitat type refers to riparian forests along rivers with woody vegetation including *Salix alba* (White Willow) and *Populus alba* (White Poplar). This habitat is widespread throughout Europe although the greatest proportion occurs in the Mediterranean. This extent of this habitat is considered to have been significantly reduced by modification of river channels, although the habitat persists or regenerates better than many riparian communities along modified channels in locations where trees are allowed to grow. *Salix alba* and *Populus alba* gallery forest is considered to be in "unfavourable-inadequate" condition in Greece based on the 2001-2006 Article 17 reporting. However, the woodland faces significant pressures from land conversion to agriculture and modification of river channels.
- **Annex 1 Habitat '92C0 *Platanus orientalis* and *Liquidambar orientalis* woods'**. They occur along riparian corridors throughout Greece and Albania. This habitat type refers to riparian forests largely dominated by *Platanus orientalis*, but often with a diverse mix of trees and shrubs. The total range of this habitat type is rather restricted, occurring in Greece, Albania, Bulgaria, Cypress and southern Italy. This extent of this habitat is considered to have been significantly reduced by modification of river channels. *Quercus*

macrolepis forest is considered to be in favourable condition in Greece based on the 2001-2006 Article 17 reporting. However, the woodland faces significant pressures from land conversion to agriculture, changes to grazing regimes and exploitation for timber.

- **Annex 1 Habitat '92D0 Southern riparian galleries and thickets'**. This habitat type refers to riparian scrub with *Tamarix* and/or *Nerium* and occurs in riparian locations across Greece. It has been recorded along the pipeline route along the Axios river corridor. Southern riparian galleries and thickets are considered to be in unfavourable condition in Greece based on the 2001-2006 Article 17 reporting. This extent of this habitat is across its range is considered to have been significantly reduced by human modification of river channels and face ongoing threats to alterations to rivers.
- **Annex 1 Habitat '9340 *Quercus ilex* and *Quercus rotundifolia* forests'**. The occurrence of this habitat in Albania is a humid variant of the vegetation type but still dominated by evergreen trees. It is found in small fragments in the hilly areas of the pipeline route in the Osumi River valley. The forest is a dense, evergreen scrub up to 2.5 m tall. It occurs mainly on acid soil in slightly damp places is representing a more disturbed stage of evergreen *Quercus ilex* (Holm Oak) forests. Threats to this habitat type include land conversion for agriculture and quarrying as well as general erosion of slopes along the river valley. It will also suffer where regeneration of young trees is inhibited by grazing, particularly by agile goats.
- **Annex 1 Habitat '9340 *Quercus ilex* forests'**. It has been recorded along the pipeline route south-west of Kirki village. This habitat type refers to loose galleries and stands of *Quercus ithaburensis* subsp. *macrolepis* growing on calcareous substrates from the sea level up to 600-700 m in the lowland and semi-mountainous zone of continental and insular Greece. The total range of this habitat type is rather restricted, occurring in Greece, Albania, southern Italy and western Turkey. This extent of this habitat is considered to have been significantly reduced by human activity, thus it constitutes a habitat type of high importance for Greece, which is considered primarily responsible for their conservation in the EU. *Quercus macrolepis* forest is considered to be in favourable condition in Greece based on the 2001-2006 Article 17 reporting. However, the woodland faces significant pressures from land conversion to agriculture, changes to grazing regimes and exploitation for timber.
- **Annex 1 Habitat '9350 *Quercus macrolepis* forests'**. It has been recorded along the pipeline route south-west of Kirki village. This habitat type refers to loose galleries and stands of *Quercus ithaburensis* subsp. *macrolepis* growing on calcareous substrates from the sea level up to 600-700 m in the lowland and semi-mountainous zone of continental and insular Greece (TAP Greece ESIA). The total range of this habitat type is rather restricted, occurring in Greece, Albania, southern Italy and western Turkey. This extent of this habitat is considered to have been significantly reduced by human activity, thus it constitutes a habitat type of high importance for Greece, which is considered primarily responsible for their conservation in the EU (TAP Greece ESIA).

In addition to the above habitats the coastal vegetation in Albania also constitutes a priority biodiversity feature. This area of vegetation runing from the "wooded dunes" around KP210 to the coast is heavily disturbed, areas of sand, including the foredunes, have very limited areas of sand-binding grasses such as marram or sand couch. These species would normally stabilise sands and begin the process of succession to fixed dune vegetation. The very high disturbance prevents this from happening, maintaining an open dune community. There are populations of these species within 3 km along the

coast – seed could be collected from these sustainably and used to establish them along the pipeline RoW leading to more natural vegetation. A rapid ecological assessment was undertaken in this area in June 2017. Preliminary findings indicate no marram grass was identified but that five clusters of *Sarcopoterium spinosum* were identified on, or close to the ROW at KP211.5. This is an endangered species in Albania and is only the second location where this is identified in the country therefore this survey data will be key to informing mitigation measures (via Site Files) in this locality for such important biodiversity features.

The residual impact assessment for potential project impacts on these habitats are presented in Table 55.

Threatened flora species not triggering critical habitat, but classified as priority biodiversity features, were encountered in a few locations throughout the pipeline route. These species are all associated with a small number (often only one) habitat along the pipeline route, and the protection measure in place for the habitat will be sufficient to ensure the persistence of these species. The habitat associations for these species is given in Table 23 below. Because the habitat mitigation will be sufficient to ensure the persistence of these species, they are not assessed separately.

Table 23 PBF flora species and their associated habitats

Species	Habitats for the species (along TAP working width)
Adiantum capillus-veneris	9170 *Galio-Carpinetum* oak-hornbeam forests 5130 Juniperus communis formations on heaths or calcareous grasslands 5210 Mediterranean arborescent matorral, arborescent matorral with Juniperus spp.
Ammophila arenaria	2110 Embryonic shifting dunes (*Cakiletea maritimae & Ammophiletea*)
Cephalanthera epipactoides	9170 *Galio-Carpinetum* oak-hornbeam forests
Colchicum autumnale	9170 *Galio-Carpinetum* oak-hornbeam forests 5130 Juniperus communis formations on heaths or calcareous grasslands 5210 Mediterranean arborescent matorral, arborescent matorral with Juniperus spp.
Dictamnus albus	9170 Galio-Carpinetum oak-hornbeam forests
Ephedra distachya	Species absent from AOI in recent surveys
Erica forskalii	Garrigues on Italian coast in areas avoided due to microtunnelling
Gentiana lutea	9110 Luzulo-Fagetum beech forests
Hypericum perforatum	6520 Mountain hay meadows
Juglans regia	92A0 Salix alba and Populus alba galleries 91E0*Alluvial Forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion Incanae, Salicion Albae)

Juniperus communis	5130 Juniperus communis formations on heaths or calcareous grasslands 8210 Calcareous rocky slopes with chasmophytic vegetation
Juniperus oxycedrus	2270 * Wooded dunes with Pinus pinea and/or Pinus pinaster
Origanum vulgare	9170 *Galio-Carpinetum* oak-hornbeam forests
Pancratium maritimum	Not present (confirmed 2017 surveys)
Phyllitis scolopendrium	9110 Luzulo-Fagetum beech forests
Quercus ilex	9340 Quercus ilex forests
Salix fragilis	92A0 Salix alba and Populus alba galleries 91E0*Alluvial Forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion Incanae, Salicion Albae)
Salvia officinalis	8210 Calcareous rocky slopes with chasmophytic vegetation 8220 Siliceous rocky slopes with chasmophytic vegetation
Sambucus nigra	9170 *Galio-Carpinetum* oak-hornbeam forests
Satureja montana	8210 Calcareous rocky slopes with chasmophytic vegetation
Serapias orientalis subsp. apulica	Meadows on Italian coast in areas avoided due to microtunnelling
Viburnum tinus	9170 *Galio-Carpinetum* oak-hornbeam forests
Viscum album	9110 Luzulo-Fagetum beech forests

8.2.4 Fauna

The section considers terrestrial, freshwater and marine fauna that may constitute a priority biodiversity feature and therefore require consideration during identification of mitigation measures to ensure no net loss, and ideally, a net gain.

The assessment process for fauna is based upon, and therefore draws predominately from, the EBRD criteria for the identification of biodiversity features.

The following definition is taken from EBRD's PR6: *Priority biodiversity features are a subset of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats*. Such features may include: threatened habitats, vulnerable species and significant biodiversity features identified by a broad set of stakeholders or governments (e.g. KBAs, IBAs). IFC PS6 performance standards for projects within natural habitats (refer to Section 2.3 for details) are broadly similar to those outlined below for EBRD.

All species that did not trigger critical habitat were reviewed individually in relation to their IUCN classification (globally, regionally and/or nationally) and listing on Annex II of the Habitats Directive. An IUCN classification of CR, EN or VU (at any level) or listing on Annex II was enough to trigger PBF unless;

- no impact pathway exists
- the species or their habitat is not known within the AOI
- a DMU was not identified during the CHA.

The following groups of PBFs have been identified as a result of this screening process:

- birds
- freshwater fish
- herpetofauna
- threatened / endemic flora
- cave-roosting bats
- tree-roosting bats
- threatened habitats
- marine benthos and habitats
- marine mammals
- turtles
- bony fish.

These are considered further in the impact assessment tables in Section 10, the screening of PBFs is shown in Appendix 10.

9 BIODIVERSITY IMPACT ASSESSMENT

9.1 Impact assessment methodology

In order to apply current best practice approaches, the assessment of residual impacts on important biodiversity features (including critical habitat, natural habitat and priority biodiversity features) follows the Chartered Institute of Ecology and Management (CIEEM) 2016 guidance[42] for ecological impact assessment.

In summary the CIEEM guidelines on ecological impact assessment state:

- impacts should be characterised according to extent, magnitude, duration, reversibility, timing and frequency
- impacts that are unlikely to occur, or if they did occur are unlikely to be significant, can be scoped out (with justification)
- broadly, significant effects encompass impacts on the structure and function of defined sites, habitat or ecosystems, and the conservation status of habitats and species (including extent, abundance and distribution)
- an ecologically significant impact is one that has a negative effect on the integrity of a site or ecosystem and/or the conservation objectives for habitats and species populations within a given geographical area
- discussion on residual impacts should consider an evaluation of the likelihood of success of the proposed mitigation
- discourages the use of a matrix approach but, if unavoidable, requires a distinction between evidence-based and value-based judgements to be made. In addition, any quantification of impacts requires clear definition of the underpinning criteria and thresholds.

Considering this, detailed definitions of magnitude and a more sharply defined significance matrix (than that used in the original project ESIAs) have been developed, these will be applied using evidence based and value based judgements as appropriate with clearly defined thresholds and criteria.

9.1.1 Sensitivity/importance

Criteria such as conservation status, provision of ecosystem services, diversity, etc. were developed for the ESIA to determine the overall quality and/or importance (and therefore sensitivity) of different habitats and species (receptor/resource) present. Sensitivity was graded on a comparative axis from negligible to high.

All species and habitats triggering critical habitat were automatically assigned a **high sensitivity** for all subsequent assessments due to their high conservation value. priority biodiversity features and natural habitats were assigned a **medium sensitivity**.

9.1.2 Magnitude

Factors influencing the magnitude of potential impacts include:

[42] cieem.net/data/files/Publications/EcIA_Guidelines_Terrestrial_Freshwater_and_Coastal_Jan_2016.pdf

- the spatial extent over which the impact is experienced
- the extent to which habitat relied upon by the species is impacted (see above)
- the size of the population (or proportion thereof) that is affected
- the timing of the impact
- the duration and/or frequency of the impact
- the extent to which an impact is reversible
- the size of the impact footprint in the context of the wider range over which the species lives
- the scale of change induced
- the likelihood of a receptor being present at the time of the impact occurring.

Table 24 defines the different levels of magnitude that were assigned to potential impacts arising as a result of TAP activities.

Table 24 Magnitude of impacts

Magnitude	Definition
Large	• Fundamental - permanent and/or irreversible change or damage to all/the majority of exposed receptor/receptor group and/or features/integrity of the habitat which are of vital importance to the receptor/ receptor group • Fundamental - alteration to key characteristics, integrity, distribution and/or features of the particular receptor/receptor groups character or distinctiveness • Impact occurrence or sensitive receptor presence highly likely or known to occur
Medium	• Considerable- long-term (> 5 years) change to a significant proportion of exposed receptor/ receptor group and/or features/integrity of the habitat which are of particular importance to the receptor/ receptor group • Considerable - discernible alteration to key characteristics integrity, distribution and/or features of the particular receptor/ receptor groups character or distinctiveness • Impact occurrence or sensitive receptor presence likely
Small	• Discernible - temporary (throughout entire project construction and reinstatement phase) and/or reversible change to a minor proportion of a receptor/receptor group and/or features / integrity of the habitat which are of particular importance to the receptor/ receptor group. • Discernible – limited but discernible alteration to key characteristics, integrity, distribution and/ or features of the particular receptor/ receptor groups character or distinctiveness • Impact occurrence to sensitive receptor possible/likely to be one-off
Negligible	• Noticeable - temporary (duration of a particular construction activity) and/or reversible change, or barely discernible change for any period of time, to an insignificant proportion of a receptor/receptor group and/or features/integrity of the habitat which are of particular importance to the receptor/ receptor group • Noticeable - slight alteration to key characteristics, integrity, distribution and/or features of the particular environmental aspect's character or

	distinctiveness. • Impact occurrence or receptor presence unlikely, or considered to be one-off

9.1.3 Assessment of significance

Magnitude and receptor sensitivity were looked at in combination to evaluate whether an impact is going to be significant, using the matrix illustrated in Figure 6.

All residual impacts on critical habitat and priority biodiversity features/natural habitat will require the application of the mitigation hierarchy, including biodiversity offsets as a last resort, in order to achieve a net gain or no net loss respectively; this is discussed further in Section 11 and in the Biodiversity Offsets Strategy (document reference CAL00-C5577-640-Y-TRY-0001).

	Magnitude			
Sensitivity	Large	Medium	Small	Negligible
High				
Medium				
Low				
Negligible				

Where:

Not significant
Significant

Figure 6 Evaluation of significance

The following sections provide a more detailed assessment of potential impacts, proposed mitigation and residual impacts for each identified critical habitat trigger and priority biodiversity feature (including natural habitat).

Where priority biodiversity features fall within existing species groups of critical habitat triggers and/or geographically fall within existing DMUs for which the proposed mitigation measures will also address the potential impacts on the priority biodiversity feature, a separate impact assessment has not been considered necessary.

9.2 Summary of potential impacts

Prior to the application of mitigation measures, the project could have the following main impacts on critical habitat/ natural habitat/ priority biodiversity features:

- direct habitat loss to wildlife – this will be temporary for the majority of the pipeline working strip, with a reduced permanent loss of terrestrial habitat within the 8 m-wide Permanent Protection Strip (PPS) and at compressor stations
- indirect habitat loss due to avoidance of temporary working areas and permanent access roads by animals
- permanent conversion of habitats from one habitat type to another, resulting in a decrease in areas of certain habitats (particularly wooded habitats). This will be permanent for the 8 m-wide PPS and at compressor stations. Other habitats along the pipeline working strip may also be altered permanently or for the long-term
- impacts on water quality of watercourses from run-off, sedimentation, fragmentation etc.
- habitat degradation
- fragmentation (reduced connectivity) of animal populations
- disturbance and displacement of fauna and avifauna
- direct mortality (collision with vehicles, vessels and construction plant)
- indirect mortality from hunting and collecting (facilitated access)
- indirect habitat loss due to avoidance of temporary working areas offshore and in nearshore/coastal areas
- physical loss of / damage to seabed habitats, and associated species, within the footprint of the anchors and cables of the installation barge along the entire offshore alignment, and direct loss under the footprint of the pipeline and associated infrastructure
- increased suspended sediment concentrations (including potential contaminants) resulting in increased turbidity and potential for smothering of marine biota beyond the spatial extent of the direct construction footprint
- physiological (mortality, injury, permanent threshold shifts, temporary threshold shifts) and behavioural (disturbance, displacement, disruption of foraging) impacts on marine mammals, turtles and fish from underwater noise associated with piling and other construction activities

The impact assessments for all critical habitat triggers and priority biodiversity features (including natural habitat) are presented in Section 10. TAP have produced a separate Cumulative Impact Assessment (document reference CAL00-C5577-640-Y-TAE-0005) in accordance with the IFC Good Practice Handbook[43] which incorporates the critical habitat triggers and priority biodiversity features, cumulative impacts are not considered further in this document.

43 https://www.ifc.org/wps/wcm/connect/3aebf50041c11f8383ba8700caa2aa08/IFC_GoodPracticeHandbook_CumulativeImpactAssessment.pdf?MOD=AJPERES

9.3 Mitigation hierarchy

The assessment of residual impacts is undertaken after the application of the mitigation hierarchy, as presented in Figure 7.

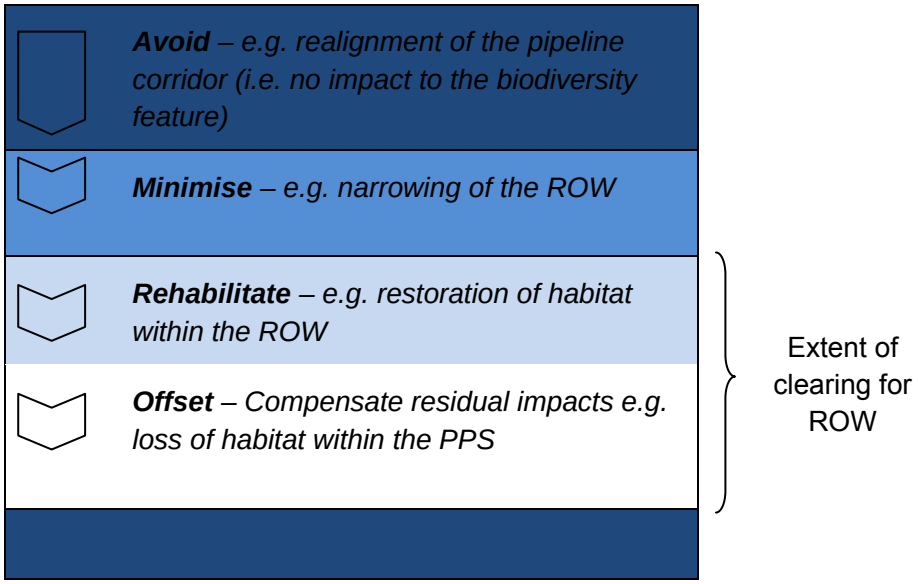


Figure 7 Mitigation hierarchy for pipeline ROW

TAP has undertaken the route design process and has evidence that these measures have been implemented in accordance with the mitigation hierarchy in order to avoid biodiversity features. Below are a few examples of how the mitigation hierarchy was integrated into project planning.

9.4 Application of the mitigation hierarchy – project examples

9.4.1 Avoidance and minimisation of impacts

An extensive, thorough and iterative appraisal of route options was undertaken by TAP to select a technically feasible pipeline route with minimal impacts on environmental, socio-economic and cultural heritage receptors. The selected route begins near Kipoi in Greece, at the Greek-Turkish border and terminates near San Foca in Italy, crossing Greece, Albania and the Adriatic Sea. The pipeline will span 773 km onshore (550 km in Greece, 215 km in Albania and 8 km in Italy) and 105 km offshore with approximately 60 km in Albanian waters and 45 km in Italian waters.

Refinement of the route occurred at four stages: pre-feasibility study; feasibility study; extended basic engineering; pre-Front end engineering design (FEED) and FEED. The detailed design phase is still ongoing allowing up-to-date information, e.g. from surveys of sensitive habitats and species, to be taken into consideration during construction and installation.

The systematic route selection process considered alternative pipeline routes which were evaluated to determine technical, environmental and economic viability. Consideration was given to constraints relating to: engineering, land ownership, environmental features, health and safety requirements. The length of the pipeline was also used as a screening criterion as it relates directly to risk of leaks, areas of construction related disturbance, permanent habitat fragmentation, construction and operational costs.

During 2010 and 2011 the initial base case onshore corridor was narrowed from 50 km to 25 km, and the landfalls and the offshore corridor options were also assessed. The following parameters were used to inform this process:

Onshore

- ease of returning crossed areas to the morphological conditions and land use existing before the works thereby minimising landscape and livelihood impacts
- avoidance where possible of environmental protected areas such as national parks
- avoiding crossings in areas affected by urban and/or industrial development plans; preference for agricultural land
- avoidance of areas susceptible to hydrogeological instability
- avoidance of springs and wells tapped for drinking water
- avoidance of marshlands and peat soil
- avoidance of geohazard areas
- using, wherever possible, the easement corridors already constructed by pre-existing infrastructure (natural gas, pipelines, channels, roads etc.)
- minimise environmental and social impacts

Offshore

- shortest distance
- avoid areas of geohazards / unstable slopes
- avoidance of Natura 2000 areas designated for seagrass
- minimise the number of curves
- minimise the pipeline installation and construction constraints i.e. obstacles, fishing areas, dumping areas, unexploded ordnance (UXO) areas, archaeological areas
- optimise the crossings with other pipelines and cables
- minimise interferences with navigation channels
- identify the widest installation corridor in the most critical and uneven areas in order to have greatest freedom to deviate where required
- minimise the number, lengths and heights of the free spans in the most uneven areas
- optimise the lay away from the landfall
- compliance with any third party and authority requirements
- minimise environmental and social impacts.

From 2011-2012 the 25 km corridor was refined to 400 m through assessment of macro-corridors 2-9km wide, using desk-top and field studies along with environmental,

socio-economic and cultural heritage considerations as well as logistical constraints. The data were then mapped using GIS to establish the characteristics of each route option and key indicators used to highlight key features of relevance to the impacts of a gas pipeline project for each alignment. This allowed the route options to be compared and contrasted within a matrix to facilitate the route selection process. Within Greece and Albania specific, iterative route selection processes were undertaken with particular focus on key areas that may pose engineering challenges, contain environmentally or culturally sensitive areas or existing infrastructure routes. This process was on-going from 2012-2015 and also involved extensive stakeholder consultation.

The landfall location in Albania was largely driven by the onshore route selection process with six alternative routes being considered. Five landfall locations were considered in Italy. In both instances detailed assessments of the options were undertaken from technical, environmental and socio-economic perspectives. At the Italian landfall a micro-tunnel connecting the onshore and offshore route is proposed to minimise environmental and social impacts, this is discussed further in Section 9.4.1.3.

The offshore route selection process considered three options and was greatly influenced by the landfall locations. Other factors considered included water depth and route length. Constraints considered included protected areas, species and habitats of high ecological value (e.g. *Posidonia* meadows), geohazards, military areas, UXO disposal grounds, fishing areas, recreation and tourism and existing offshore installations and infrastructure.

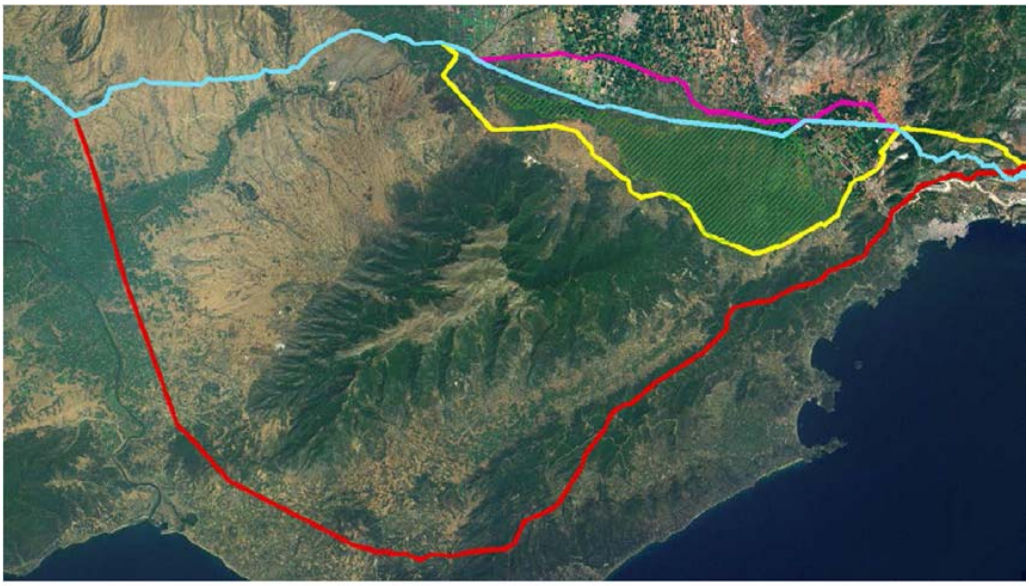
9.4.1.1 *Example 1 – Greece - Kavala Mountains area*

As part of TAPs ongoing consultation process, several re-routings were investigated following stakeholder requests, including the crossing of Philippi Plain in Kavala. The main concern raised by stakeholders was that the highly organic peat area crossed by the pipeline would have significant socio-economic impacts for local farmers and introduce operational risks to the pipeline itself.

Taking into consideration the above concerns, TAP identified the following three alternatives (see Figure 8):

- the alternative parallel to the existing DESFA route
- the south alternative, suggested by TEE-AM (Technical Chamber of Greece, Division of East Macedonia)
- the north alternative.

To select a new base case, these alternatives were each compared to the ESIA base case and evaluated on their technical feasibility, environmental constraints (including natural, cultural and socio-economic environment) and conflicts with other infrastructure and projects in the area.



Light blue line: ESIA basecase
Yellow line: Alternative parallel to DESFA route
Red line: South alternative
Purple line: North alternative
Green dashed area: Tenagi area (Peat)

Figure 8 Philippi Plain route options

The evaluation demonstrated that the south alternative and the alternative parallel to the DESFA route present major technical problems that make their construction extremely difficult and challenging, requiring complex mitigation measures that would further increase their environmental impacts. As such, these alternatives were rejected.

The north alternative maintains all the advantages of the ESIA base case while it avoids crossing the peat area. Additionally, it mainly follows existing roads and channels in order to minimise the impact on cultivated land. Therefore, the north alternative was considered to effectively address local concerns and at the same time provide a technically feasible and environmentally advantageous route for this sensitive area. One drawback was that the north alternative crosses the peripheral zone of the archaeological area of Philippi, and additional work and investigations were required to ensure that pipeline construction would not affect known cultural heritage.

Based on the above, the north alternative was selected as the new base case for Philippi Plain.

9.4.1.2 *Example 2 – Albania – Hotova Region*

At the core of this re-route pipeline segment is the Hotova region, which includes the Hotova Fir-Dangelli National Park, a legally protected area and potential Emerald site. Steep slopes and instable soils were also known to be present within this region.

Throughout 2009, alternative corridors were identified (see Figure 9). The outcome of the interdisciplinary alternatives assessment led to four of the alternatives being

discarded, primarily due to the potential for causing irreversible changes to the landscape and habitat, but also because of the presence of active landslides. This therefore resulted in the identification of two technically feasible route alternatives for which the main environmental, socioeconomic and cultural heritage aspects were further assessed.

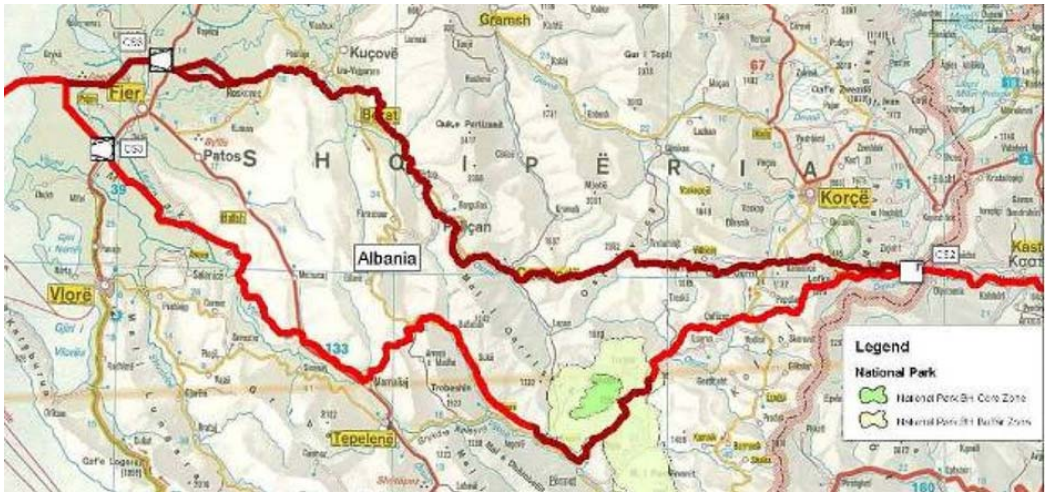


Figure 9 Albania central region route options

Appraisals of each alternative demonstrated that both were technically feasible, facing similar over-all construction challenges. Similarly, no significant differences were found in terms of safety, socio-economic and cultural heritage impacts.

The Northern Alternative faced fewer challenges in terms of environmental impacts and interference with official planning zones. The construction of the Southern Alternative would not comply with Albanian and European Union (EU) legislation due to its impacts on the Hotova National Park, as it crosses the Park's sustainable/traditional use zones for 18 km.

As a result of the outcomes of the alternatives assessment, TAP AG adopted the Northern Alternative as the base case routing for its further planning and approval process in Albania.

9.4.1.3 *Example 3 - Italian nearshore pipeline route selection*

The proposed pipeline route is located to the north of San Foca (Lecce), Italy. The pipeline landfall is located between San Foca and Torre Specchia Ruggeri in the municipality of Melendugno. As described above, TAP produced a Preliminary Environmental Study and the Front End Engineering Design (FEED) for the Microtunnel project at the Italian landfall in 2014, This was in order to meet permitting requirements and ensure impacts on sensitive coastal and marine habitats were minimised through embedded mitigation in the design engineering.

The landfall will be constructed using micro tunnelling techniques in order to minimize the landscape and environmental impacts on the coast and nearshore benthic habitats.

The direction of the micro-tunnel axis and its exit point have been selected through an optioneering process that satisfies the limitations imposed by the consent agreement, considers engineering constraints and minimizes potential risks and impacts on the environment including:

- avoidance of the coastline adjacent to some areas characterized by a very high geomorphological risk
- avoidance of all Natura 2000 sites and other protected areas
- as far as possible, avoidance of environmentally sensitive areas, minimizing direct and indirect interference with bioconstructions and seagrass of conservation value (discussed in detail in the following sections)
- avoidance of any construction work impacts on the beach and on the neighbouring areas
- restricting construction work close to the shore to outside of the summer recreational usage period.

The nearshore alignment has been selected to ensure spatial separation from bioconstructions and seagrass present in the nearshore waters.

9.4.2 Rehabilitation of pipeline working width

The majority of the pipeline working strip, with the exception of the 8 m PPS, will be rehabilitated on completion of construction, with pre-construction habitats allowed to regenerate naturally from the seed bank. Natural regeneration will be monitored for percentage cover and species composition annually post-construction, using undisturbed areas of the same habitat nearby as benchmarks. Some habitats (such as coastal dune ecosystems) may be more challenging to rehabilitate and may require support through seed collection, active planting and/or translocation programmes. Recommendations for supplementary actions will be made based on the annual monitoring results.

In habitats where natural regeneration is sufficient only the PPS will be considered a permanent habitat loss that requires offsetting. However, it is acknowledged that some habitats simply cannot be recreated within the ROW post-construction (i.e. those supporting deep-rooted tree species such as beech forest and complex riparian vegetation). For these more challenging habitats, the restoration initiatives within the ROW will only be considered as “above-and-beyond” gains in biodiversity values and will not be considered as compensation for any loss (see Biodiversity Offsets Strategy).

9.4.3 Nearshore alignment

To follow on from the surveys undertaken for the ESIA, seagrass and bioconstruction surveys were undertaken in 2016 around the micro-tunnel exit point.

Two species of seagrass, *Posidonia oceanica* and *Cymodocea nodosa*, are found in Italian nearshore waters. *Posidonia oceanica* is on the IUCN red list as ‘least concern’, it is endemic to the Mediterranean Sea throughout which it is widespread. Seagrass beds, or meadows, provide habitats for many species. Seagrass is under pressure from anthropogenic activities resulting in population declines.

Within the Mediterranean several typologies of bioconstructions are widespread and common, these take the form of rocky limestone shores, calcareous algae midlittoral rims, coralligenous reefs, oysters and mussels banks. The term “bioconstruction”, geologically refers to a “*bioconstructed limestone*” (Fox, 2005). Coralligenous assemblages and circalittoral oyster beds were both recorded during the Italian nearshore surveys, both of which are classed as bioconstructions.

The species and densities of seagrass were noted and the nature and conservation value of the bioconstructions classified in terms of ecological value. Offshore sensitivies at the Italian landfall, including seagrass and bioconstructions, are illustrated in Figure 16, Appendix 1.

The current route alignment in the nearshore Italian waters has been selected to ensure spatial separation of seabed works from the highest density areas of seagrass which tend to be formed in the main by the *Cymodocea nodosa*. *Posidonia oceanica* is found in isolated patches in association with coarser sediments, at distances greater than 50m from the microtunnel exit point. Since the initial route selection, the spacing between the works and the seagrass has been increased by extending the micro-tunnel length, moving the exit point further offshore. A further seagrass survey undertaken by divers in June 2017 confirmed the suitability of the refined location of the tunnel exit point.

As noted there are a number of bioconstructions offshore from the tunnel exit of varying ecological significance. Five sites were surveyed based on geophysical data that showed the presence of bioconstructions, at four of these sites (all at distances of greater than 10km from the landfall) the structures were determined to be shell beds of the oyster *Neopychnodonte cochlear* which are not of conservation interest.

However at one site (Area 5), much closer to the micro-tunnel exit point, the structures were found to comprise predominately of coralligenous assemblages. The field survey investigations were performed using a remote operated vehicle (ROV) on 5 transects (50m and 25m north of the pipeline; 50m and 25m south of the pipeline; and along the pipeline itself within Area 5). Of the 13 coralligenous bioconstructions identified in this area as being of ‘good’ or ‘moderate’ status only one ‘good’ and two ‘moderate’ were recorded close (10 m +/-) to the pipeline alignment (Area 5 C01). Overall, within the surveyed site the majority of outcrops were classified as ‘scarce’ or ‘bad’, many of which were characterized by encrusting sponges and Hydrozoa. At approximately >70m water depth a facies with the protected sponges *Axinella cannabina* and *Axinella polypoides* was observed. The assemblages observed along the five transects are presented in Figure 10. The condition of bioconstructions within Area 5 were assessed and classified as bad (red), scarce (yellow), moderate (green) and good (blue).

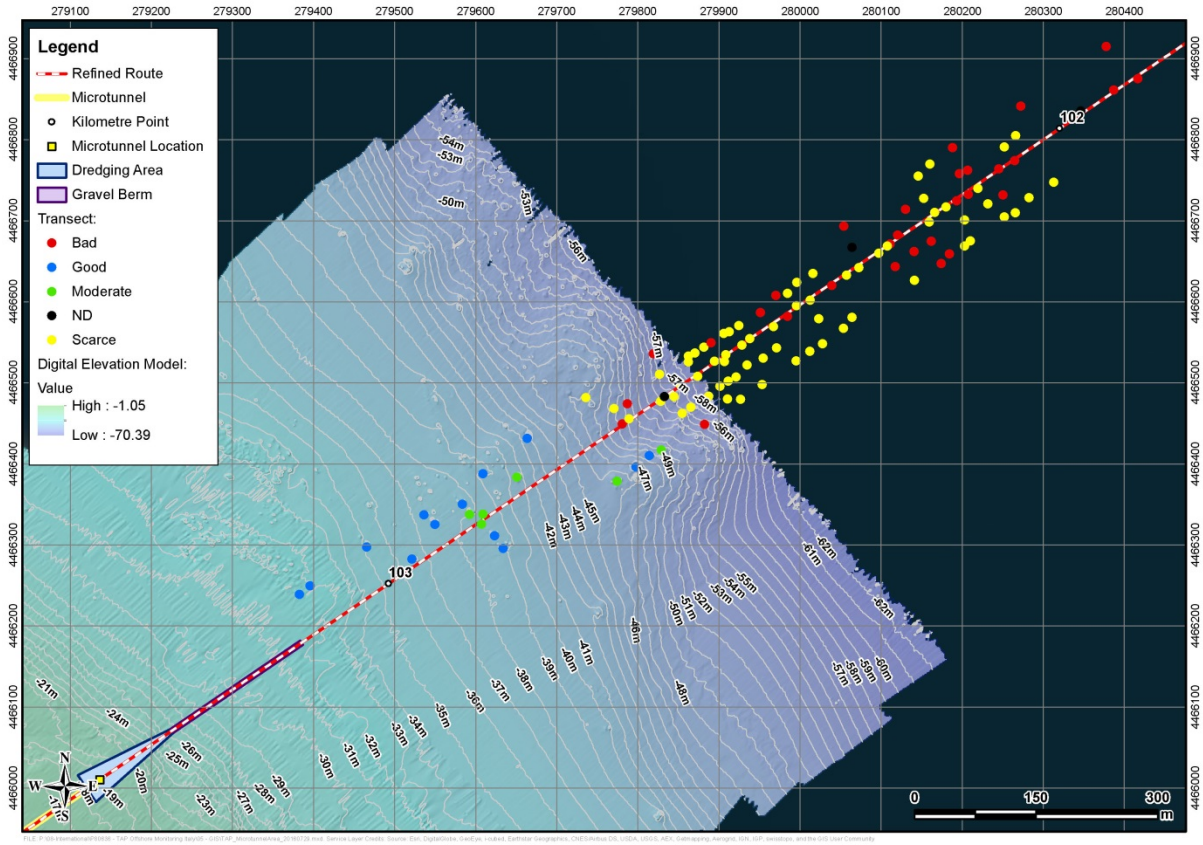


Figure 10 Classified bioconstructions found in Area 5 along five transects

Figure 10 shows that none of the assemblages overlap with, or are in proximity to, the areas where invasive seabed works including dredging, trenching and creation of the gravel berm will be required. The nearest bioconstructions to shore are found along the pipeline route at approximately 400m from the micro-tunnel exit. The majority of 'good' and 'moderate' assemblages identified are outwith the alignment.

9.4.3.1 *Engineering*

In addition to the ecological considerations to routing, there are engineering constraints in nearshore waters; the pipeline must remain straight upon exit of the tunnel and the current alignment is the optimal for achieving this while minimising impacts on benthic habitat features. Further offshore there is greater scope for micro-siting and re-routing, but in nearshore waters the decreased flexibility dictates that these are hard engineering constraints.

A review of four alternative micro-tunnel alignments found that there were no significant reductions in potential impacts on benthic habitat features. The review concluded that the micro-tunnel exit point which has been selected is likely to result in lesser impacts to seagrass and bioconstructions of conservation value than an exit point to the north, south, east or west.

9.4.3.2 *Mitigation*

Throughout Area 5, the pipeline will be laid on the seabed with an ROV providing live feedback to the pipelay vessel (guided lay). This will ensure that the lay is carried out extremely accurately, and will provide the greatest possibilities of avoiding direct impacts upon those coralligenous bioconstructions of the greatest conservation importance. Once further engineering details become available the potential for use of special anchor handling measures within this area to mitigate impacts on other coralligenous assemblages within the 25m and 50m limits may also be investigated. Consultation with the Italian authorities is ongoing, the outputs of this consultation in relation to benthic habitat features are expected in Q4 2017.

10 IMPACT ASSESSMENT

A re-assessment of impacts and residual impacts associated with TAP on critical habitat and priority biodiversity features (including natural habitat) is provided here using the methodology presented in Section 9.1. In instances where the proposed mitigation is not considered sufficient to remove the potential for residual impacts the need for offsetting measures will be triggered. Any residual impacts on critical habitat will require offsets to achieve a Net Gain in those biodiversity values for which the critical habitat was triggered, while residual impacts on priority biodiversity features (including natural habitat) will require No Net Loss. The outputs of this assessment will inform the Biodiversity Offset Strategy for the project, this is discussed further in Section 11. It should be noted that to complement this impact assessment process, site specific rapid ecological assessments will be undertaken for all critical habitat and priority biodiversity features, these will ensure that monitoring, mitigation and adaptive management is undertaken throughout and beyond the construction phases.

10.1 Brown bear

Five DMUs in Albania and four in Greece have been identified for brown bear (*Ursus arctos*) covering approximately 707km^2 collectively. These DMUs are likely to form parts of permanent home ranges, some of which are important year round and others just seasonally. Table 25 summarises the potential for residual impacts on brown bears as a result of the project.

Table 25 Residual impacts on brown bear

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
Site clearing and pipeline trenching within known or potential bear habitat	Loss or conversion of foraging habitats	High as CH trigger species	Medium: considerable long-term (> 5 years) change to significant proportion of (283 ha) of known or potential bear habitat across the entire project area of influence. Impact occurrence or sensitive receptor presence likely	Avoid Pipeline route selection avoids, as far as possible, protected and designated areas where the species is listed as a qualifying feature, taking into consideration engineering, health and safety aspects Minimise Reduce working width to 28m in areas of confirmed bear habitat Rehabilitation Restoration of habitat within the ROW, including species representative of the pre-construction habitat (noting limitations of planting deep-rooted species within the 8m PPS) Compensation reforestation, as required by forestry permits in Albania and Greece	Small: temporary change (throughout entire project construction and reinstatement phase) to minor proportion (198 ha of habitat cleared and fully reinstated) of known or potential natural and modified bear habitat across the entire project area of influence; limited but discernable alteration to key characteristics of habitat. Permanent conversion of natural habitat to grass and shrubland within 8m PPS (33ha) will not necessarily preclude the continued use of that habitat by bears. Annual monitoring for first	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
				Inclusion of native fruiting species in reinstatement plan Conduct additional monitoring before, during and after construction, to confirm continued use of DMUs	three years, thereafter monitoring frequency will be based on success by Year 3.	
	Temporary disruption of bear movements		Small: temporary (throughout entire project construction and reinstatement phase), reversible change to a minor proportion of a receptor. Impact occurrence to sensitive receptor likely	<u>Avoid</u> Avoid construction works and blasting during breeding season for bears No night time working c. KP21 in Albania undertake works within the narrow wildlife corridor section outside of the migration period for mammals at the end of summer (July–September) and spring (March–May). <u>Minimise</u> Reduce working width to 28m in areas of confirmed bear habitat Work to retain passage for species as long as possible across the corridor and to reinstate passage upon pipe section completion Cover trenches overnight and leave gaps in pipe strings at known movement locations <u>Rehabilitation</u> Rapid reinstatement of key movement corridors	Negligible: temporary (duration of particular construction activity), reversible change.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
	Direct loss of den sites		Small: impact occurrence unlikely as no dens found in surveyed corridor during multiple surveys.	Avoid Avoid construction works and blasting during denning/hibernation season for bears Ecological Monitor required for detailed surveys ahead of right of way preparation in key areas to confirm no new dens	Negligible impact occurrence unlikely as no dens found in surveyed corridor during multiple surveys.	No residual impact, no offsets required
Movement of vehicles and construction plant within known or potential bear habitat	Injury or death of bears due to vehicle strike		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	Avoid No night driving (when animals are most likely to be moving) Minimise Speed restrictions for construction vehicles and plant within known or potential bear habitat Strict traffic management and vehicle access route selection through known or potential bear habitat. Warning signs erected on project access roads Environmental education programme for construction workers	Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Creation of new access roads (Albania only) /	Facilitated access for hunters		Large: permanent, irreversible change or damage to the exposed receptor population. Impact occurrence highly likely	Avoid Access to ROW blocked with earth berms or rock piles at road and track crossings until ROW has re-established. Planting of shallow rooting fruit plants	Medium: long-term change to a significant proportion of the receptor population. Impact occurrence likely	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
upgrading existing access roads (Albania and Greece)				and natural regeneration of shrubs to inhibit access over the PPS <u>Minimise</u> Environmental education programmes within local communities Forest roads reinstated to orginal condition.		
	Avoidance of upgraded roads by bears following construction		Medium: long-term (> 5 years) change to significant proportion (29.1 ha) of known or potential bear habitat across the entire project area of influence. Impact highly likely.	<u>Minimise</u> Creation of new 'natural' tracks post-construction e.g. within ROW for bears to follow instead of using new/upgraded roads	Medium: long-term (> 5 years) change to a significant proportion of the bear population (until individual animals habituate to new conditions). Impact occurrence likely	Yes, offsets required to achieve Net Gain
Construction /operation of camps	Bear-human interactions around camp, especially areas with food		Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion of the population. Impact occurrence possible.	Implement mitigation measures detailed in the Large Carnivore Management Plan (sub-plan to the EcMP)	Negligible: temporary, barely discernible change. Impact occurrence unlikely	No residual impact, no offsets required

10.2 Golden jackal

Five golden jackal (*Canis aureus*) DMUs were identified in Greece through surveys. Whilst no specific surveys for golden jackal have been undertaken by TAP in Albania, a number of observations by TAP environmental personnel have been made in the coastal dunes habitat at the western end of the corridor, and confirmed by relevant species experts through supporting photographic evidence. A single DMU was subsequently identified within the project AOI in Albania on the basis of the golden jackal's habitat preferences and the fact that the species is listed in the management plan for the Karavasta National Park, located to the north of the Albanian landfall. Collectively these DMUs extend over 646 km². Table 26 describes the potential for residual impacts on jackals as a result of the project.

Table 26 Residual impacts on golden jackal

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Site clearing and pipeline trenching	Loss of habitat	High as CH trigger species	Medium: considerable long-term (> 5 years) change to significant proportion of (145 ha) of known or potential jackal habitat across the entire project area of influence. Impact occurrence or sensitive receptor presence likely	<u>Avoid</u> Avoid 2 of the 6 jackal DMUs in Greece by constructing the pipeline under watercourses and associated riparian vegetation by HDD Avoid establishment of temporary construction facilities (camps, etc.) within known jackal territories <u>Minimise</u> Minimise clearing of riparian vegetation; rapid reinstatement of riparian areas post-construction <u>Rehabilitation</u> Restoration of habitat within the ROW, including species representative of the pre-construction habitat (noting	Small: temporary change (throughout entire project construction and reinstatement phase) to minor proportion (114 ha) of known or potential natural and modified jackal habitat across the entire project area of influence; limited but discernable alteration to key characteristics of habitat. Permanent conversion of natural habitat to grass and shrubland within 8m PPS (5 ha) will not necessarily preclude the continued use of that habitat by jackals.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				limitations of planting deep-rooted species within the 8m PPS) Conduct additional monitoring before, during and after construction, to confirm continued use of DMUs	Annual monitoring for first three years, thereafter monitoring frequency will be based on success by Year 3	
	Temporary disruption of jackal movements		Small: temporary (throughout entire project construction and reinstatement phase), reversible change to a minor proportion of a receptor. Impact occurrence to sensitive receptor likely	<u>Avoid</u> Avoid construction works, particularly blasting and other noisy activities, between March and July, in known jackal territories Avoid construction activities during dawn/dusk and at night within known jackal territories <u>Minimise</u> Traffic to be restricted to existing main roads, and speed limits to be observed on construction access roads	Negligible: temporary (duration of particular construction activity), reversible change.	No residual impact, no offsets required

10.3 Wildcat

The wildcat (*Felis silvestris*) primarily associates with forest and is found in highest numbers in broad-leaved or mixed forests with low population densities of humans. They are also found in Mediterranean maquis scrubland, riparian forest, marsh boundaries and along sea coasts. Wildcats can do well in cultivated landscapes, where there are increased rodent population densities (Sunquist and Sunquist, 2002). The DMUs for wildcat are the same as those defined for brown bear and grey wolf in Albania, covering areas of 60 km^2 and 57 km^2 respectively. Table 27 describes the potential for residual impacts on wildcats as a result of the project.

Table 27 Residual impacts on wildcat

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Site clearing and pipeline trenching	Direct loss of habitat including potential den sites	High as CH trigger species	Medium: considerable long-term (> 5 years) change to significant proportion of (98 ha) of known or potential wildcat habitat across the entire project area of influence. Impact occurrence or sensitive receptor presence likely	<u>Minimise</u> Minimise working width in key habitats to 28m Ecological Field Monitor to inspect suitable trees for potential resting sites at the base during pre-construction survey. Any areas where blasting is required to remove rocks will be assessed to determine if they could support wildcats. Areas around any potential den sites inspected for evidence of activity prior to works taking place <u>Rehabilitate</u> Rehabitation of the ROW – species has broad habitat requirements and is likely to continue to use the pipeline corridor	Negligible: temporary (duration of particular construction activity) change to an insignificant proportion (76 ha of natural and modified habitat cleared then fully reinstated) of known or potential wildcat habitat across the entire project area of influence; slight alteration to habitat. Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<15 ha) is not expected to preclude the continued use of that habitat by wildcat. Annual monitoring for first	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				once revegetated, even if the vegetation community has changed from beech forest to scrub and grassland. Re-creation of potential den sites with surplus rock from blasting activities post-construction Undertake post-construction monitoring to confirm continued use of ROW by wildcat	three years, thereafter monitoring frequency will be based on success by Year 3.	
	Disruption of movements		Small: temporary (throughout entire project construction and reinstatement phase), reversible change to a minor proportion of a receptor. Impact occurrence to sensitive receptor likely	<u>Avoid</u> No night-time working in key areas when species is most active <u>Minimise</u> Reduce working width to 28m in areas of wildcat habitat Work to retain passage for species as long as possible across the corridor and to reinstate passage upon pipe section completion Cover trenches overnight and leave gaps in pipe strings at known movement locations	Negligible: temporary (duration of particular construction activity), reversible change.	No residual impact, no offsets required
Movement of vehicles and construction plant within known or potential	Injury or death of wildcats due to vehicle strike		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	<u>Avoid</u> No night driving (when animals are most likely to be moving) <u>Minimise</u> Speed restrictions for construction	Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
wildcat habitat				vehicles and plant within known or potential wildcat habitat Strict traffic management and vehicle access route selection through known or potential wildcat habitat. Warning signs erected on project access roads Environmental education programme for construction workers		

10.4 Grey wolf

Four grey wolf *(Canis lupus*) DMUs have been identified in Albania, with a further seven in Greece. These DMUs form likely parts of wolf pack territories extending over 912 km² collectively. Table 28 describes the potential for residual impacts on wolves as a result of the project.

Table 28 Residual impacts on grey wolf

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
Site clearing and pipeline trenching within known or potential wolf habitat	Direct loss or conversion of habitat, including potential den sites	Medium, as PBF	Medium: long-term (> 5 years) change to a significant proportion 478 ha of known or potential wolf habitat across the entire project area of influence	<u>Avoid</u> Pipeline route selection avoids, as far as possible, protected and designated areas where the species is listed as a qualifying feature, taking into consideration engineering, health and safety aspects <u>Minimise</u> Reduce working width to 28m in areas of confirmed wolf habitat. bear habitat <u>Rehabilitation</u> Restoration of habitat within the ROW, including species representative of the pre-construction habitat (noting limitations of planting deep-rooted species within the 8m PPS) Consider creation of artificial den sites within in design of ravine reinstatement	Small: temporary (throughout entire project construction and reinstatement phase) change to 278 ha (natural and modified habitat cleared then fully reinstated) of known or potential wolf habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (50 ha) will not necessarily preclude the continued use of that habitat by grey wolf.	Yes, offsets required to achieve No Net Loss

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
				Compensation reforestation, as required by forestry permits in Albania and Greece Conduct additional monitoring before, during and after construction, to confirm continued use of DMUs		
	Disturbance of wolves in general, and disturbance of wolves with young		Small: temporary (throughout entire project construction and reinstatement phase), reversible change to a minor proportion of a receptor. Impact occurrence to sensitive receptor likely	<u>Avoid</u> Avoid construction and blasting during pup-rearing season for wolves (May-July) KP 21-23 in Albania: Undertake works within the narrow wildlife corridor section outside of the migration period (March-May and August-October). Avoid construction between dusk and dawn. <u>Minimise</u> Work to retain passage for species as long as possible across the corridor and to reinstate passage upon pipe section completion Cover trenches overnight and leave gaps in pipe strings at known movement locations <u>Rehabilitation</u> Rapid reinstatement of key movement corridors	Negligible: temporary (duration of particular construction activity), reversible change.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
	Disturbance of wolf prey (e.g. wild boar)		Small: temporary (throughout entire project construction and reinstatement phase), reversible change to a minor proportion of a receptor. Impact occurrence to sensitive receptor likely	Minimise No hunting of wolf prey species by construction staff	Negligible: temporary (duration of particular construction activity), reversible change.	No residual impact, no offsets required
Movement of vehicles and construction plant within known or potential wolf habitat	Injury or death of wolves due to vehicle strike		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	Avoid No night driving (when animals are most likely to be moving) Minimise Speed restrictions for construction vehicles and plant within known or potential wolf habitat Strict traffic management and vehicle access route selection through high sutiability wolf habitat. Warning signs erected on project access roads Environmental education programme for construction workers	Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Creation of new access roads (Albania only) / upgrading	Facilitated access for hunters		Large: permanent, irreversible change or damage to the exposed receptor population. Impact occurrence highly likely	Avoid Access to ROW blocked with earth berms or rock piles at road and track crossings until ROW has re-established. Planting of shallow rooting fruit plants and natural regeneration of shrubs to	Medium: long-term change to a significant proportion of the receptor population. Impact occurrence likely	Yes, offsets required to achieve No Net Loss

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
existing access roads (Albania and Greece)				inhibit access over the PPS Minimise Environmental education programmes within local communities Forest roads reinstated to orginal condition.		
	Avoidance of upgraded tracks by wolves following construction		Negligible: temporary change to 29 ha of known or potential wolf habitat across the entire project area of influence. This species is known to readily habituate to roads	Minimise Consider creation of new 'natural' tracks post-construction e.g. within ROW for wolves to follow instead of using new/upgraded roads	Negligible: this species is known to readily habituate to roads (all sighitings by field survey teams to date have been of wolves using existing paved roads)	No residual impact, no offsets required
Construction/ operation of camps	Wolf-human interactions around camp, especially areas with food		Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion of the population. Impact occurrence possible.	Implement mitigation measures detailed in the Large Carnivore Management Plan (sub-plan to the EcMP)	Negligible: temporary, barely discernible change. Impact occurrence unlikely	No residual impact, no offsets required

10.5 Otter

Surveys identified otters in ten watercourses within the project AOI in Albania (where the species is listed as VU nationally) and 22 watercourses within the project AOI in Greece (where the species is listed as EN nationally). DMUs were defined as extending 10 km either side of a watercourse crossing in order to encompass home-ranges of two otters (the entirety of a female's home-range and part of one male's range).

Potential project impacts on otters and their habitat is largely dependent on the type of construction technique used to cross the watercourses, with open cut crossings generally having greater potential for impacts than non-open cut crossings. Table 29 and Table 30 present the results of the residual impact assessment for otters based on open cut and non-open cut techniques, respectively.

Table 29 Residual impacts on otters based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Construction of open cut pipeline crossings	Direct loss and disturbance of known and potential habitat including resting sites and feeding areas	High as CH trigger species	Small: temporary (throughout entire project construction and reinstatement phase) change to 11.6 ha of known or potential otter habitat across the entire project area of influence.	<u>Minimise</u> Stagger construction of the watercourse crossings to minimise potential for cumulative disturbance on species. Undertake crossing during low-flow season to reduce impacts of sediment and pollution dispersal. Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow,etc. Use sheet pile walls where possible to minimise excavation at riverbanks.	Negligible : temporary (duration of particular construction activity) change to 11.6 ha of known or potential otter habitat across the entire project area of influence.	Yes, offsets required to achieve No Net Loss
	Creation of barriers to movement during construction		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor		Negligible: temporary impact (duration of particular construction activity)	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
			group. Impact occurrence possible.	Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use. No night-time working around the main watercourse or any secondary channels. Prepare a detailed Watercourse Crossing Plan for each sensitive crossing. Carry out further check for otter holts and resting sites immediately before works begin. Prepare a detailed work plan to minimise impacts if holts or resting sites are found within 30m of the works. Work to be supervised by an on-site Ecological Field Monitor. No long-term (> 3 days) impediment of water flow (appropriately-sized (in ecological terms) flumes excepted) and no construction of long-term barriers (> 3 days) along the river banks. Plant and machinery should only use the designated access roads and shall not be stored adjacent to the watercourse overnight or when not in use. Minimise plant operation in the river, ensure all plant has been checked for		
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary impact (duration of particular construction activity)	No residual impact, no offsets required
	Death / injury during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of habitat		Small: temporary (throughout entire project construction and reinstatement phase) change to 11.6 ha of known or potential otter habitat across the entire project area of influence.		Negligible : temporary (duration of particular construction activity) change to 11.6 ha of known or potential otter habitat across the entire project area of influence.	Yes, offsets required to achieve No Net Loss
	Mobilisation of fine sediments resulting in siltation of sensitive		Small: temporary (duration of a particular construction activity) change to a insignificant proportion of habitat. Impact occurrence		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	habitat.		possible.	signs of leaks or malfunction prior to entering the river and provide all plant entering the river with pollution prevention measures. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible i.e. restrict initial clearance to running track for equipment access. Exit ramps (wooden boards) should be placed in the pipeline trench if left open overnight and/or the excavation profiled/sloped to allow otters and other animals to escape if they become trapped. Ecological awareness training to be provided to all appropriate personnel. Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. All wastewater (including used hydrotest water) to meet the defined standard (e.g. WFD standard), EU and national legislation requirements prior to disposal	receptor population	
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary, impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population		Negligible: temporary, impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				to a watercourse. <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Restore riparian vegetation as soon as possible after completion of the works.		

Table 30 Residual impacts on otters based on a non-open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation (ESIA)	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through watercourses	Direct loss and disturbance of habitat	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase), discernible impact to a minor proportion of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Use of non-open cut crossing technique (e.g. HDD or microtunnel) <u>Minimise</u> Carry out further check for otter holts and resting sites immediately before works begin. Prepare a detailed work plan to minimise impacts if holts or resting sites are found within 30m of the works. Prepare a detailed Watercourse Crossing Plan for each crossing Use directional lighting angled away from the river to keep the riverbank in darkness to avoid disturbance to individuals moving at night. Minimise night-time noise and light as far as possible, consistent with the need for drilling to be a 24-hour operation. No vegetation removal or clearance at the floodplain and the riverbanks; retain mature trees on banks Site the HDD working area away from riparian vegetation and, where possible, place a spoil bund on the side of the bank nearest to the river so it acts as a	No impact to DMUs	No residual impact, no offsets required
	Death / injury/ disturbance during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	No residual impact, no offsets required
	Leachate from chemicals used during HDD techniques		Small: temporary, (throughout project construction and reinstatement phase), discernible impact to a minor proportion of known or potential habitat across the entire project area of influence. Impact occurrence possible.		Negligible: temporary, impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation (ESIA)	Magnitude of impact post-mitigation	Residual impact /offset required?
				noise and visual barrier. Exit ramps (wooden boards) should be placed in the excavation if left open overnight and/or the excavation profiled/sloped to allow otters and other animals to escape if they become trapped. Work to be supervised by an on-site Ecological Field Monitor (ECoW). Plant and machinery should only use the designated access roads and shall not be stored adjacent to the watercourse overnight or when not in use. Develop and implement a Pollution Prevention Plan and an Erosion and Sediments Management Plan. Develop an emergency spill response plan to minimise effects if HDD process causes break-out of drilling mud into the river channel. Ecological awareness training should be provided to all appropriate personnel. Monitoring of impacts on flora and fauna at sensitive locations.		
Installation of flumed crossing over watercourse	Direct loss and disturbance of otter habitat		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact	<u>Avoid</u> Use existing bridges wherever possible to avoid having to instal new temporary	Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation (ESIA)	Magnitude of impact post-mitigation	Residual impact /offset required?
to provide access for construction plant and vehicles			occurrence a one-off	crossing points		
	Creation of barriers to otter movement during construction		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion of a receptor group. Impact occurrence possible.	<u>Minimise</u> Sediment retention ponds to be used during construction works as required. Work to be supervised by an on-site Ecological Field Monitor. Ecological awareness training should be provided to all appropriate personnel. Develop and implement a Pollution Prevention Plan and a Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, etc. Remove temporary crossings as soon as possible on completion of each pipline crossing <u>Rehabilitate</u> Reinstate watercourse banks to original condition	Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary, impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Develop and implement a Pollution	Negligible: temporary, impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation (ESIA)	Magnitude of impact post-mitigation	Residual impact /offset required?
				Prevention Plan and an Erosion and Sediments Management Plan. All wastewater (including used hydrotest water) to meet the defined standard (e.g. WFD standard), EU and Albanian legislation prior to disposal to a watercourse.		

10.6 Birds

Five DMUs were identified for birds in Albania: Prespa Lakes and Karavasta Lagoon (both of which are National Parks, designated Ramsar sites and proposed Emerald sites), Morava Mountains, the Vithkuq-Ostrovice CORINE biotope and the Grykedhja-Semanit Corine Biotope.

In Greece a further 12 DMUs for birds were identified: the Loutros Forest SPA, Kirki Wildlife Refuge, an area within the vicinity of Mesopotamia (Kastoria) which is intersected by the pipeline between KP525 – KP541, Lake Kastoria, Evros Delta SPA/Ramsar, Potamous Filiouris IBA, Nestos Delta IBA/Ramsar, Lake Kerkini IBA, Lake Pikrolimni IBA, River Axios complex, Agra artificial lake complex and Lake Chimaditis and Lake Zazaris IBA.

Two of the wetland sites in Albania, Prespa Lakes and Karavasta Lagoon, are located 3 km[44] and 3.45 km[45] respectively from the pipeline corridor. There will be no direct impacts on these two sites as a result of pipeline construction and indirect impacts are considered highly unlikely due to the nature of the proposed works and the separation distances. As such, these sites are not considered further in this assessment.

Both critical habitat triggering and priority biodiversity feature bird species have been grouped according to habitat preferences for the assessment of impacts in the following tables to reflect the different recovery times of different habitat types.

Table 31 summarizes the potential residual impacts of pipeline construction on the following critical habitat triggers that are either known or are thought to potentially breed in one or more of these DMUs:

- greater spotted eagle (*Aquila clanga*): the Vithkuq-Ostrovice CORINE biotope and the Grykedhja-Semanit Corine Biotope have been identified as DMUs in Albania and Loutros Forest SPA in Greece.
- lesser spotted eagle (*Clanga pomarina*): the Vithkuq-Ostrovice Corine Biotope and Loutros Forest SPA have also been identified for this species.

[44] The boundary of the Prespa Lakes National Park & Emerald designations is approximately 3 km from the pipeline corridor, the boundary of the Ramsar designation is approximately 7.25 km from the pipeline corridor

[45] The boundary of the Karavasta National Park & Emerald designations is approximately 3.45 km from the pipeline corridor, the boundary of the Ramsar designation is approximately 10 km from the pipeline corridor

- booted eagle (*Hieraaetus pennatus*): the Vithkuq-Ostrovice Corine Biotope in Albania and Loutros Forest SPA and Kirki Wildlife Refuge have been identified as DMUs for this species.
- black kite (*Milvus migrans*): Morava Mountains, Vithkuq-Ostrovice Corine Biotope and Grykedhja- Semanit Corine Biotope have been identified as DMUs in Albania, and Loutros Forest SPA in Greece.

In addition to these the following species have been identified as priority biodiversity features and have the same habitat preferences (forests, trees):

- Short-toed eagle (*Circaetus gallicus*)
- Golden eagle (*Aquila chrysaetos*)
- Bonelli's eagle (*Aquila fasciata*)
- Lesser kestrel (*Falco naumanni*)
- European honey buzzard (*Pernis apivorus*)
- Red-footed falcon (*Falco vespertinus*)
- Grey headed woodpecker (*Picus canus*)
- Red kite (*Milvus milvus*)

Separate impact assessments have not been undertaken for these priority biodiversity features as the generic commitments relating to birds are applicable to the entire ROW, the impacts will be the same across similar habitat types and as priority biodiversity features they have a lower (medium) sensitivity than critical habitat triggers.

Table 31 Residual impacts on the greater spotted eagle, lesser spotted eagle, booted eagle and black kite, and PBF birds with similar habitat requirements

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Vegetation clearing and pipeline trenching	Direct loss and disturbance/degradation of habitat	High as CH trigger species	Small: long-term (> 5 years) change to a significant proportion (119 ha) of potential habitat across the	Minimise Co-locate pipeline with existing infrastructure where possible, e.g.	Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion	Yes, offsets required to achieve Net

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
within suitable habitat	(including potential breeding habitat)		entire project area of influence. Impact occurrence possible	alongside DESFA pipeline through Loutros Forest in Greece Where possible clearing of vegetation should be undertaken before 1st March, or after 30th September. Should it be necessary to clear vegetation during the bird breeding season (1st March -31st July) pre-vegetation clearance surveys should be undertaken by suitably qualified ornithologists. Should nests of species of conservation interest be located within the vicinity of the working strip, no works will be carried out within a minimum 100 m buffer of the nest site until the chicks have fully fledged. All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training to be delivered to all appropriate personnel <u>Rehabilitate</u> PPS zone increases prey refuge habitat	(81 ha of natural and modified habitat cleared then fully reinstated) of potential habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<14 ha) will not necessarily preclude the continued use of that habitat by avifauna.	Gain
	Disturbance / displacement of species during works period		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible		Negligible: temporary (duration of particular construction activity) change, impact occurrence unlikely.	No residual impact, no offsets required
	Death / injury to individuals during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Creation of new access roads (Albania only) / upgrading existing	Facilitated access for illegal hunters		Large: permanent, irreversible change or damage to the exposed receptor population. Impact occurrence highly likely	<u>Minimise</u> Construction personnel prohibited from hunting (note the hunting ban in Albania has recently been extended for another 5 years hence this is a legal requirement)	Medium: long-term change to a significant proportion of the receptor population. Impact occurrence likely	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
access roads (Albania and Greece)				Environmental education programmes within local communities <u>Rehabilitate</u> Forest roads reinstated to orginal condition. Access to ROW blocked with earth berms of rock piles at road and track crossings until ROW has re-established. Planting of shallow rooting plants and natural regeneration of shrubs to inhibit access over the PPS		
Construction/ operation of camps	Bird-human interactions around camp, especially areas with food		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible	<u>Minimise</u> Proper waste management (particularly food waste) to avoid attracting birds to the work site All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training including birds to be delivered to all appropriate personnel	Negligible: temporary (duration of particular construction activity), reversible change, impact occurrence considered a one-off.	No residual impact, no offsets required

Table 32 summarizes the potential residual impacts of pipeline construction on the critical habitat triggering Montagu's harrier (*Circus pygargus*) which potentially breeds in the DMU identified within the Mesopotamia area (Kastoria), intersected by the pipeline between KP525 – KP541.

The following species have been identified as priority biodiversity features and have the same habitat preferences (open habitat: farmland, heathland, meadows, steppe, pasture, light scrub/trees):

- Marsh harrier (*Circus aeruginosus*)
- Hen harrier (*Circus cyaneus*)
- Merlin (*Falco columbarius*)
- Grey partridge (*Perdix perdix*)
- Turtle dove (*Streptopelia turtur*)
- European roller (*Coracius garrulus*)
- Skylark (*Alauda arvensis*)
- Short-toed lark (*Calandrella brachydactyla*)
- Calandra lark (*Melanocorypha calandra*)
- Red-backed shrike (*Lanius collurio*)
- Lesser grey shrike (*Lanius minor*)
- Long-legged buzzard (*Buteo rufinus*).

Separate impact assessments have not been undertaken for these priority biodiversity features as the generic commitments relating to birds are applicable to the entire ROW, the impacts will be the same across similar habitat types and as priority biodiversity features they have a lower (medium) sensitivity than critical habitat triggers.

Table 32 Residual impacts on the Montagu's harrier and PBF birds with similar habitat requirements

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Vegetation clearing and pipeline trenching within suitable habitat	Direct loss and disturbance/degradation of habitat (including potential breeding habitat)	High as CH trigger species	Small: long-term (> 5 years) change to a significant proportion (67 ha) of potential habitat across the entire project area of influence. Impact occurrence possible	<u>Minimise</u> Undertake additional surveys for Montagu's harrier within the relevant DMU as only a single individual has been observed during surveys, once. Where possible clearing of vegetation should be undertaken before 1st March, or after 30th September. Should it be necessary to clear vegetation during the bird breeding season (1st March -31st July) pre-vegetation clearance surveys should be undertaken by suitably qualified ornithologists. Should nests of species of conservation interest be located within the vicinity of the working strip, no works will be carried out within a minimum 100 m buffer of the nest site until the chicks have fully fledged. All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training to be delivered to all appropriate personnel <u>Rehabilitate</u> PPS zone increases prey refuge habitat	Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion (56 ha of natural and modified habitat cleared then fully reinstated) of potential habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<1 ha) will not necessarily preclude the continued use of that habitat by avifauna.	Yes, offsets required to achieve Net Gain
	Disturbance / displacement of species during works period		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible		Negligible: temporary (duration of particular construction activity) change, impact occurrence unlikely.	No residual impact, no offsets required
	Death / injury to individuals during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Construction/	Bird-human		Small: temporary (throughout	<u>Minimise</u>	Negligible: temporary	No residual

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
operation of camps	interactions around camp, especially areas with food		entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible	Proper waste management (particularly food waste) to avoid attracting birds to the work site All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training including birds to be delivered to all appropriate personnel	(duration of particular construction activity), reversible change, impact occurrence considered a one-off.	impact, no offsets required

Table 33 summarizes the potential residual impacts of pipeline construction on the critical habitat triggering eagle owl (*Bubo bubo*) within the Vithkuq-Ostrovice CORINE biotope, where this species is either known, or thought to potentially breed.

Additionally the following species have been identified as priority biodiversity features and have the same habitat preferences (remote mountain areas, particularly ledges):

- Griffon vulture (*Gyps fulvus*)
- Black vulture (*Coragyps atratus*)

The Peregrine falcon (*Falco peregrinus*) has also been identified as a priority biodiversity feature as it is VU in Albania. This species has an extremely large range, it is highly migratory within temperate regions and inhabitats an extreme variety of habitats from sea level to 4,000m a.s.l within which is tolerates hot and cold, wet and dry climates. Considering this, for the purposes of this assessment it has been grouped with the above species based on its 'nesting' habitat prefence for ledges. It does not build nests, instead laying eggs in a scrape or depression in a rock face[46].

Separate impact assessments have not been undertaken for these priority biodiversity features as the generic commitments relating to birds are applicable to the entire ROW, the impacts will be the same across similar habitat types and as priority biodiversity features they have a lower (medium) sensitivity than critical habitat triggers.

Table 33 Residual impacts on eagle owl and PBF birds with similar habitat requirements

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Vegetation clearing and pipeline trenching within suitable	Direct loss and disturbance/degradation of habitat (including potential	High as CH trigger species	Small: long-term (> 5 years) change to a significant proportion (47ha) of potential habitat across the entire project area of influence. Impact occurrence possible	Avoid Avoid night-time working including night-driving Minimise Where possible clearing of vegetation	Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion (34 ha cleared then fully reinstated) of potential	Yes, offsets required to achieve Net Gain

[46] http://datazone.birdlife.org/species/factsheet/peregrine-falcon-falco-peregrinus/text

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
habitat	breeding habitat)			should be undertaken before 1st March, or after 30th September. Should it be necessary to clear vegetation during the bird breeding season (1st March -31st July) pre-vegetation clearance surveys should be undertaken by suitably qualified ornithologists. Should nests of species of conservation interest be located within the vicinity of the working strip, no works will be carried out within a minimum 100 m buffer of the nest site until the chicks have fully fledged. Undertake additional surveys for Montagu's harrier within the relevant DMU as only a single individual has been observed during surveys, once. All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training to be delivered to all appropriate personnel <u>Rehabilitate</u> PPS zone increases prey refuge habitat	natural and modified habitat across the entire project area of influence. Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<8 ha) will not necessarily preclude the continued use of that habitat by avifauna.	
	Disturbance / displacement of species during works period		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible		Negligible: temporary (duration of particular construction activity) change, impact occurrence unlikely.	No residual impact, no offsets required
	Death / injury to individuals during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Creation of new access roads (Albania only) / upgrading	Facilitated access for illegal hunters		Large: high likelihood of long-term impact occurrence, permanent, irreversible change or damage to the exposed receptor population	<u>Minimise</u> Construction personnel prohibited from hunting (note the hunting ban in Albania has recently been extended for another 5 years hence this is a legal	Large: high likelihood of long-term impact occurrence, permanent, irreversible change or damage to the exposed receptor population	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
existing access roads (Albania and Greece)				requirement) Environmental education programmes within local communities <u>Rehabilitate</u> Forest roads reinstated to orginal condition. Access to ROW blocked with earth berms of rock piles at road and track crossings until ROW has re-established. Planting of shallow rooting plants and natural regeneration of shrubs to inhibit access over the PPS		
Construction/ operation of camps	Bird-human interactions around camp, especially areas with food		Negligible: temporary (duration of particular construction activity), reversible change, impact occurrence considered a one-off.	<u>Minimise</u> Proper waste management (particularly food waste) to avoid attracting birds to the work site All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training including birds to be delivered to all appropriate personnel	Negligible: temporary (duration of particular construction activity), reversible change, impact occurrence considered a one-off.	No residual impact, no offsets required

Table 34 summarizes the potential residual impacts of pipeline construction on the critical habitat triggering Dalmatian pelican within the following DMUs Lake Kastoria; the Evros Delta SPA/Ramsar; Potamous Filiouris IBA; Nestos Delta IBA/Ramsar; Lake Kerkini IBA; Lake Pikrolimni IBA; River Axios complex; Agra artificial lake complex; Lake Chimaditis and Lake Zazaris IBA; Prespa Lakes; Grykedhja-Semanit Corine Biotope/Karavasta Lagoon. Additionally the following species have been identified as priority biodiversity features and have the same habitat preferences (wetlands):

- Little egret (*Egretta garzetta*)
- Night heron (*Nycticorax nycticorax*)
- White stork (*Ciconia ciconia*)
- Black stork (*Ciconia nigra*)
- Shelduck (*Tadorna tadorna*)
- Pygmy cormorant (*Microcarbo pygmeus*)
- Kingfisher (*Alcedo atthis*)
- Purple heron (*Ardea purpurea*)
- Squacco heron (*Ardeola ralloides*).

Separate impact assessments have not been undertaken for these priority biodiversity features as the generic commitments relating to birds are applicable to the entire ROW, the impacts will be the same across similar habitat types and as priority biodiversity features they have a lower (medium) sensitivity than critical habitat triggers.

Table 34 Residual impacts on Dalmatian pelican and PBF birds associated with wetlands

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Vegetation clearing and pipeline trenching within	Direct loss and disturbance/degradation of habitat (including	High as CH trigger species	Small: long-term (> 5 years) change to a significant proportion (29 ha) of potential habitat across the entire project area of influence.	Minimise Where possible clearing of vegetation should be undertaken before 1st March, or after 30th September.	Small: temporary (throughout entire project construction and reinstatement phase) change to a minor proportion (23 ha cleared then fully	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
suitable habitat	potential breeding habitat)		Impact occurrence possible	Should it be necessary to clear vegetation during the bird breeding season (1st March -31st July) pre-vegetation clearance surveys should be undertaken by suitably qualified ornithologists. Should nests of species of conservation interest be located within the vicinity of the working strip, no works will be carried out within a minimum 100 m buffer of the nest site until the chicks have fully fledged. All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training to be delivered to all appropriate personnel <u>Rehabilitate</u> PPS zone increases prey refuge habitat	reinstated) of potential natural and modified habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<1 ha) will not necessarily preclude the continued use of that habitat by avifauna.	
	Disturbance / displacement of species during works period		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible		Negligible: temporary (duration of particular construction activity) change, impact occurrence unlikely.	No residual impact, no offsets required
	Death / injury to individuals during works period		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.		Negligible: impact occurrence unlikely, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Construction/ operation of camps	Bird-human interactions around camp, especially areas with food		Small: temporary (throughout entire project construction and reinstatement phase) impact. Impact occurrence to sensitive receptor possible	<u>Minimise</u> Proper waste management (particularly food waste) to avoid attracting birds to the work site All personnel to report wildlife sightings to the EFO / EFC Environmental awareness training including birds to be delivered to all	Negligible: temporary (duration of particular construction activity), reversible change, impact occurrence considered a one-off.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				appropriate personnel		

10.7 Threatened, endemic and/or migratory freshwater fish and invertebrates

The critical habitat assessment identified DMUs for the following threatened, endemic and/or migratory freshwater fish and invertebrates in Greece and Albania:

- *Pelasgus minutus* is thought to be restricted to Lake Ohrid basin in Albania and Macedonia, although it is a critical habitat triggering species it is found >5km from any watercourse crossings and therefore is not considered further in this impact assessment
- the Aggitis spined loach (*Cobitis punctilineata*) is known only from a single location, the Aggitis stream in the Strymon river basin in northern Greece, with an extent of occurrence (EOO) <100 km
- Greek brook lamprey (*Eudontomyzon hellenicus*) is only known from two river basins with a total estimated EOO <100 km² and area of occupancy (AOO) <10 km². It may now be absent (or at least severely declining) in the Louros basin and is not widely distributed in the Strymon river basin
- *Pelasgus prespensis* was thought to be restricted only to Lake Prespa in north-western Greece, Albania and the FYROM, however during surveys it was also recorded at a location on the Dunaveci stream, a tributary of the Devolli River. It is considered feasible that *P. prespensis* spread to the Dunaveci stream via an artificial irrigation channel that has recently been constructed to connect the Devolli River to Prespa Lake
- to date the Devoll riffle minnow (*Alburnoides devolli*) has only been found in the Upper Devoll River system, consequently its one DMU is assumed to be the entire Devoll river system in Albania
- the Osum riffle minnow (*Alburnoides fangfangae)* has, to date, only been found in the Upper Osum River system in Albania, consequently the one DMU identified for this species is the entire Osum River system
- for the critically endangered European eel (*Anguilla anguilla*) 15 DMUs were identified that were considered likely to support eels in Albania, with a further 17 DMUs in Greece. A review of the presence of significant man-made barriers (e.g. weirs, dams) reduced the number of DMUs selected in upstream sections of rivers as these act as barriers to fish movement and migration (to date, no ffish passes have been observed on such structures in-country).
- *Alburnus vistonicus* the majority of the global population is believed to be located in Lake Vistonis drainage with smaller populations being found in the Filouris, Kasinthos and Xiropotamos rivers. These have been defined as DMUs for the species
- *Alburnoides sp. volvi* is undergoing taxonomic revision but is currently considered to be a distinct species from other similar species found in the same areas (e.g. *Alburnus volviticus* and *Alburnus vistonicus*). It is reported as being endemic to Lakes Volvi and Korinia (including Richios River) and the lower stretch of the Strymon River (including Lake Kerkini).

- Pindus stone loach (*Oxynoemacheilus pindus*) this species only occurs in 5 to 10 tributaries in the Aoos, Semani, Shkumbini and Erzeni drainages. Of these, only the Semanit River is within the project AOI, in Albania and is therefore mapped as a DMU for the species.
- Brown spined loach (*Cobitis puncticulata*) only occurs at three sites: Lower Matiza/Evros river in Greece/Turkey and two other sites in Turkey. The Evros River is within the project AOI in Greece and has been defined as a DMU for the species.
- *Barbus macedonicus* is thought to be restricted to the Axios, Pinios, Loudias and Aliakmon river basins
- Pelagos trout (*Salmo pelagonicus*) may in fact be a morphotype of brown trout (*Salmo trutta*) rather than a species in its own right. The tributaries of the lower Vardar (Axios), Upper Aliakmon and Strumica drainage are believed to be the current stronghold for this species and these have been defined as DMUs for this species in the CHA. For consistency with the CHA it shall also be referred to as Pelagos trout in this document although this may alter in live management documentation.
- The thick-shelled river mussel *Unio crassus* is listed as EN globally and is a qualifying feature for the Filiouris Freshwater KBA and the Kastoria Freshwater KBA in Greece. It is known to inhabit clean river ecosystems and lakes, with flowing water and sandy or sandy-gravel bottoms. The pipeline crosses 7 watercourses within the Kastoria KBA and 3 watercourses within the Filiouris KBA, these have been mapped as DMUs for *Unio crassus*.
- *Turcorientalia Hohenackeri:* Available records suggest that the species is restricted to just seven locations on mainland Greece and other islands in the Aegean Sea. Within the AOI the Nestos and Aggitis drainage basins are likely to be important strongholds for this species and have both been delinated as DMUs for this species.

The screening process for priority biodiversity features identified the following freshwater fish species within the project AOI:

- Twaite shad (*Alosa fallax*) is likely to be present in the Evros, Filiouris, Nestos, Strymon, Loudias, Aliakmon and Axios rivers
- Ukrainian stickleback (*Pungitius platygaster*) has been recorded in the Aliakmon and Axios rivers
- *Vimba melanops* is also found in the Evros River

As all of these watercourses have already been identified as DMUs for freshwater fish/invertebrate critical habitat triggers, seperate impact assessments for these priority biodiversity features have not been undertaken as they will fall within the scope of the assessments and associated mitigation measures proposed for the critical habitat species. In addition, as priority biodiversity features, they will have a lower (medium) sensitivity than critical habitat triggers.

Potential project impacts on these aquatic species and their habitat is largely dependent on the type of construction technique used to cross the watercourses, with open cut crossings generally having greater potential for impacts than non-open cut crossings. Table 35 to

Table 45 present the results of the impact assessment for freshwater species based on open cut and non-open cut techniques respectively. Note: within Greece crossing locations are pre-fixed 'C0' in Albania they are pre-fixed with 'RV'.

A high sensitivity has been assigned to these freshwater fish and invertebrate species as they trigger critical habitat, the magnitude of impact has been defined as per Table 24 and all proposed mitigation is detailed within the assessment table. A breakdown of impacts by species and location as well as proposed mitigation is detailed within the assessment tables below. These assessments are currently highly precautionary; in Greece, targeted surveys have only been carried out for Aggitis spined loach and Greek brook lamprey. Surveys for freshwater invertebrates are scheduled in all the watercourses listed in Table 43 and Table 44 in autumn 2017 and the results of these surveys will be used to refine the relevant impact assessment and offset calculations.

Table 35 Residual impacts on Aggitis spined loach (*Cobitis puntilineata)* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse name [crossing ID and (KP)]	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction in Aggitis spined loach DMUs shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise	Negligible: temporary and reversible, barely discernible impact to an insignificant 1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Greece Philippoi 9 [C0797-N-23 (211)] Unnamed [C0848A-N-6 (216)] Doxata xiropottimus [C0865 (222)]	gravels) or suffocation of fish.		importance to the receptor.	potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment)		
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor;	Yes, offsets required to achieve Net

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	sensitive habitat (e.g. spawning gravels) or suffocation of fish.		proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.	When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use	impact occurrence to sensitive receptor possible.	Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure	Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 36 Residual impacts on *Pelasgus prespensis* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Albania</u> RV-240 (52)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (<1ha ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction in DMUs shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and	Negligible: temporary and reversible, barely discernible impact to an insignificant <1ha ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.	unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse,	Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of a receptor group. Impact occurrence possible.	and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u>		
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 37 Residual impacts on Osumi riffle minnow (*Alburnoides fangfangae)* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Albania</u> RV-256 (59) RV-282 (105) RV-301 (135) RV-400 (143) RV-405 (146)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (8 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction in DMUs shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and	Negligible: temporary and reversible, barely discernible impact to an insignificant 8 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.	unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse,	Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of a receptor group. Impact occurrence possible.	and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u>		
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 38 Residual impacts on Devoll Riffle Minnow (*Alburnoides devolli)* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Albania</u> RV-227 (52)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction in DMUs shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and	Negligible: temporary and reversible, barely discernible impact to an insignificant <1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.	unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse,	Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion of a receptor group. Impact		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
			occurrence possible.	and personnel be trained in its use		
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel Rehabilitate	Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 39 Residual impacts on European eel (*Anguilla anguilla)* and PBF fish with similar habitat requirements (such as twaite shad), based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Albania</u> RV-282 (105) RV- 287 (109) RV-301 (135) RV-400 (143) RV-405 (146) <u>Greece</u>	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (14 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction in DMUs shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to	Negligible: temporary and reversible, barely discernible impact to an insignificant 13 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
C0007-N (1)			occurrence possible	accommodate flow of watercourse and unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size		
C0041 (13) C0074 (27) C0127-N (42) C0240 (82) C0302-N (100) C0319-N (106) C0330-N (107) C0376 (117) C0411 (126) C0458 (136) C0711-N-1 (179) C0848A-N-6 (216) C0865 (222) C1030 (269) C1103 (284) C1458 (359) C2843 (539)	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed	Direct loss and disturbance of		Negligible: temporary or barely discernible impact to		Negligible: temporary or barely discernible impact to	No residual impact, no

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
crossing over watercourse to provide access for construction plant and vehicles	fish habitat including spawning areas		an insignificant proportion of the habitat. Impact occurrence a one-off	and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel	an insignificant proportion of the DMUs.	offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				<u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 40 Residual impacts on *Alburnus vistonicus* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Greece</u> C0240 (82) C0302-N (100) C0458 (136)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of fish; backfill	Negligible: temporary and reversible, barely discernible impact to an insignificant 1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.	using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use	Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of a receptor group. Impact occurrence possible.	Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey		
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				(including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 41 Residual impacts on Pelagos trout (*Salmo pelagonicus*) and PBF fish with similar habitat requirements (e.g. Ukrainian stickleback), based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Greece</u> C2843 (539) C2772-1 (520) C1103 (284)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (<1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and	Negligible: temporary and reversible, barely discernible impact to an insignificant <1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
			occurrence possible	unhindered movement of fish; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse,		
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion		Negligible: temporary or barely discernible change to an insignificant proportion of	No residual impact, no offsets

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of a receptor group. Impact occurrence possible.	and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u>	the receptor group	required
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 42 Residual impacts on *Barbus macedonicus* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Greece</u> C2856-1-1 (543) C2843 (539)	Direct loss and disturbance of fish habitat including spawning areas.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (<1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Construction shall avoid the spawning period (early April and late June) Avoid working at night. Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the three watercourse crossings to minimise potential for cumulative disturbance on fish species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of fish; backfill	Negligible: temporary and reversible, barely discernible impact to an insignificant <1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.	using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for fish during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any fish or invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling (undertaken outside of spawning season, with soft start procedure), sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use	Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or suffocation of fish.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Creation of barriers to fish movement during		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of a receptor group. Impact occurrence possible.	Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey		
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				(including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 43 Residual impacts on *Turcorientalia hohenackeri* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Greece</u> C0797- N -23 (211) C0848A-N-6 (216) C0865 (222)	Direct loss and disturbance of habitat.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the watercourse crossings to minimise potential for cumulative disturbance on species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of water; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms.	Negligible: temporary and reversible, barely discernible impact to an insignificant 1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat or suffocation of individuals.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Disturbance / displacement of species during works		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence		Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	period process		possible.	Maintain water flow (via pump-around) during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling, sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and		
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of habitat		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat or suffocation of individuals.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to		

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				their original condition as soon as possible after completion of works.		

Table 44 Residual impacts on thick shelled river mussel (*Unio crassus)* based on an open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs for the species. Watercourse crossing ID and (KP) <u>Greece</u> C0240 (82) C0302-N (100) C2700 (505) C2732 (510) C2772-1 (520) C2843 (539) C2856-1-1	Direct loss and disturbance of habitat.	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (<1 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Stagger construction of the watercourse crossings to minimise potential for cumulative disturbance on species. Use existing bridges to cross watercourses wherever possible. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of water; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of	Negligible: temporary and reversible, barely discernible impact to an insignificant <1 ha of known or potential habitat across the entire project area of influence; impact occurrence considered to be a one-off.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat or suffocation of individuals.		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary (duration of particular construction activity) and barely discernible change to integrity of habitat which is of particular importance to the receptor.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
(543)				contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any invertebrate species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling, sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest		
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of habitat		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat or suffocation of individuals.		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to sensitive receptor possible.	Yes, offsets required to achieve Net Gain
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.)		

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 45 Residual impacts on threatened, endemic and migratory fish (critical habitat triggers and priority biodiversity features) and invertebrates based on a non-open cut construction technique

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
Installation of pipeline through the following watercourses, which have been identified as DMUs. Watercourse crossing ID and (KP) <u>Albania</u> RV-27 (9) European Eel Devoll Riffle Minnow RV-287 (109) European Eel Osumi riffle Minnow RV-294 (114) Osumi riffle Minnow RV-298 (134) Osumi riffle Minnow	Direct loss and disturbance of habitat	High as CH trigger species	Small: temporary, (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion (32 ha) of known or potential habitat across the entire project area of influence. Impact occurrence possible.	<u>Avoid</u> Use of non-open cut crossing technique (e.g. HDD or microtunnel) <u>Minimise</u> Prepare a detailed Watercourse Crossing Plan for each crossing Use directional lighting angled away from the river to keep the riverbank in darkness to avoid disturbance to migrating fish species at night. Minimise night-time noise and light as far as possible, consistent with the need for drilling to be a 24-hour operation. No vegetation removal or clearance at the floodplain and the riverbanks; retain mature trees on banks Prepare an emergency response plan to minimise effects if HDD process causes break-out of drilling mud into the river channel. Work to be supervised on-site by a suitably qualified ecologist (i.e. someone with experience in aquatic ecology). Ecological awareness training should be	No impact to DMUs	No residual impact, no offsets required
	Creation of barriers to fish movement during construction		Small: temporary (throughout project construction and reinstatement phase) and reversible, discernible impact to a minor proportion of the receptor group. Impact occurrence possible		No impact to DMUs	No residual impact, no offsets required
	Disturbance / displacement of species during works period process		Small: temporary, (throughout entire project construction and reinstatement phase), discernible impact to a minor proportion of a receptor group. Impact occurrence possible.		No impact to DMUs	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
European Eel RV-302 (135) European Eel RV-302 (138) Osumi riffle Minnow European Eel RV-304 (139) Osumi riffle Minnow European Eel RV-401 (144) European Eel Osumi riffle Minnow RV430 (161) Osumi riffle Minnow European Eel RV-490 (186) European Eel Osumi riffle Minnow	Mobilisation of fine sediments resulting in siltation of sensitive habitats (e.g. spawning gravels) or suffocation of individuals		Large/medium: impact occurrence or sensitive receptor presence highly likely or known to occur; considerable change to a significant proportion of habitat which is of particular importance to the receptor	provided to all appropriate personnel. All wastewater to meet the defined standard (e.g. WFD standard), EU and Albanian legislation and requirement prior to disposal to a watercourse. Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Monitoring of impacts on flora and fauna at sensitive locations. Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse.	Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
Oxynoemacheilus pindus RV-540 (198) European Eel Osumi riffle Minnow *Oxynoemacheilus pindus* <u>Greece</u> C0001-N (0) *Cobitis puncticulata* European Eel C0223 (78) European Eel *Alburnus vistonicus* *Unio crassus* C0530 (154) European Eel *Turcorientalia hohenackeri* C0343 (113) European Eel *Alburnus vistonicus*						

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
C0570 (165) *Turcorientalia hohenackeri* European Eel C0689-N (175) *Turcorientalia hohenackeri* European Eel C2053 (375) European Eel C2796 (525) European Eel Pelagos trout *Unio crassus* C2053 (375) European Eel *Barbus macedonicus* Pelagos trout C2403 (420) European Eel						

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
C1256 (294) European Eel *Alburnoides sp. volvi* *Barbus macedonicus* Pelagos trout C0791-N (205) Greek brook lamprey Aggitis Spined Loach European Eel *Turcorientalia hohenackeri* C0797-N-9-1 (208) C0886 (226) Aggitis Spined Loach European Eel *Turcorientalia hohenackeri* C2258 (400) *Barbus macedonicus* European Eel C2796 (525) Pelagos trout *Unio crassus*						

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
Barbus macedonicus European Eel C2825 (534) Pelagos trout *Unio crassus* *Barbus macedonicus* European Eel C2065 (377) Pelagos trout *Barbus macedonicus*						
Installation of flumed crossing over watercourse to provide access for construction plant and vehicles	Direct loss and disturbance of fish habitat including spawning areas		Negligible: temporary or barely discernible impact to an insignificant proportion of the habitat. Impact occurrence a one-off		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required
	Mobilisation of fine sediments resulting in siltation of sensitive habitat (e.g. spawning gravels) or		Medium/small: sensitive receptor presence highly likely or known to occur; temporary change to a minor proportion of habitat which is of particular importance to the receptor. Impact occurrence likely.		Small: temporary and/or reversible change to integrity of habitat which is of importance to the receptor; impact occurrence to	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/ offset required?
	suffocation of fish.				sensitive receptor possible.	
	Creation of barriers to fish movement during construction		Small: temporary (throughout entire project construction and reinstatement phase) chance to a minor proportion of a receptor group. Impact occurrence possible.		Negligible: temporary or barely discernible change to an insignificant proportion of the receptor group	No residual impact, no offsets required
Hydrotesting	Effects on water quality from dewatering of hydrotest water		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.		Negligible: temporary or barely discernible impact to an insignificant proportion of the DMUs.	No residual impact, no offsets required

10.8 Herpetofauna

Three amphibian species, the fire-bellied toad (*Bombina bombina*), the Macedonia crested newt (*Triturus macedonicus*), and the Albanian pool frog (*Pelophylax shqipericus*), and one reptile, the four-lined snake (*Elaphe quatuorlineata*) were identified in the Critical Habitats Assessment as triggering Tier 2 critical habitat. The known distribution of the fire-bellied toad in Greece is limited to marshlands around the Evros River, which represent the single DMU for the species in Greece. This DMU is approximately 10 km from the pipeline corridor at its nearest point. There will be no direct impacts on this site as a result of pipeline construction and indirect impacts are considered highly unlikely due to the nature of the proposed works and the separation distance. As such, the species is not considered further in this assessment.

The Macedonian crested newt is distributed throughout Albania but is restricted to the western part of mainland Greece where it is listed as EN. It was not observed in Greece during any of the surveys but based on known habitat preferences, it may occur in the forested areas between KP370 and KP465; this area has therefore been identified as a DMU for this species. Table 46 presents the results of the impact assessment for Macedonian crested newt. Species specific surveys will be completed in the appropriate season prior to clear and grade in order to verify critical habitat and confirm presence and/or absence of species at suitable features within the DMU, also to inform site specific mitigation measures, e.g. translocation and exclusion.

The Albanian pool frog is classified as EN on the IUCN Red List. It is an endemic species, distributed along the coast of Albania and Lake Scutaria/Skadar which just crosses the border into Montenegro. It has a range of approximately 5000 km^2. This species associates with a broad range of still or slow-moving freshwater waterbodies including canals, lakes, ponds, ditches, marshes and swamps. It was observed during TAP field surveys and the area between KP195 and the coast is classified as part of its range. There are also records (Jablonski, 2011) of the species being found less than 5 km north of the pipeline between KP191 and KP194. Table 47 presents the results of the impact assessment for the Albanian pool frog. Species specific surveys will be completed in the appropriate season prior to clear and grade in order to verify critical habitat and confirm presence and/or absence of species at suitable features within the DMU, also to inform site specific mitigation measures, e.g. translocation and exclusion.

The four-lined snake is classified as NT on the IUCN Red List but as VU in the Albanian Red Data Book. It is endemic to Europe, with a distribution across the south of Italy as well as the coast of the Balkans and Greece. Its range covers the majority of Albania and there are records (Haxhiu, 1998) of the species being found within 20 km of the pipeline around KP80, KP140 and KP210. A lack of understanding

and the patchy nature of their populations means that the DMUs and surrounding area across the whole pipeline could support 10% of the regional population.

Table 48 presents the results of the impact assessment for the four lined snake. Species specific surveys will be completed in the appropriate season prior to clear and grade in order to verify critical habitat and confirm presence and/or absence of species at suitable features within the DMU, also to inform site specific mitigation measures, e.g. translocation and exclusion.

Table 46 Residual impacts on Macedonian crested newt

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Pipeline trenching within potentially suitable Macedonian newt habitat	Mortality of individuals from ground clearance and vehicle movements	High as CH trigger species	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	<u>Avoid</u> Ground clearance and excavation works will be minimised during the winter months. Ground clearance and excavation works in forested areas will not be undertaken in late spring where possible. <u>Minimise</u> Contractors and staff to implement Environmental Method Statement for Amphibians and Reptiles, as well as EFO instructions and briefing. The habitats directly crossed/affected by the pipeline will be assessed on their potential to support reptiles and amphibians by the EFO. All site clearance/initial ground breaking will be monitored by the EFO. Prior to ground clearance works,	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	No residual impact, no offsets required
	Direct loss and disturbance/degradation of breeding habitat and terrestrial habitat within 100m of breeding habitat		Small: temporary (throughout entire construction and reinstatement phase) change to 11 ha of terrestrial habitat within 100m of known or potential breeding sites (note breeding sites in the wider environment not known however detailed surveys have not been undertaken).		Small: temporary (throughout entire construction and reinstatement phase) change to 11 ha of terrestrial natural and modified habitat within 100m of known or potential breeding sites	Yes, offsets required to achieve Net Gain
	Creation of barriers to movement during		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant proportion		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of	No residual impact

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	construction		of likely or known newt habitat.	vegetation in areas of suitable habitat will be trimmed and removed as per Method Statement. Immediately before any ground disturbance, destructive searches will be undertaken. Any reptiles or amphibians found during these pre-construction activities will be caught and moved to a suitable receptor site. All vehicles and plant will only follow routes cleared under supervision of the EFO. Boarding, or similar, will be installed at open excavations in suitable reptile/amphibian habitats to provide a means of escape. Trained fauna handlers will check the open trench for trapped fauna. Any trapped fauna will be located at suitable habitat at least 100m from the construction works. All topsoil and subsoil will be stored separately and mounds lightly tamped down to minimise reptiles and amphibians seeking shelter.	receptor population.	
	Disturbance / displacement of species during works period		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant proportion of likely or known newt habitat.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact
Construction of open cut pipeline	Direct loss and disturbance/degradation of		Small: temporary (throughout entire construction and reinstatement phase) change	Avoid Use of isolated or dry bed open cut	Small: temporary (throughout entire construction and reinstatement phase) change	Yes, offsets required to achieve Net

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
crossings (dry open cut assumed for all watercourses determined to be critical habitat unless TAP have indicated HDD or similar)	habitat		to an insignificant proportion of likely or known newt habitat.	construction technique. <u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of aquatic fauna; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for aquatic fauna during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during	to an insignificant proportion of likely or known newt habitat.	Gain
	Creation of barriers to movement during construction		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact
	Disturbance / displacement of species during works period process		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				dewatering any amphibian species observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling, sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back		

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 47 Significant residual impacts on Albanian pool frog

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Pipeline trenching within potentially suitable Albanian pool frog habitat	Mortality of individuals from ground clearance and vehicle movements	High as CH trigger species	Negligible: in the absence of mitigation any impacts would affect a small proportion of receptor population.	<u>Avoid</u> Ground clearance and excavation works will be minimised during the winter months. Ground clearance and excavation works in forested areas will not be undertaken in late spring where possible. <u>Minimise</u> Construction personnel forbidden to collect/harvest individuals (included in environmental awareness training) Contractors and staff to implement Environmental Method Statement for Amphibians and Reptiles, as well as EFO instructions and briefing. The habitats directly crossed/affected by the pipeline will be assessed on their potential to support reptiles and amphibians by the EFO. All site clearance/initial ground breaking will be monitored by the EFO. Prior to ground clearance works, vegetation in areas of suitable habitat will be trimmed and removed as per Method Statement.	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	No residual impact, no offsets required
	Mortality from harvesting by construction staff for consumption/sale		Small: temporary (throughout entire construction and reinstatement phase) impact to a minor proportion of receptor population. Impact occurrence possible		Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	No residual impact, no offsets required
	Direct loss and disturbance/degradation of habitat		Small: temporary (throughout entire construction and reinstatement phase) change to 100 ha of known or potential habitat across the entire project area of influence.		Small: reversible change to 17 ha of known or potential habitat which will be fully reinstated on completion of construction.	Yes, offsets required to achieve Net Gain
	Creation of barriers to movement during construction		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
			proportion of likely or known frog habitat.	Immediately before any ground disturbance, destructive searches will be undertaken. Any reptiles or amphibians found during these pre-construction activities will be caught and moved to a suitable receptor site. All vehicles and plant will only follow routes cleared under supervision of the EFO. Boarding, or similar, will be installed at open excavations in suitable reptile/amphibian habitats to provide a means of escape. Trained fauna handlers will check the open trench for trapped fauna. Any trapped fauna will be located at suitable habitat at least 100m from the construction works. All topsoil and subsoil will be stored separately and mounds lightly tamped down to minimise reptiles and amphibians seeking shelter.		
	Disturbance / displacement of species during works period		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant proportion of likely or known frog habitat.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
Construction of open cut pipeline crossings in agricultural ditches(dry	Direct loss and disturbance/degradation of habitat including potential		Small: likely temporary change to breeding habitats for an unknown proportion of breeding sites within the DMUs.	<u>Avoid</u> Use of isolated or dry bed open cut construction technique. <u>Minimise</u> Undertake crossing (including	Small: likely temporary change to breeding habitats for an unknown proportion of breeding sites within the DMUs.	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
open cut assumed for all watercourses determined to be critical habitat)	breeding habitat			installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of aquatic fauna; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for aquatic fauna during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any amphibian species observed should be carefully removed from this area and replaced within the		
	Creation of barriers to movement during construction		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
	Disturbance / displacement of species during works period process		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				river in an area with no sediment) When constructing dry river crossings, vibro piling, sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk assessment performed to ensure biosecurity of receiving watercourse.		

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 48 Significant residual impacts on four lined snake

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Construction and upgrade of access roads	Direct mortality of individuals through vehicle collision (ongoing for lifetime of road)	High as CH trigger species	Negligible: any impacts would affect insignificant proportion of receptor population.	Minimise Observation of speed restrictions for all construction plant and vehicles Environmental awareness programme for construction personnel	Negligible: any impacts would affect insignificant proportion of receptor population.	No residual impact, no offsets required
Pipeline trenching within potentially suitable four lined snake habitat	Direct mortality of individuals from ground clearance and vehicle movements		Negligible: any impacts would affect insignificant proportion of receptor population.	Avoid Ground clearance and excavation works will be minimised during the winter months. Ground clearance and excavation works in forested areas will not be undertaken in late spring where possible. Minimise Contractors and staff to implement Environmental Method Statement for Amphibians and Reptiles, as well as EFO instructions and briefing. The habitats directly crossed/affected by the pipeline will be assessed on their potential to support reptiles and amphibians by the EFO.	Negligible: any unmitigated impacts would affect insignificant proportion of receptor population.	No residual impact, no offsets required
	Direct loss and disturbance/degradation of habitat		Small: temporary (throughout entire construction and reinstatement phase) change to 114 ha of known or likely habitat across the entire project area of influence		Small: temporary, reversible change to 107 ha of known or potential natural and modified habitat across the entire project area of influence, which will be fully reinstated on completion of construction	Yes, offsets required to achieve Net Gain
	Creation of barriers to		Small: temporary (throughout entire		Negligible: temporary, reversible change, any	No residual impact, no

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	movement during construction		construction and reinstatement phase) change to an insignificant proportion of likely or known snake habitat.	All site clearance/initial ground breaking will be monitored by the EFO. Prior to ground clearance works, vegetation in areas of suitable habitat will be trimmed and removed as per Method Statement. Immediately before any ground disturbance, destructive searches will be undertaken. Any reptiles or amphibians found during these pre-construction activities will be caught and moved to a suitable receptor site. All vehicles and plant will only follow routes cleared under supervision of the EFO. Boarding, or similar, will be installed at open excavations in suitable reptile/amphibian habitats to provide a means of escape. Trained fauna handlers will check the open trench for trapped fauna. Any trapped fauna will be located at suitable habitat at least 100m from the construction works. All topsoil and subsoil will be stored separately and mounds lightly tamped down to minimise reptiles and amphibians seeking shelter.	impacts would affect an insignificant proportion of receptor population.	offsets required
	Disturbance / displacement of species during works period		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant proportion of likely or known snake habitat.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Two amphibian species, yellow-bellied toad (*Bombina variegata*) and Greek marsh frog (*Pelophylax kurtmuelleri*, syn. *Rana balcanica*), and two reptile species, spur-thighed tortoise (*Testudo graeca*) and Aesculapian snake (*Elaphe longissima*), were identified as priority biodiversity features. Pool frog (*Rana lessonae*) was originally considered as a potential critical habitat trigger or priority biodiversity feature as it is listed as VU on the Albanian red list (2007). However, due to taxonomic revision, this species is no longer considered to be present in Greece or Albania and the species is not considered further.

The yellow-bellied toad is distributed throughout Albania but has a restricted distribution in mainland Greece including around major rivers and wooded mountain regions. Greek marsh frog has similar habitat requirements and is even more widespread that the yellow-bellied toad. Both species are listed as VU on the Albania red list (2007). Both species have been observed in a few locations in Greece and Albania during surveys but based on known habitat preferences may occur almost anywhere with suitable breeding habitat along the pipeline route. The two species have similar ecology and the potential impacts from the project are the same so they are assessed together. Table 49 presents the results of the impact assessment for both yellow-bellied toad and Greek marsh frog.

Spur-thighed tortoise occurs in most areas of wooded semi-natural habitat along the pipeline route in Greece, and was observed regularly in most survey locations. The species is considered VU globally. Aesculapian snake is also widespread in Albania and Greece, and is considered EN in Albania. Table 50 presents the results of the impact assessment for both reptile species.

A specific Amphibian and Reptile Management Plan has been developed and is included as an appendix to the EcMP. The EcMP describes the verification surveys that will be carried out by in the correct survey season (spring-early summer) in each of the areas identified as potentially supporting amphibian and reptile species of conservation significance. The results of these verification surveys will be used to update the relevant Level 3 site files, as listed on the Route Environmental Impact Register. The EcMP describes in greater detail the mitigation measures to be implemented in all areas that potentially support amphibians and reptiles.

Table 49 Residual impacts on yellow-bellied toad and Greek marsh frog

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Pipeline trenching within potentially suitable amphibian habitat	Mortality of individuals from ground clearance and vehicle movements	Medium, as PBF	Negligible: any impacts would affect insignificant proportion of receptor population.	<u>Minimise</u> Observation of speed restrictions for all construction plant and vehicles Environmental awareness programme for construction personnel	Negligible: any impacts would affect insignificant proportion of receptor population.	No residual impact, no offsets required
	Direct loss and disturbance/degradation of habitat		Small: temporary (throughout entire construction and reinstatement phase) change to small area of known or potential habitat across the entire project area of influence.	<u>Avoid</u> Ground clearance and excavation works will be minimised during the winter months. Ground clearance and excavation works in forested areas will not be undertaken in late spring where possible. <u>Minimise</u> Contractors and staff to implement Environmental Method Statement for Amphibians and Reptiles, as well as EFO instructions and briefing. The habitats directly crossed/affected by the pipeline will be assessed on their potential to support reptiles and amphibians by the EFO. All site clearance/initial ground breaking will be monitored by the EFO. Prior to ground clearance works, vegetation in areas of suitable habitat	Negligible: temporary change to small area of known or potential habitat across the entire project area of influence, which will be fully reinstated	No residual impact, no offsets required
	Creation of barriers to movement during construction		Small: temporary (throughout entire construction and reinstatement phase) change to a minor proportion of likely or known amphibian habitat.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
	Disturbance / displacement of species during works period		Small: temporary (throughout entire construction and reinstatement phase) change to a minor proportion of likely or known amphibian habitat.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				will be trimmed and removed as per Method Statement. Immediately before any ground disturbance, destructive searches will be undertaken. Any reptiles or amphibians found during these pre-construction activities will be caught and moved to a suitable receptor site. All vehicles and plant will only follow routes cleared under supervision of the EFO. Boarding, or similar, will be installed at open excavations in suitable reptile/amphibian habitats to provide a means of escape. Trained fauna handlers will check the open trench for trapped fauna. Any trapped fauna will be located at suitable habitat at least 100m from the construction works. All topsoil and subsoil will be stored separately and mounds lightly tamped down to minimise reptiles and amphibians seeking shelter.		
Construction of open cut pipeline crossings in	Direct loss and disturbance/degradation of habitat		Small: temporary (throughout entire construction and reinstatement phase) change to an insignificant proportion	<u>Avoid</u> Use of isolated or dry bed open cut construction technique.	Negligible: temporary change to an insignificant proportion of the DMUs	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
rivers, streams and agricultural ditches (dry open cut assumed for all watercourses determined to be critical habitat unless TAP have indicated HDD or similar)	including breeding habitat		of likely or known amphibian habitat.	<u>Minimise</u> Undertake crossing (including installation of any flumed crossings) during low-flow season to reduce impacts of sediment and pollution dispersal. Minimise removal of riparian vegetation and leave a vegetated strip at the crossing point for as long as possible (i.e. restrict initial clearance to running track) to prevent sediment runoff Use flumes of adequate size to accommodate flow of watercourse and unhindered movement of aquatic fauna; backfill using clean gravel over geo-membrane Implementation of Pollution Prevention Plan and an Erosion and Sediments Management Plan, including removal of contaminated sediments, control of river flow, use of booms. Maintain water flow (via pump-around) and passage for aquatic fauna during construction Engage a suitably qualified ecologist (i.e. someone with experience in aquatic ecology) to carry out fauna translocation when creating a dry works area (during dewatering any amphibian species		
	Creation of barriers to movement during construction		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
	Disturbance / displacement of species during works period process		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				observed should be carefully removed from this area and replaced within the river in an area with no sediment) When constructing dry river crossings, vibro piling, sandbags or 'aquadams' will be used to create a dry trench Sediment retention ponds to be used during construction works as required. Each watercourse crossing crew to be supplied with emergency spill response equipment commensurate with the size and flow conditions of the watercourse, and personnel be trained in its use Minimise plant operation within the river; ensure all plant has been checked for signs of leaks or malfunction prior to entering the river Develop and implement biosecurity measures for all plant and equipment Develop and implement a Hydrotest Management Plan that describes test sections, proposed extraction and discharge points, use of any additives to test water, minimum flow conditions for watercourses receiving discharge, design of discharge points to minimise risk of scour, proposed monitoring, etc. Hydrotest water to be discharged back into watershed of origin. Or risk		

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				assessment performed to ensure biosecurity of receiving watercourse. All wastewater to meet the defined standard (e.g. WFD standard), EU and Greek legislation and requirements prior to disposal to a watercourse. Prepare and implement a detailed Watercourse Crossing Plan for each sensitive crossing. Ecological awareness training to be provided to all appropriate personnel <u>Rehabilitate</u> Undertake a pre-construction survey (including detailed photographic survey) to confirm baseline condition against which all mitigation, restoration, and loss / degradation can be measured. Retain original (cut) riparian vegetation for use in reinstatement (bank stabilisation, cover for fauna, etc.) Restore the in-channel habitat (e.g. substrate) and riparian vegetation to their original condition as soon as possible after completion of works.		

Table 50 Significant residual impacts on spur-thighed tortoise and Aesculapian snake

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Pipeline trenching within potentially suitable reptile habitat	Direct mortality of individuals from ground clearance and vehicle movements	Medium, as PBF	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	<u>Minimise</u> Observation of speed restrictions for all construction plant and vehicles Environmental awareness programme for construction personnel Contractors and staff to implement Environmental Method Statement for Amphibians and Reptiles, as well as EFO instructions and briefing. The habitats directly crossed/affected by the pipeline will be assessed on their potential to support reptiles and amphibians by the EFO. All site clearance/initial ground breaking will be supervised by the EFO. Ground clearance and excavation works will be minimised during the winter months. Ground clearance and excavation works in forested areas will not be undertaken in late spring where possible. Prior to ground clearance works, vegetation in areas of suitable habitat will be strimmed and removed as per Method Statement. Immediately before any ground	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	No residual impact, no offsets required
	Direct loss and disturbance/degradation of habitat		Small: temporary (throughout entire construction and reinstatement phase) change to a minor proportion of habitat across the entire project area of influence.		Small: temporary (throughout entire construction and reinstatement phase) change to minor proportion of habitat across the entire project area of influence, which will be fully reinstated.	No residual impact, no offsets required
	Creation of barriers to movement during construction		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
	Disturbance / displacement of species during works period		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				disturbance, destructive searches will be undertaken. Any reptiles or amphibians found during these pre-construction activities will be caught and moved to a suitable receptor site. Exclusion fencing shall be erected in areas of high population densities. All vehicles and plant will only follow routes cleared under supervision of the EFO. Boarding, or similar, will be installed at open excavations in suitable reptile/amphibian habitats to provide a means of escape. Trained fauna handlers will check the open trench for trapped fauna. Any trapped fauna will be caught and moved to a suitable receptor site. All topsoil and subsoil will be stored separately and mounds lightly tamped down to minimise reptiles and amphibians seeking shelter.		
Construction and upgrade of access roads	Direct mortality of individuals through vehicle collision (ongoing for		Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	<u>Minimise</u> Observation of speed restrictions for all construction plant and vehicles Environmental awareness programme for construction personnel	Negligible: any impacts would affect an unknown but likely very small proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	lifetime of road)					

10.9 Threatened and/or endemic flora

DMUs were identified within the project AOI for the following threatened and/or endemic flora species:

- mountain tea (*Sideritis raeseri* subsp. *raeseri*) approximately 2,182 ha within sub-alpine meadows between KP72 and KP97 in Albania
- yellow monk's-hood (*Aconitum lamarkii*) collectively 1,773 ha within beech forests from KP70 to KP90 in Albania
- deadly nightshade (*Atropa belladonna*) collectively estimated to be 1,933 ha within beech forests in both Greece and Albania
- Albanian lily (*Lilium albanicum*) collectively 2,182 ha in sub-alpine meadows between KP72 and KP97 in Albania
- serpentine false-brome (*Festucopsis serpentini*) collectively 2,182 ha of areas with serpentine soils between KP72 and KP97 in Albania.
- *Sarcopoterium spinosum* was recorded in five patches on or close to the ROW around KP 211.5 during the June 2017 coastal vegetation survey, the survey report is pending and therefore the collective area of occurrence is unknown at time of writing. This is only the second location in which this species has been recorded in the country.

As detailed in Section 8.2.3 a further 22 species of flora were identified as PBFs these have been incorporated into the appropriate habitat type for consideration in this assessment.

Table 51 assesses the potential residual impacts on the above-listed vascular plants.

Table 51 Residual impacts on mountain tea, yellow monk's-hood, deadly nightshade, Albanian lily and serpentine false-broom

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Site / ROW preparation (including vegetation removal, topsoil	Direct loss/ disturbance/de gradation/ fragmentation of habitat	High as CH trigger species	Medium: considerable long term (>5 yrs) change to 38 ha of known or potential habitat across the entire project area of influence, discernible alteration to	Minimise Work to be supervised by an on-site Ecological Field Monitor. Pre-construction survey to confirm extent of loss / disturbance to species.	Medium: considerable long term (>5 yrs) change to to 29 ha of known or potential habitat across the entire project area of influence, discernible alteration to	Yes, offsets required to achieve Net Gain

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
stripping) within suitable vascular plant habitat	Edge effects		distribution of receptor, sensitive receptor presence likely, impact occurrence likely.	Implement measures outlined in the 'Species Action Plan for *Lilium Albanicum* and *Festucopsis serpentini'.* Implement measures outlined in the 'Species Action Plan for *Aconitum lamarckii*'. Implement measures outlined in the 'Species Action Plan for *Sarcopoterium spinosum*'. Minimise vegetation clearance / working width. <u>Rehabilitate</u> Post-construction monitoring to ensure species re-establish after pipeline construction. Contractor to develop procedures to avoid, monitor and control invasive species as appropriate.	distribution of receptor, sensitive receptor presence likely, impact occurrence likely.	

10.10 Congregatory bats

Two DMUs were initially identified for congregatory species of cave-roosting bats in Albania: former military tunnel (#8) which is located in the Berat region, and Pirogosh Cave which is listed as a Nature Monument (IUCN category III) and is well known for its diversity and assemblage of bats.

The following species were recorded during surveys: Blasius's horseshoe (*Rhinolophus blasii*), Mediterranean horseshoe bat (*Rhinolophus euryale*), Schreiber's bat (*Miniopterus schreibersii*), long-fingered bat (*Myotis capaccinii*) and the greater horseshoe bat (*Rhinolophus ferrumequinum*).

A small section of a project access road is just within 2 km of Pirogosh Cave; the project will not result in direct impacts on this site and indirect impacts are considered highly unlikely due to the nature of proposed activities and the separation distance. This site is therefore not discussed further in this report.

Additional DMUs for congregatory bats were identified in Albania associated with Prespa Lakes National Park (greater horseshoe bat, lesser horseshoe bat (*Rhinolophus hipposideros*)), Tomorrit National Park (lesser horseshoe bat, Schreiber's bat, long-fingered bat) and the Vithkuq-Ostrovice Corine Biotope (greater horseshoe, Mediterranean horseshoe, Schreiber's bat and long-fingered bat).

In Greece DMUs have also been identified in association with the following protected areas:

- Mount Kouskouras IBA/SPA/SCI (Schreiber's Bat, Bechstein's bat (*Myotis bechsteinii*), lesser mouse-eared bat (*Myotis blythii*), long-fingered bat, Geoffroy's bat (*Myotis emarginatus*), greater mouse-eared bat (*Myotis myotis*), Blasius' horseshoe bat, Mediterranean horseshoe bat, greater horseshoe bat, lesser horseshoe bat, Mehely's horseshoe bat (*Rhinolophus mehelyi*) all listed as Qualifying Features);
- Lake Volvi National Park/SPA/SCI (Schreiber's Bat, Bechstein's bat, greater horseshoe listed as Qualifying Features);
- Oros Vermio SCI (Schreiber's bat , lesser mouse eared bat, long fingered bat, Geoffroy's bat , greater mouse eared bat listed as Qualifying Features);
- Lake Kastoria protected area complex (greater horseshoe bat, Geoffroy's bat, Schreiber's bat)
- Prespa Lakes (greater horseshoe bat, lesser horseshoe bat).

An additional ten species of ground-roosting (i.e. roosting in caves, mines, crevices, quarries, buildings) bats were identified as PBFs within the project AOI; serotine (*Eptesicus serotinus*), free-tailed bat (*Tadarida teniotis*), whiskered bat (*Myotis mystacinus*), natterers bat

(*Myotis nattereri*), noctule (*Nyctalus noctula*), Kuhl's pipistrelle (*Pipistrellus kuhlii*), Nathusius's pipistrelle (*Pipistrellus nathusii*), common pipistrelle (*Pipistrellus pipistrellus*), Savi's pipistrelle (*Pipistrellus savii*) and parti-coloured bat (*Vespertilio murinus*).

These species all fall within the same broad species group as the critical habitat triggering species, therefore a seperate impact assessment has not been undertaken for them as they will fall within the scope of the assessments and associated mitigation measures proposed for the critical habitat species. Also as priority biodiversity features they have a lower (medium) sensitivity than critical habitat triggers.

Table 52 Residual impacts on CH-qualifying congregatory bats

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
Preparation of the working area (including mobilisation of heavy machinery, vegetation clearance, topsoil stripping, etc.)	Disturbance/degradation of habitat	High as CH trigger species	Small: temporary change to 109 ha of known or potential habitat across the entire project area of influence.	<u>Avoid</u> Work during the swarming and hibernation period (1 September to 1 March) should be avoided. If rock blasting is required in these areas, it should be undertaken in March and April to minimise disturbance impacts to any roosts. Blasting and other construction activities with the potential to generate significant noise and vibration (e.g. hydrotesting) shall not be carried out within 100m of any known roosts <u>Minimise</u> Reduce working width to 28m in areas where bat habitat coincides with other critical habitat e.g. for bears Avoid night-time working	Small: temporary change to 83 ha of known or potential natural and modified habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<16 ha) will not necessarily preclude the continued use of that habitat by foraging bats	Yes, offsets required to achieve Net Gain
Pipeline trenching within adjacent habitat (potentially	Disturbance / displacement of species during works period		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required
	Death / injury /		Medium: long-term (> 5		Negligible: temporary,	No residual

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
including rock blasting in some areas) Movement of vehicles and construction plant within adjacent habitat	disturbance (disruption to or prevention of hibernation) during works period		years) change to a significant proportion of exposed receptor group. Impact occurrence likely	Ensure no intrusion by machinery or storage of equipment into any part of the tunnel or natural cave system. All personnel to report wildlife sightings to the EFO / EFC. Environmental awareness training to be delivered to all personnel. <u>Rehabilitate</u> Reinstatement of bat foraging habitat Monitoring will be required to understand any changes to the site after works..	reversible change, any impacts would affect an insignificant proportion of receptor population.	impact, no offsets required

There is also the potential for tree-roosting bats to be present in areas of woodland and forest in Greece and Albania, and these species are considered PBFs due to their inclusion on Annex 4 of the Habitats Directive. TAP has developed an Environmental Method Statement to minimise impacts on tree-roosting bats along the alignment where trees need to be felled as part of ground clearance and preparation activities for the pipeline RoW and ancillary working areas. It adopts a precautionary principle and will be implemented during project construction, replacing the need for detailed pre-construction surveys. It provides instruction aligned with good working practice when undertaking operations which could affect bats in trees and will ensure compliance with international directives and prevent bats being significantly disturbed and/ or harmed. The requirement for this Method Statement is driven by Council Directive 92/43/EEC (the 'Habitats Directive') the key mitigation measures are summarised below.

Table 53 Residual impacts on tree roosting priority biodiversity feature bat species

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
Preparation of the working area (including commencement of tree felling, mobilisation of heavy machinery, vegetation clearance, topsoil stripping, etc.) Pipeline	Disturbance/degradation of habitat	Medium, as PBF	Medium: long-term (> 5 years) change to 109 ha of known or potential habitat across the entire project area of influence.	<u>Avoid</u> Pipeline route selection avoids, as far as possible, protected and designated areas where these species are listed as a qualifying feature, taking into consideration engineering, health and safety aspects <u>Minimise</u> Reduce working width to 28m in areas where bat habitat coincides with other critical habitat e.g. for bears Avoid night-time working Prior to commencement of tree felling a HSE risk assessment and toolbox talk will be provided to EPC contractors (including works supervisor, foreman,	Small: temporary change to 83 ha (cleared then fully reinstated) of known or potential natural and modified habitat across the entire project area of influence Permanent conversion of natural habitat to grass and shrubland within 8m PPS (<16 ha) will not necessarily preclude the continued use of that habitat by foraging bats	Yes, offsets required to achieve No Net Loss
	Disturbance / displacement of species		Negligible: temporary, reversible change, any impacts would affect an		Negligible: temporary, reversible change, any impacts would affect an	No residual impact, no offsets

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
trenching within adjacent habitat (potentially including rock blasting in some areas) Movement of vehicles and construction plant within adjacent habitat	during works period		insignificant proportion of receptor population.	semi-skilled workers and machine operators) regarding potential bat presence and the method statement. The EPC EFOs will walk c.250 m in front of the tree-fellers/machinery and conduct a ground-level inspection of any trees to be felled. Close-focussing binoculars will be used to inspect the tree from the ground to the canopy. All aspects of the tree will be inspected for potential roost features (PRFs) or evidence indicative of bat roosts. A high-powered torch will also be used to inspect cavities and shaded areas of the branch structure at ground level. The EFO will mark the trees to be felled with the number 1, 2 or 3, once they have been inspected. All category 2 and 3 trees should be soft-felled (i.e. trees are felled in stages from the top down and steadily lowered to the ground where possible). If rock blasting is required, it should be undertaken in March and April to minimise disturbance impacts to roosting bats. Felled trees should be re-inspected for evidence of bats.	insignificant proportion of receptor population.	required
	Death / injury / disturbance (disruption to or prevention of hibernation) during works period		Medium: long-term (> 5 years) change to a significant proportion of exposed receptor group. Impact occurrence likely.		Negligible: temporary, reversible change, any impacts would affect an insignificant proportion of receptor population.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
				Occupied roosts will be removed from the working area and placed along the edge of the ROW as soon as possible as detailed in the method statement. All personnel to report wildlife sightings to the EFO / EFC. Environmental awareness training to be delivered to all personnel. <u>Rehabilitate</u> Reinstatement of bat foraging habitat In sections of the route where tree-roosting opportunities are scarce (i.e. nearly all trees are classed as category 1), habitat enhancement measures will be considered. Categorisation will trigger need for bat boxes to be erected.		

10.11 Highly threatened or unique habitats (critical habitat triggers)

Eight highly threatened or unique habitats were identified within the project AOI across the three host countries:

- four DMUs were identified for the EU Priority Habitat **6220***[47] Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea within the project AOI in Italy; these are estimated to collectively be approximately 21 ha
- two DMUs were identified for the EU Priority Habitat **2270*** Wooded dunes with Maritime pine (*Pinus pinea*) and/or *Pinus pinaster* in Albania; these are collectively estimated to be approximately 93 ha
- three DMUs were identified for the EU Priority Habitat **3170*** Mediterranean temporary ponds, one in Italy and two in Greece; these are collectively estimated to extend to 571 ha
- one DMU which supports the EU Priority Habitat **7210*** Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* was identified in Italy with an approximate area of 26 ha
- a single DMU in Albania was identified for the EU Priority Habitat **9530*** (Sub-) Mediterranean pine forests with endemic black pine, estimated to be approximately 33 ha
- a single DMU supporting the EU Priority Habitat **91E0*** Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion Incanae*, *Salicion Albae*) was identified in Greece; while the DMU extends over approximately 1,326 ha this habitat type only occurs within a part of it
- five DMUs were identified that support the EU Annex 1 Habitat **9540** Mediterranean pine forests with endemic Mesogean pines, two in Albania and three in Greece. These DMUs are estimated to be approximately 423 ha in Greece and 328 ha in Albania.
- one DMU supporting the EU Annex 1 Habitat **9110** Luzulo-fagetum beech forest was found in Albania covering an area of approximately 1,773 ha.

Table 54 assesses the potential residual impacts of the project on these habitats. A high sensitivity has been assigned to these critical habitats.

[47] EU Annex 1 habitats are identified using a unique four-character code (e.g. 3110 or 91E0). This code refers to a specific habitat or group of habitats that is defined by the phytosociological and management characteristics. These codes can be compared to other habitat types using the Interpretation Manual of European Union Habitats (European Commission, 2013). When used throughout the text, these habitats are referred to as 'EU habitats' but the reference to the interpretation manual is not included with each occurrence. Further details of these habitats as they apply specifically to the TAP project are provided in the technical annexes of the ESIAs for each country

Table 54 Residual impacts on highly threatened or unique habitats

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact/offset required?
Site / ROW preparation (including vegetation removal, topsoil stripping) within suitable vascular plant habitat	Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species	High as CH trigger habitats	Medium: considerable long term (>5 yrs) change to 37 ha of known or potential habitat across the entire project area of influence.	<u>Minimise</u> Work to be supervised by an on-site Ecological Field Monitor. Pre-construction survey to confirm extent of loss / disturbance to species. Post-construction monitoring to ensure habitats re-establish after pipeline construction. Implement measures outlined in all relevant Species and Habitat Action Plans. Minimise vegetation clearance / working width. Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail.	Small: discernible, temporary (throughout entire project construction and reinstatement phase) change to 58 ha (cleared then fully reinstated) of habitat across the entire project area of influence Permanent conversion of habitat to grass and shrubland within 8m PPS 15 ha)	Yes, offsets required to achieve Net Gain

10.12 Threatened habitats (priority biodiversity features)

Thirty two threatened ecosystems were identified as priority biodiversity features within the project AOI across the three host countires:

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- 1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
- 2110 Embryonic shifting dunes (*Cakiletea maritimae* & A*mmophiletea*)
- 3280 Constantly Flowing Mediterranean Rivers with *Paspalo-Agrostidion* Species and Hanging Curtains of *Salix* and *Populus Alba*
- 5110 Stable xerothermophilous formations with *Buxus sempervirens* on
- 5130 *Juniperus communis* formations on heaths or calcareous grasslands
- 5210 Mediterranean arborescent matorral, arborescent matorral with *Juniperus* spp.
- 6420 Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion
- 6520 Mountain hay meadows
- 72A0 Reed beds (Phragmito-Magnocaricetea)
- 8120 Calcareous and calcshist screes of the montane to alpine levels
- 8210 Calcareous rocky slopes with chasmophytic vegetation
- 8220 Siliceous rocky slopes with chasmophytic vegetation
- 9130 *Asperulo-Fagetum* beech forests
- 9170 Galio-Carpinetum oak-hornbeam forests
- 91M0 Pannonian-Balkanic turkey oak- sessile oak forests
- 924A Thermophilous oak woods of E Mediterranean and Balkans
- 9250 Quercus Trojana Woods
- 925A Ostrya, Carpinus and mixed thermophilous forests
- 92A0 Salix alba and Populus alba galleries
- 92C0 Platanus orientalis and Liquidambar orientalis woods (Plantanion orientalis)

- 92D0 Southern Riparian Galleries and Thickets (*Nerio-tamaricetea* and *Securinegion tinctoriae)*
- 9340 *Quercus ilex* forests
- 9350 Quercus macrolepis forests
- 32B0 Annual river communities
- 5340 Garrigues of Eastern Mediterranean
- 5350 Pseudomaquis
- 6290 Mediterranean subnitrophilous grasslands
- 62A0 Eastern sub-mediterranean dry grasslands (*Scorzonetalia villosae*)
- 6450 Greek hyper-Mediterranean humid grasslands; and
- 5160 South-eastern sub-mediterranean deciduous thickets

Table 55 assesses the potential residual impacts of the project on these habitats which are described in more detail in Section 8.2.3.

Table 55 Residual impacts on habitats considered priority biodiversity features

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Upgrade of new permanent access road within area supporting this habitat	Annex 1 Habitat '1310 Salicornia and other annuals colonising mud and sand' Direct loss/ disturbance/ degradation/ fragmentation of habitat Edge effects Spread of invasive species	Medium, as PBF	Negligible: loss of an insignificant proportion of the national extent of this habitat.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	Negligible: Temporary loss of an insignificant proportion of the national extent of this habitat.	No residual impact, no offsets required
ROW	Annex 1		Negligible: loss of an	Minimise	Negligible: Temporary loss of	No residual

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Habitat '1420 Mediterranean and thermo-Atlantic halophilous scrubs' Direct loss/ disturbance/ degradation/ fragmentation of habitat Edge effects Spread of invasive species		insignificant proportion of the habitat due to construction of 1.6 km of pipeline and 0.7 km of new access road.	Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	7.4ha of the habitat due to construction of 1.6 km of pipeline and 0.7 km of new access road.	impact, no offsets required
ROW preparation (including vegetation	Annex 1 Habitat '2110 Embryonic shifting dunes'		Negligible: loss of an insignificant proportion of the habitat due construction of approximately 100 m of	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be	Negligible: Temporary loss of 0.3 ha of the habitat due construction of approximately 100 m of pipeline.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
removal, topsoil stripping) within areas supporting this habitat	Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		pipeline.	sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas	Annex 1 Habitat '3280 Constantly flowing Mediterranean rivers with *Paspalo-Agridion*		Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline (which is due to be installed by HDD at four of the five watercourse crossings where this habitat	Development of river-crossing plans for each watercourse to include specific ecological mitigation Other mitigation as listed above	Negligible: Temporary loss of 0.1 ha of the habitat due to construction of the pipeline (which is due to be installed by HDD at four of the five watercourse crossings where this habitat occurs).	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
supporting this habitat	species and hanging curtains of *Salix* and *Populus'* Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species		occurs).			
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '5110 Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes' Direct loss/ disturbance/de gradation/		Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline in one discrete area and upgrade of an existing access road.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity;	Negligible: Temporary loss of 3.6 ha of the habitat due to construction of the pipeline in one discrete area and upgrade of an existing access road.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	fragmentation of habitat Edge effects Spread of invasive species			Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '5130 *Juniperus communis* formations on heaths or calcareous grasslands' Direct loss/ disturbance/de gradation/ fragmentation of habitat		Negligible: loss of an insignificant proportion of the habitat due to construction of approximately 1 km pipeline and upgrade of two existing access roads.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to	Negligible: temporary loss of 3.7 ha of the habitat due to construction of approximately 1 km pipeline and upgrade of two existing access roads.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Edge effects Spread of invasive species			avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Greek scrub habitats: 5160 "South-eastern sub-Mediterranean deciduous thickets", 5340 "Garrigues of Eastern Mediterranean", and 5350 "Pseudomaquis" Direct loss/ disturbance/degradation/ fragmentation of habitat		Small: loss of a minor proportion of the habitat due to pipeline construction.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix	Small: Temporary loss of 19.8 ha of the habitat due to pipeline construction.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Edge effects Spread of invasive species			to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '5210 Arborescent matorral with *Juniperus* spp' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		Small: loss of a minor proportion of the habitat due to pipeline construction (1.5 km in Albania at three locations; 2 km in Greece at three locations) and access road upgrades (2 km in two locations in Albania).	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-	Small: Temporary loss 11.1 ha of the habitat due to pipeline construction (1.5 km in Albania at three locations; 2 km in Greece at three locations) and access road upgrades (2 km in two locations in Albania).	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Greek habitat '6290 Mediterranean subnitrophilous grassland' Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species		Small: loss of a minor proportion (< 1%) of the habitat due to construction of the pipeline.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if	Small: Temporary loss of a 39.4 ha (< 1%) of the habitat due to construction of the pipeline.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Greek habitat '62A0 Eastern sub-Mediterranean dry grasslands (*Scorzonetailia villosae*)' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline at seven areas	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	Negligible: Temporary loss of 28.a ha of the habitat due to construction of the pipeline at seven areas	No residual impact, no offsets required
ROW preparation	Annex 1 Habitat '6420		Small: loss of a minor proportion of the habitat due	Minimise	Small: temporary loss of 10.3 ha of the habitat due	No residual impact, no

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
(including vegetation removal, topsoil stripping) within areas supporting this habitat	Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		construction of the pipeline (2.5 km across four areas in Greece).	Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	construction of the pipeline (2.5 km across four areas in Greece).	offsets required
ROW preparation (including vegetation	Greek Habitat '6450 Greek hyper-Mediterranean		Negligible: loss of an insignificant proportion of the habitat due construction of the pipeline (in eight discrete	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be	Negligible: loss of an insignificant proportion of the habitat due construction of the pipeline (in eight discrete	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
removal, topsoil stripping) within areas supporting this habitat	humid grasslands' Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species		areas in Greece).	sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	areas in Greece).	
ROW preparation (including vegetation removal, topsoil stripping) within areas	Annex 1 Habitat '6520 Mountain hay meadows' Direct loss/ disturbance/de		Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline in Albania (15 km in three areas) and upgrades of two existing access roads (5 km).	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment	Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline in Albania (15 km in three areas) and upgrades of two existing access roads (5 km).	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
supporting this habitat	gradation/ fragmentation of habitat Edge effects Spread of invasive species			unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. <u>Rehabilitate</u> Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	<u>Greek habitat '72A0 Reed beds'</u> Direct loss/ disturbance/de gradation/ fragmentation of habitat		Small: loss of a minor proportion of the habitat due to construction of the pipeline in Greece (approximately 800 m).	<u>Minimise</u> Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done,	Small: loss of a minor proportion of the habitat due to construction of the pipeline in Greece (approximately 800 m).	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Edge effects Spread of invasive species			where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '8120 Calcareous and calcshist screes of the montane to alpine levels' Direct loss/ disturbance/de gradation/ fragmentation of habitat		Small: loss of a minor proportion of the habitat due to construction of the pipeline and access roads in Albania (approximately 2.2km)	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site	Small: loss of a minor proportion of the habitat due to construction of the pipeline and access roads in Albania (approximately 2.2km)	Yes, to achieve No Net Loss – on precautionary basis (current surveys not sufficient to determine impact)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Edge effects Spread of invasive species			Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. <u>Rehabilitate</u> Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if neededEarly flowering survey and a main season (July-August) botanical survey of this habitat. The plants of alpine screes are slow-growing and have a very short season due to low temperatures. They will be slow to recover. They are also most threatened by climate change. Without detailed survey of vegetation it isn't possible to state that habitat will recover easily		
ROW preparation (including vegetation removal, topsoil stripping) within areas	<u>Annex 1 Habitat '8210 Calcareous rocky slopes with chasmophytic vegetation'</u>		Small: loss of a minor proportion of the habitat due to construction of the pipeline in Albania	<u>Minimise</u> Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent	Small: loss of a minor proportion of the habitat due to construction of the pipeline in Albania	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
supporting this habitat	Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species			authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '8220 Siliceous rocky slopes with chasmophytic vegetation' Direct loss/ disturbance/de gradation/ fragmentation		Small: loss of a minor proportion of the habitat due to construction of the pipeline in Albania	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position	Small: loss of a minor proportion of the habitat due to construction of the pipeline in Albania	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	of habitat Edge effects Spread of invasive species			available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '9130 *Asperulo-Fagetum* beech forests' Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects		Small: loss of a minor proportion of the habitat due to construction of the pipeline in Greece	As above	Small: temporary loss of a 4.2 ha of the habitat due to construction of the pipeline in Greece. Permanent loss of 1.6 ha of forest to grassland.	Offset required for residual impacts

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Spread of invasive species					
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '9170 Galio-Carpinetum oak-hornbeam forests' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		Small: loss of a minor proportion of the habitat due to construction of the pipeline in Albania	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	Small: temporary loss of 32.6 haof the habitat due to construction of the pipeline in Albania. Permanent conversion of 3.7 ha of forest to grassland.	Offset required for residual impacts

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '91M0 Pannonian-Balkanic turkey oak-sessile oak forests' Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species		Negligible: loss of an insignificant proportion of the habitat due to construction of the pipeline in Albania.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	Small: temporary loss of 16.7 ha of the habitat due to construction of the pipeline in Albania.Permanent conversion of 3.7 ha of forest to grasslands	Offset required for residual impacts
ROW preparation (including	Greek Habitat '924A thermophilous		Negligible: loss of an insignificant proportion (< 1ha) of the habitat due to	Minimise Reduced pipeline working width from	Negligible: temporary loss of 44.1 ha (< 1ha) of the habitat due to construction of the	Offset required for residual

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
vegetation removal, topsoil stripping) within areas supporting this habitat	oak woods of Eastern Mediterranean and the Balkans' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species		construction of the pipeline in Greece.	38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	pipeline in Greece Permanent loss of 13.7 ha of forest to grassland	impacts
ROW preparation (including vegetation removal,	Annex 1 Habitat '9250 *Quercus trojana* woods''		Negligible: loss of an insignificant proportion of the habitat due to pipeline construction in Greece.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value	Negligible: temporary loss of 3 ha of the habitat due to pipeline construction in Greece. Residual impact of 0.8 ha of forest converted to	Offset required for residual impact

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
topsoil stripping) within areas supporting this habitat	Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species			No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed	grasslands	
ROW preparation (including vegetation removal, topsoil stripping)	Annex 1 Habitat '92A0 *Salix alba* and *Populus alba* galleries' Direct loss/		Small: loss of a minor proportion of the habitat due to pipeline construction in Greece and Albania.	Some watercourses supporting this habitat type will be crossed using HDD, thereby avoiding impacts on the habitat Additional mitigation as described above	Small: temporary loss of a 4.2 ja of the habitat due to pipeline construction in Greece and Albania. Residual impact of f 0.8 ha for conversion from forest to grasslands.	Offset proposed for residual impact

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
within areas supporting this habitat	disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive species					
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '92C0 *Platanus orientalis* and *Liquidambar orientalis* woods' Direct loss/ disturbance/degradation/ fragmentation of habitat Edge effects Spread of invasive		Small: loss of a minor proportion of the habitat due to pipeline construction in Greece and Albania.	Some watercourses supporting this habitat type will be crossed using HDD, thereby avoiding impacts on the habitat Additional mitigation as described above	Small: temporary loss of 0.8ha of the habitat due to pipeline construction in Greece and Albania.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	species					
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '92D0 Southern riparian galleries and thickets' Direct loss/ disturbance/de gradation/ fragmentation of habitat Edge effects Spread of invasive species		Negligible: no loss of habitat due to proposed HDD crossing of the Axios River.	Use of HDD to cross the Axios River	Negligible: no loss of habitat due to proposed HDD crossing of the Axios River.	No residual impact, no offsets required
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this	Annex 1 Habitat '9340 *Quercus ilex* forests'' Direct loss/ disturbance/de gradation/ fragmentation		Small: loss of a minor proportion of the habitat due to pipeline construction adjacent to the DESFA pipeline in Greece.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent	Small: Temporary loss of a 26.8 ja of the habitat due to pipeline construction adjacent to the DESFA pipeline in Greece. A permanent loss of 5.2ha of forest to grassland habitat	Offsets proposed for permanent loss in PPS

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
habitat	of habitat Edge effects Spread of invasive species			authority; Micro-siting of the route to be done, where possible, for best position available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate. See Invasive Species Management Plan (as appendix to the EcMP) for more detail. Rehabilitate Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		
ROW preparation (including vegetation removal, topsoil stripping) within areas supporting this habitat	Annex 1 Habitat '9350 *Quercus macrolepis* forests'' Direct loss/ disturbance/de gradation/ fragmentation of habitat		Small: loss of a minor proportion of the habitat due to pipeline construction adjacent to the DESFA pipeline in Greece.	Minimise Reduced pipeline working width from 38m to 28m Ancillary construction facilities to be sited on land of no ecological value No construction materials will be taken from the surrounding environment unless approved by the competent authority; Micro-siting of the route to be done, where possible, for best position	Small: loss of a minor proportion of the habitat due to pipeline construction adjacent to the DESFA pipeline in Greece.	No residual impact, no offsets required

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Edge effects			available for biodiversity; Work to be supervised by an on-site Field Environmental Monitor <u>Rehabilitate</u> Development and implement a habitat-specific restoration plan Implement post-construction monitoring to observe restoration and take actions if needed		

10.13 Offshore

It is more difficult to ascribe rigid ecological boundaries in the marine environment, than for distinct onshore environments such as forests and river catchments. Three broad seascape marine DMUs were identified based on recognised physical and biological characteristics. The DMUs include both the surface waters and entire water column (that contain pelagic organisms including fish, and air-breathing turtles/marine mammals) as well as benthic (seabed) habitats and organisms (such as sponges, coral, echinoderms and benthic fish).

- **coast** (0-30 m) This DMU is characterised by shallow coastal habits with well-developed benthic communities that are able to support significant photosynthetic activity as demonstrated by the presence of seagrass at the Italian landfall. The Albanian landfall instead supports bioturbated soft-sediment communities.
- **nearshore** (30-100 m) This deeper habitat is characterised by much lower levels of light where photosynthetic activity is very limited (an arbitrary lower limit of 100 m has been selected due to this representing the approximate depth beyond which there is no significant light penetration in the Mediterranean). Coralligenous habitats, the majority of which are usually found within water depths of 30-70 m, are characteristic of this zone in the Italian nearshore, although these habitats have not been confirmed from the Albanian nearshore. The Albanian nearshore was characterised by soft-sediment (sand or muddy sand) communities, sometimes with seapens (*Pennatula* sp.).
- **offshore** (>100 m) The pipeline route extends through Italian and Albanian waters, to depths in excess of 800 m. Deep-sea environments such as this are generally characterised by fine sediment, low energy and stable conditions. The habitat survey of the pipeline route revealed soft sediments (often with bioturbation) and occasional visible biota such as sessile (Octacorallia) and motile (e.g. echinoderms) invertebrates, and fish such as skates (Rajidae). This DMU includes surface waters of the offshore environment, as well as entirely aphotoic deep-sea habitats.

The CHA identified the following offshore critical habitat triggers; cnidaria (bamboo coral (*Isidella elongata*), tall sea pen (*Funiculina quadrangularis*), deepwater coral (*Lophelia pertusa*), zigzag coral (*Madrepora oculata*), white Gorgonian (*Eunicella singularis*), stony cup coral (*Dendrophyllia cornigera*), cockscombe cup coral (*Desmophyllum dianthus*), smooth black coral (*Leiopathes glaberrima*), slender sea pen (*Virgularia mirabilis*), *Pennatula rubra*), sponges (*Axinella cannabina, Axinella polypoides*), fin whale (*Balaenoptera physalus*), Cuvier's beaked whale (*Ziphius cavirostris*), bottlenose dolphin (*Tursiops truncatus*), striped dolphin (*Stenella coeruleoalba*), Risso's dolphin (*Grampus griseus*), loggerhead turtle (*Caretta caretta*), European eel (*Anguilla anguilla*), *Posidonia oceanica* beds, reefs (including bioconstructions), submarine structures made by leaking gases and the South Adriatic and Ionian Strait EBSA.

The priority biodiversity features screening identified the following species: Mediterranean monk seal (*Monachus monachus*), short-beaked common dolphin (*Delphinus delphis*), sperm whale (*Physeter macrocephalus*), green turtle (*Chelonia mydas*), leatherback turtle

(*Dermochelys coriacea*), hawksbill turtle (*Eretmochelys imbricate*), Kemp's Ridley turtle (*Lepidochelys kempii*), bluefin tuna (*Thunnus thynnus*), twaite shad (*Alosa fallax*), Mediterranean tapeweed (*Posidonia oceanica*) and slender seagrass (*Cymodocea nodosa*).

Both the critical habitat triggers and the priority biodiversity features have been grouped as follows for the purposes of assessing residual impacts on these features:

- marine mammals
- turtles
- bony fish
- marine benthos (cnidarians, sponges, seagrass (incl. beds) and habitats (reefs (incl. bioconstructions), submarine structures made by leaking gases (incl. carbonate chimneys, gas seeps and pockmarks).

Residual impacts on the biodiversity features supported by these DMUs are assessed in Table 56 to Table 60. The EBSA overlaps with the offshore DMU in Italian waters and the offshore and nearshore DMUs in Albanian waters and therefore impacts on its qualifying features are included in the assessmentsd in Table 57 and Table 58.

A high sensitivity has been assigned to all critical habitat triggers and priority biodiversity features (as they all fall within the DMUs and species groups of the critical habitat triggers), within the offshore environment. The definitions in Table 24 are used to define the magnitude of each impact. All proposed mitigation is summarised within the assessment table and detailed in the project EcMP (CAL00-C5577-640-Y-TTM-0002) which will be a live document to be updated as more marine surveys are undertaken pre-construction. N.B. At the time of writing only high level mitigation measures are proposed, these will be refined as further marine survey data becomes available, consequently the assessments made are considered to be precautionary.

Any residual impacts on critical habitat will require offsets to achieve a Net Gain in those biodiversity values for which the critical habitat was triggered, while residual impacts on priority biodiversity features will require No Net Loss to be achieved. Biodiversity offsetting is widely acknowledged to be far more complex and challenging within marine than terrestrial environments and therefore it is essential that the mitigation hierarchy is applied prior to offsets being considered, this is discussed further within the Biodiversity Offset Strategy.

Table 56 Residual impacts on biodiversity features (critical habitat triggers and priority biodiversity features) within the Albanian coastal DMU (0-30m depth, KP 0.7- KP 7.2)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Seabed intervention works including: sheet pile installation, trenching and backfilling; pipe laying and anchor handling.	Physical loss of and/or damage to seabed habitats	High	Medium: considerable, long term alteration to a significant proportion of exposed receptor / receptor group / features/ integrity. Impact occurrence and receptor presence likely.	Micro-siting of pipeline in case of presence of sensitive habitats. Use of tugboats rather than anchors/ careful anchor handling to avoid dragging during relocation. If deemed necessary prior to construction, use of further mitigation measures (e.g. ROV with live feed back to pipelay vessel) to avoid sensitive habitats	**Marine benthos** -Small: short term, largely temporary and reversible impact (due to pipeline burial towards landfall and temporary nature of cofferdam). Sensitive benthic receptors potentially present, however any impacts on sensitive receptors unlikely due to application of mitigation. Habitat loss associated with construction is temporary and largely reversible and existing seabed environment is dynamic.	**Marine benthos** (including potential presence of sensitive/protected marine habitat/species) – **Yes**
					Marine mammals – N/A	**Marine mammals** – N/A
					Turtles – N/A	**Turtles** – N/A
					Bony fish- Negligible: short term, temporary, reversible impact, receptor presence unlikely as highly mobile	**Bony fish**- No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
					species with limited association with benthos.	
	Increase in turbidity causing smothering of benthic fauna. Direct smothering as a result of dredged material deposition. Re-suspension of fine sediments (including any associated contaminants)	High	Small: discernible temporary impact altering the features of a minor proportion of the DMU.	Micro-siting of pipeline in case of presence of sensitive habitats. Use of tugboats rather than anchors/ careful anchor handling to avoid dragging during relocation.	**Marine benthos** -Negligible: short term, temporary reversible impact within an area with naturally high suspended sediment loads and deposition due to coastal processes and the discharge of two rivers in proximity to landfall.	**Marine benthos** – No
					Marine mammals – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Turtles** – No
					Bony fish Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Bony fish** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	Noise and vibration (disturbance / displacement of species)	High	**Marine mammals & bony fish**: Small: discernible temporary impact altering the features of a minor proportion of the DMU. **Turtles**: Medium: considerable alteration to a significant proportion of exposed receptor / receptor group (potential prescence of nesting turtles). Impact occurrence and receptor presence likely.	Use of trained marine mammal observers (MMOs) during the landfall and coastal works. Develop and implement a Marine Megafauna Mitigation Protocol (MMMP). Application of Turtle Management Plan. No construction during peak turtle nesting season (July – August) Application of Vessel Code of Conduct	**Marine benthos** – N/A	**Marine benthos** – N/A
					Marine mammals – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Marine mammals** – No
					Turtles –Small : short term, largely temporary and reversible impact. Nesting turtles potentially present during June when construction works are scheduled.	**Turtles** – **Yes** potential residual impacts possible and dependent on successful application of proposed mitigation (MMMP and Turtle MP).
					Bony fish- Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Bony fish**- No

Table 57 Residual impacts on biodiversity features (critical habitat triggers and priority biodiversity features) within the Albanian nearshore DMU (30 - 100m depth, KP 7.2 – KP 21.7, includes EBSA)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
Seabed intervention works including: trenching and backfilling; pipe laying and anchor handling.	Physical loss of and/or damage to seabed habitats	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Micro-siting of pipeline in case of presence of sensitive habitats. Use of tugboats rather than anchors/ careful anchor handling to avoid dragging during relocation. If deemed necessary prior to construction, use of further mitigation measures (e.g. ROV with live feed back to pipelay vessel) to avoid sensitive habitats	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** (including potential presence of sensitive species (e.g. seapens, cold water coral)/protected marine habitat) – **Yes** .
					Marine mammals – N/A	**Marine mammals** – N/A
					Turtles – N/A	**Turtles** – N/A
					Bony fish- Negligible: short term, temporary, reversible impact, receptor presence unlikely as highly mobile species with limited association with benthos.	**Bony fish**- No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
	Increase in turbidity causing smothering of benthic fauna. Direct smothering as a result of dredged / re-suspended material deposition. Re-suspension of fine sediments (including any associated contaminants)	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Micro-siting of pipeline in case of presence of sensitive habitats. Use of tugboats rather than anchors/ careful anchor handling to avoid dragging during relocation.	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** – **Yes** -
					Marine mammals – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Turtles** – No
					Bony fish Negligible: short term, temporary, reversible impact, receptor presence in vicinity of plume unlikely as species are highly mobile.	**Bony fish** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
	Noise and vibration (disturbance / displacement of species)	High	Small: discernible temporary impact altering the features of a minor proportion of the DMU.	Use of trained marine mammal observers (MMOs) during the landfall and coastal works. Develop and implement a Marine Megafauna Mitigation Protocol (MMMP). Application of Turtle Management Plan. Application of Vessel Code of Conduct	**Marine benthos** – N/A	**Marine benthos** – N/A
					Marine mammals – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Turtles** – No
					Bony fish- Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Bony fish**- No

Table 58 Residual impacts on biodiversity features (critical habitat triggers and priority biodiversity features) within the offshore DMU (>100m depth, KP 21.7 – KP 98.8, includes EBSA until KP 79.8)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
Seabed intervention works including: trenching and backfilling; pipe laying and anchor handling, crossing of marine infrastructure using concrete mattresses, rock placement.	Physical loss of and/or damage to seabed habitats	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Avoidance of hard substrate as preferred by deepwater corals through micro-siting/ re-routing If deemed necessary prior to construction, use of further mitigation measures (e.g. ROV with live feed back to pipelay vessel) to avoid sensitive habitats	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** (including potential presence of sensitive species (e.g. cold water corals, seapens)/protected marine habitat (e.g. cold water coral) – **Yes**
					Marine mammals – N/A	**Marine mammals** – N/A
					Turtles – N/A	**Turtles** – N/A
					Bony fish- Negligible: short term, temporary, reversible impact, receptor presence unlikely as highly mobile species with limited	**Bony fish**- No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
					association with benthos.	
	Increase in turbidity causing smothering of benthic fauna. Direct smothering as a result of resuspended material deposition. Re-suspension of fine sediments (including any associated contaminants)	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Avoidance of hard substrate as preferred by deepwater corals through micro-siting/ re-routing	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** – **Yes** -.
					Marine mammals – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile and sediment dispersal rates are high in such open waters.	**Marine mammals** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
					Turtles – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile and sediment dispersal rates are high in such open waters.	**Turtles** – No
					Bony fish - Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile and sediment dispersal rates are high in such open waters.	**Bony fish** – No
	Noise and vibration (disturbance / displacement of species)	High	Negligible: temporary, barely discernible change.	Use of trained marine mammal observers (MMOs) during the landfall and coastal works. Develop and implement a Marine Megafauna Mitigation Protocol (MMMP). Application of Turtle Management Plan. Application of Vessel Code of Conduct	**Marine benthos** – N/A	**Marine benthos** – N/A
					Marine mammals – Negligible: short term, temporary impact, proposed mitigation meets international standards. No piling proposed in offshore DMU any underwater noise associated with vessels	**Marine mammals** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
					anticipated to be within normal background ranges.	
					Turtles – Negligible: short term, temporary impact, proposed mitigation meets international standards. No piling proposed in offshore DMU any underwater noise associated with vessels anticipated to be within normal background ranges.	**Turtles** – No
					Bony fish- Negligible: short term, temporary impact, proposed mitigation meets international standards. No piling proposed in offshore DMU any underwater noise associated with vessels anticipated to be within normal background ranges.	**Bony fish**- No

Table 59 Residual impacts on biodiversity features (critical habitat triggers and priority biodiversity features) within the Italian nearshore DMU (100 - 30m depth, KP 98.8 - KP 103.6)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
Seabed intervention works including: trenching and backfilling; pipe laying and anchor handling.	Physical loss of and/or damage to seabed habitats	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Use of ROV with live feed back to pipelay vessel to avoid sensitive habitats Avoidance of hard substrate as preferred by deepwater corals	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** (including potential presence of sensitive/protected marine habitat (e.g. Biogenic reef including coralligenous habitats[48])) – **Yes** -
					Marine mammals – N/A	**Marine mammals** – N/A
					Turtles – N/A	**Turtles** – N/A
					Bony fish- Negligible: short term, temporary, reversible impact, receptor presence	**Bony fish**- No

[48] Both the coralligenous assemblages and circalittoral oyster beds recorded during the Italian nearshore surveys are bioconstructions. The term “bioconstruction”, geologically refers to a “*bioconstructed limestone*” (Fox, 2005).

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
					unlikely as highly mobile species with limited association with benthos.	
	Increase in turbidity causing smothering of benthic fauna. Direct smothering as a result of dredged / resuspended material deposition. Re-suspension of fine sediments (including any associated contaminants)	High	Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Avoidance of hard substrate as preferred by deepwater corals	**Marine benthos** - Large: permanent, irreversible change or damage to features / integrity of receptors / receptor group. Impact occurrence and receptor presence likely.	**Marine benthos** – **Yes** –.
					Marine mammals – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile.	**Turtles** – No
					Bony fish - Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as	**Bony fish** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset trigger?
					species are highly mobile.	
	Noise and vibration (disturbance / displacement of species)	High	Negligible: temporary, barely discernible change.	Use of trained marine mammal observers (MMOs) during the landfall and coastal works. Develop and implement a Marine Megafauna Mitigation Protocol (MMMP). Application of Turtle Management Plan. Application of Vessel Code of Conduct.	**Marine benthos** – N/A	**Marine benthos** – N/A
					Marine mammals – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary impact, proposed mitigation meets international standards..	**Turtles** – No
					Bony fish- Negligible: short term, temporary impact, proposed mitigation meets international standards..	**Bony fish**- No

Table 60 Residual impacts on biodiversity features (critical habitat triggers and priority biodiversity features) within the Italian coastal DMU (30 – 0m depth, KP 103.6 – KP 104)

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
Seabed intervention works for construction of microtunnel; launch shaft excavation; microtunnel excavation and installation of concrete jacking pipes; pre-dredging and use and recovering of a remote controlled tunnel boring machine; anchor	Physical loss of and/or damage to seabed habitats	High	Medium: considerable, long term alteration to a significant proportion of exposed receptor / receptor group / features/ integrity. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; application of best practice techniques, substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Use of ROV with live feed back to pipelay vessel to avoid sensitive habitats Avoidance of hard substrate as preferred by corals Mitigation measures proposed to minimize impacts associated with microtunnel: minimizing movement of dredging material, reducing dredging speed, planning of dredging activities only with calm marine and meteorological conditions. Optimization of the excavation area at the micro tunnel to reduce the impact on *Cymodocea nodosa,* installation of sheet piling at tunnel exit point to reduce	**Marine benthos** -Small: a spatially limited but discernible impact to a minor proportion of the marine benthos within the DMU. Presence of sensitive receptors possible, however any impacts on sensitive receptors unlikely due to application of mitigation. Loss associated with construction is temporary and largely reversible.	**Marine benthos** (including potential presence of sensitive/protected marine habitat (e.g. seagrass, biogenic reef including coralligenous habitats and associated species[49])) – **Yes** - potential residual impacts possible and dependent on successful

[49] Both the coralligenous assemblages and circalittoral oyster beds recorded during the Italian nearshore surveys are bioconstructions. The term “bioconstruction”, geologically refers to a “*bioconstructed limestone*” (Fox, 2005).

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
handling; rock dumping, dredging activities related to the implementation of the landing point, piling work proposed.				excavation volumes and in turn suspended sediment load, also displacement of the exit point outside of the seagrass, specifically the *Cymodocea nodosa* prairie		application of proposed mitigation.
					Marine mammals – N/A	**Marine mammals** – N/A
					Turtles – N/A	**Turtles** – N/A
					Bony fish- Negligible: short term, temporary, reversible impact, receptor presence unlikely as highly mobile species with limited association with benthos.	**Bony fish**- No
	Increase in turbidity causing smothering of benthic fauna. Direct smothering as a result of	High as CH trigger	Medium: considerable, long term alteration to a significant proportion of exposed receptor / receptor group / features/ integrity. Impact occurrence and receptor presence likely.	Options for mitigating impacts from anchor spread include; substitution of anchors by tugboats, or specific very careful anchor handling (avoidance of dragging through the seabed but rather raising during relocation) Avoidance of hard substrate as preferred by corals	**Marine benthos** -. Small: discernible temporary impact altering the features of a minor proportion of the DMU.	**Marine benthos Yes** - potential residual impacts possible and dependent on

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
	dredged / resuspended material deposition. Re-suspension of fine sediments (including any associated contaminants)			Monitoring of suspended sediments and recolonisation rates Mitigation measures proposed to minimize impacts associated with microtunnel: minimizing movement of dredging material, reducing dredging speed, planning of dredging activities only with calm marine and meteorological conditions Extension of the MT exit point (55 m) in order to not directly affect the seagrass prairie Backfilling cycles carried out only during hours of reduced brightness (h 16:00 - 5:30 h) in order to guarantee the supply of natural light to the phanerogams which is useful for their photosynthetic activity during the day The length of the trench has been optimized (compared to the previous EIA) through the application of sheet piling aimed at minimizing volumes of sediments to be moved. Utilization of environmentally friendly substances in the final portion of the Microtunnel Implementation of best practices such as the use of a closed bucket during dredging and a fall pipe (FPV)		successful application of proposed mitigation.
					Marine mammals – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile.	**Turtles** – No
					Bony fish - Negligible: short term, temporary, reversible impact, receptor presence in vicinity of suspended sediments unlikely as species are highly mobile.	**Bony fish** – No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				Use of a smaller bucket and of closed loop hydraulic pumps (for precision excavation at the sides of the TBM) so no discharge of seawater rich in SST occurs Use of environmentally friendly products for the drilling of the last section of the micro tunnel		
	Noise and vibration (disturbance / displacement of species)	High as CH trigger	Negligible: temporary, barely discernible change.	Use of trained marine mammal observers (MMOs) during the landfall and coastal works. Develop and implement a Marine Megafauna Mitigation Protocol (MMMP). Application of Turtle Management Plan. Application of Vessel Code of Conduct. Activities at sea will not be carried out during the summer (June - August inclusive) the peak period for the birth of bottlenose dolphin and the main period of biological reproduction to minimize potential impacts on fish stocks; To mitigate any potential impacts on nesting turtles landfall construction works are planned to take place outside the turtle nesting period of June-August Furthermore, as a protective measure,	**Marine benthos** – N/A	**Marine benthos** – N/A
					Marine mammals – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Marine mammals** – No
					Turtles – Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Turtles** – No
					Bony fish- Negligible: short term, temporary impact, proposed mitigation meets international standards.	**Bony fish**- No

Project activity	Potential impact	Sensitivity of receptor	Magnitude of impact pre-mitigation	Proposed mitigation	Magnitude of impact post-mitigation	Residual impact /offset required?
				trained Marine Mammals Observers will be included during pipelaying and coastal works. Continuous monitoring during the construction phases of a sea area with a radius of 5.5 km around the construction area as provided for by the PMA Implementation of best practices		

10.13.1 Summary of potential residual impacts

Marine benthos

Considering the highly limited benthic ecology data available at time of this assessment and the selection of an anchored installation vessel (for which the accuracy and effectiveness of proposed mitigation measures cannot be verified at this time), it is likely that there will be significant residual impacts on both critical habitat triggers and priority biodiversity features. The mitigation currently proposed is considered to be insufficient to remove the potential for significant residual impacts from pipeline installation within the direct construction footprint. Furthermore it has not been possible to quantify the wider AOI for impacts relating to increased suspended sediments (e.g. smothering). Due to the large extent and large magnitude of the impacts and the potential for irreversible impacts on long-lived, slow growing species such as cold water corals, residual impacts will be ecologically significant with negative effects on the integrity of the ecosystem and the conservation objectives for habitats and species populations within the offshore AOI.

Nesting turtles

There is also potential for residual impacts on nesting turtles in Albania, but this will be determined further through monitoring during the nesting season in 2018.

11 RESIDUAL IMPACTS AND BIODIVERSITY OFFSETS

11.1 Terrestrial

Table 61 and Table 62 present a summary of the impact area calculations for terrestrial critical habitat triggers and priority biodiversity features respectively. Biodiversity offsets are likely to be required in order to achieve net gain for critical habitat and no net loss for natural habitats and priority biodiversity features, as indicated in the tables.

Based on the outputs of the impact assessment presented herein, the following critical habitat triggers in Table 61 will require biodiversity offsets:

- brown bear
- golden jackal
- wildcat
- birds: greater spotted eagle, lesser spotted eagle, booted eagle, black kite, Montagu's harrier, Dalmatian pelican and eagle owl
- freshwater fish: Aggitis spined loach, *Pelasgus prespensis, Pelasgus minutes,* Devol riffle minnow, Osum riffle minnow, European eel, *Alburnus vistonicus, Aburnoides sp. volvi,* Pindus spined loach, *Barbus macedonecus*, Pelagos trout
- freshwater invertebrates: thick shelled river mussel and *Turcorientalia hohenackeri*
- congregatory bats: Blasius's horseshoe, Mediterranean horseshoe bat, Schreiber's bat, long-fingered bat ,greater horseshoe bat, lesser horseshoe bat, Bechstein's bat, lesser mouse-eared bat, Geoffroy's bat and greater mouse-eared bat
- amphibians: Macedonian crested newt and Albanian pool frog
- reptiles: four-lined snake
- threatened flora species: yellow monk's-hood, deadly nightshade, Albanian lily, mountain tea, *Dianthus tenuiflorus*, Serpentine false-brome, *Verbascum dingleri*
- highly threatened and unique habitats: EU Priority Habitats 9530* (Sub-) Mediterranean pine forests with endemic black pine, 3170*Mediterranean temporary ponds, 6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea, and the EU Annex 1 habitats 9130 Asperulo-Fagetum beech forests, 9110 Luzulo-Fagetum beech forests and 9540 Mediterranean pine forests with endemic Mesogean pines

The following priority biodiversity features (including natural habitats) will also require offsets:

- grey wolf
- birds: short toed eagle, golden eagle, Bonelli's eagle, lesser kestrel, European honey buzzard, red-footed falcon, grey-headed woodpecker, red kite, marsh harrier, hen harrier, merlin, grey partridge, turtle dove, European roller, skylark, short-toed lark, Calandra lark, red-backed shrike, lesser grey shrike, long-legged buzzard, Griffon vulture, black vulture, little egret, night heron, white

stork, black stork, shelduck, pygmy cormorant, kingfisher, purple heron, Squacco heron

- tree-roosting bats: serotine, free-tailed bat, whiskered bat, natterers bat, noctule, Kuhl's pipistrelle, Nathusius's pipistrelle, common pipistrelle, Savi's pipistrelle and parti-coloured bat
- natural habitats: Annex 1 Habitat '8120 Calcareous and calcshist screes of the montane to alpine levels'

TAP's approach to offsets is described in detail in the Biodiversity Offsets Strategy (CAL00-C5577-640-Y-TRY-0001).

11.2 Offshore

As discussed in Section 10.13 significant potential residual impacts are predicted for marine benthic species and habitats, both critical habitat triggering and priority biodiversity features, in all offshore DMUs and possibly nesting turtles in the Albanian coastal DMU. TAP acknowledge the need for this highly precautionary assessment of residual impacts at this time.

The following actions are proposed to collect and collate further data to inform and refine the mitigation and monitoring measures proposed, and in turn reassess the residual impacts, during the pre-construction phase of the project offshore:

Albanian Waters (coastal and nearshore DMUs)

- completion of supplementary pre-construction marine environmental survey to inform pipelay barge anchoring, pipeline installation and dredging procedures, construction and post construction monitoring plans.
- pipelay barge anchoring and dredging procedures to be developed to mitigate direct and turbidity impacts to sensitive habitats.
- revision of the TAP Ecological Management Plan prior to construction, to confirm construction and post construction monitoring plan.

Offshore DMU (>100m deep water)

- review of existing data and confirmation of the need and scope of supplementary pre-construction marine environmental survey to inform pipelay barge anchoring and pipeline installation and construction monitoring plans.
- pipelay barge anchoring and pipeline installation procedure to be developed to mitigate direct and turbidity impacts to sensitive habitats.
- revision of the TAP Ecological Management Plan prior to construction, to confirm construction and post construction monitoring plan.

Italian Waters (coastal and nearshore DMUs)

- review of existing data and confirmation of the need and scope of supplementary pre-construction marine environmental survey to inform pipelay barge anchoring and pipeline installation, construction and post construction monitoring plans.
- pipelay barge anchoring and pipeline installation procedure to be developed to mitigate direct and turbidity impacts to sensitive habitats.

- revision of the TAP Ecological Management Plan prior to construction, to confirm construction and post construction monitoring plan.

These actions will be implemented through the EcMP and the Site Files, which will be used to update the Biodiversity Offsets Strategy. Once a methodology for calculating No Net Loss and Net Gain for marine biodiversity features has been agreed, a Biodiversity Offset Management Plan (BOMP) will be developed.

Table 61 Residual impacts to natural habitat for critical habitat triggers

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Criterion 1: Threatened species										
Amphibian DMU										
Albanian Pool frog (*Pelophylax shqipericus*)				14.1	2.4	16.4				16.4
Italian crested newt (*Triturus carnifex*)	145.9	33.6	179.5							179.5
Bird DMU										
Greater spotted eagle (*Aquila clanga*)	41.8	10.2	52.0	39.2	8.8	48.0				100.0
Eagle owl (*Bubo bubo*)				33.5	7.6	41.1				41.1
Montagu's Harrier (*Circus pygargus*)	55.8	10.5	66.2							66.2
Lesser spotted eagle (*Clanga pomarina*)	41.8	10.2	52.0	33.5	7.6	41.1				93.1
Booted eagle (*Hieraaetus pennatus*)	41.8	10.2	52.0	33.5	7.6	41.1				93.1
Black kite (*Milvus migrans*)	41.8	10.2	52.0	52.9	11.7	64.5				116.5
Dalmatian pelican (*Pelecanus crispus*)	22.9	4.5	27.5							27.5
Botany DMU										
Yellow monk's-hood (*Aconitum lamarckii*)				22.9	5.8	28.7				28.7
Deadly nightshade (*Atropa belladonna*)	4.2	1.6	5.8	22.9	5.8	28.7				34.5

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Albanian lily (*Lilium albanicum*)				28.6	5.7	34.3				34.3
Mountain tea (*Sideritis raeseri*)				28.6	5.7	34.3				34.3
Mammal DMU										
Brown bear (*Ursus arctos*)	122.7	32.1	154.8	75.4	17.0	92.4				247.2
Golden jackal (*Canis aureus*)	93.9	18.9	112.8	21.6	3.6	25.1				138.0
Wildcat (*Felis silvestris*)	0.3	0.1	0.4	76	15	91				91.4
Reptile DMU										
Four-lined snake (*Elaphe quatuorlineata*)	23.3	4.6	27.9	83.9	16.6	100.4				128.3
Aquatic DMUs										
Alburnus vistonicus					0.7					**0.7**
European eel (*Anguilla anguilla*)		8.2			4.6					**12.8**
Barbus macedonicus					0.1					**0.1**
Aggitis spined loach (*Cobitis punctilineata*)					0.7					**0.7**
Otter (*Lutra lutra*)	8.4			3.2						**11.6**
Eudontomyzon hellenicus					0.2					**0.2**
Pelasgus prespensis		0.1								**0.1**
Pelagos trout *(Salmo pelagonicus)*					0.3					**0.3**

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Turcorientalia hohenackeri					0.8					**0.8**
Thick-shelled river mussel *(Unio crassus)*					1.1					**1.1**
Criterion 2: Endemic / restricted range species										
Botany DMU										
Dianthus formanekii	0.1	0.0	0.1							0.1
Dianthus tenuiflorus	0.3	0.1	0.3							0.3
Serpentine false-brome (*Festucopsis serpentinii*)				28.6	5.7	34.3				34.3
Albanian lily (*Lilium albanicum*)				28.6	5.7	34.3				34.3
Mountain tea (*Sideritis raeseri*)				36.9	7.1	44.0				44.0
Verbascum dingleri	2.3	0.5	2.8							2.8
Criterion 3: Migratory / congregatory species										
Congregatory Bats DMU										
Congregatory Bats				82.7	17.9	100.6				100.6
Criterion 4: Highly threatened or unique ecosystems										
EU Priority Habitat DMU										
(Sub-)Mediterranean pine forests with endemic black pine (9530)				0.4	0.1	0.5				0.5

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion, Alnion incanae, salicion albae*) (91E0)	1.4	0.2	1.6							1.6
Mediterranean temporary ponds (3170)	4.7	1.2	5.9							5.9
Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea (6220)							0.6	0.2	0.8	0.8
Wooded dunes with Maritime pine (*Pinus pinea*) and/or *Pinus pinaster* (2270)				0.4	0.1	0.5				0.5
Annex 1 Habitat DMU										
Luzulo-Fagetum beech forests (9110)				22.9	5.8	28.7				28.7
Mediterranean pine forests with endemic Mesogean pines (9530)	17.3	4.7	22.1	6.4	1.2	7.5				29.6
Criterion 5: Evolutionary processes										
Evolutionary DMU										
Evolutionary Processes	55.0	9.2	64.2	33.5	7.6	41.1				105.3

Table 62 Residual impacts to natural habitat for Priority Biodiversity Features

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Fauna										
Grey wolf (*Canis Lupus*)	**120.5**	**36.7**	**157.2**	**58.4**	**13.4**	**71.8**				**229.0**
Forest habitat avifauna		52.0			68.8					118.8
Open habitat avifauna	66.2									
Mountain habitat avifauna					57.1					57.1
Threatened Habitats not qualifying as Critical Habitat										
Annex 1 Habitat										
Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) (1420)				4.4	0.9	5.3				5.3
Embryonic shifting dunes (2110)				0.2	0.1	0.3				0.3
Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of *Salix* and *Populus alba* (3280)	0.1	0.0	0.1							0.1
Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (Berberidion p.p.) (5110)				3.0	0.6	3.6				3.6

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Juniperus communis formations on heaths or calcareous grasslands (5130)				3.1	0.6	3.6				3.6
Arborescent matorral with *Juniperus spp*. (5210)	2.9	1.0	3.9	5.9	1.2	7.1				11.1
Mediterranean tall humid grasslands of the Molinio-Holoschoenion (6420)	5.1	1.2	6.3							6.3
Greek hyper-mediterranean humid grasslands (6450)	5.4	1.3	6.7							6.7
Mountain hay meadows (6520)				26.2	4.9	31.1				31.1
Calcareous rocky slopes with chasmophytic vegetation (8210)	0.1	0.0	0.1	4.3	0.8	5.1				5.2
Siliceous rocky slopes with chasmophytic vegetation (8220)				2.1	0.4	2.5				2.5
Asperulo-Fagetum beech forests (9130)	4.2	1.6	5.8							5.8
Galio-Carpinetum oak-hornbeam forests (9170)				32.6	7.2	39.8				39.8
Pannonian-Balkanic turkey oak-sessile oak forests (91M0)				16.7	3.7	20.4				20.4
Quercus trojana woods (9250)	3.0	0.8	3.8							3.8
Salix alba and P*opulus alba* galleries (92A0)	4.0	0.8	4.8	0.1	0.0	0.1				4.9
Platanus orientalis and *Liquidambar orientalis* woods (*Platanion orientalis*)	0.7	0.2	0.9	0.1	0.1	0.2				1.0

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
(92C0)										
Quercus ilex and Quercus rotundifolia forests (9340)				26.8	5.2	31.9				31.9
Greek Habitat										
South-eastern sub-mediterranean deciduous thickets (5160)	16.5	3.4	19.8							19.8
Garrigues of eastern mediterranean (5340)	5.7	2.1	7.8							7.8
Pseudomaquis (5350)	36.4	9.9	46.4							46.4
Eastern sub-mediterranean dry grasslands (62A0)	22.6	5.5	28.1							28.1
Mediterranean subnitrophilous grasslands (6290)	31.5	7.9	39.4							39.4
Reedbeds (72A0)	0.5	0.1	0.6							0.6
Balkano-anatolian thermophilous (*Quercus*) forests (924A)	44.1	13.7	57.8							57.8
Protected and Designated Areas										
Agios Timotheos-Koupia Wildlife Refuge	7.6	2.2	9.7							9.7
Alistrati-Petroto Wildlife Refuge	8.7	1.7	10.4							10.4
Chatisio (Kosmiou) Wildlife Refuge	7.2	1.4	8.6							8.6
Flamouria - Grammatikou Dimou	8.7	3.0	11.7							11.7

Biodiversity Feature	Greece			Albania			Italy			Project Total (ha)
	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	Temp. (ha)	Perm. (ha)	Total (ha)	
Edessas Wildlife Refuge										
Kouri (Ptolema¿das) Wildlife Refuge	24.0	4.9	28.9							28.9
Perifereiaki zoni C Ethnikou Parkou ygrotopon ton limnon Koroneias - Volvis kai ton Makedonikon Tempon NP	65.0	13.2	78.2							78.2
Perifereiaki zoni Ethnikou Parkou Anatolikis Makedonias kai Thrakis NP	2.0	0.4	2.4							2.4
Pylaias - Kavissou - Ferron Dimou Ferron Wildlife Refuge	0.9	0.2	1.1							1.1

11.2.1 Document and process map

The inter-relationships of the biodiversity and other ecological management documents are outlined in Figure 11. This Supplementary Ecological Assessment feeds into the Biodiversity Offset Strategy (BOS) which has been prepared to demonstrate how any unavoidable residual impacts to biodiversity values (including both critical / natural habitat and priority biodiversity features) from TAP can be compensated though the establishment of biodiversity offsets in a manner that achieves an overall net gain in biodiversity.

A Biodiversity Offset Management Plan (BOMP) will be developed in the future to provide more details on the offset design, intended conservation outcomes, specific management actions and details on the legal mechanisms of establishing the prospective site(s), as well as any indirect initiatives to be supported.

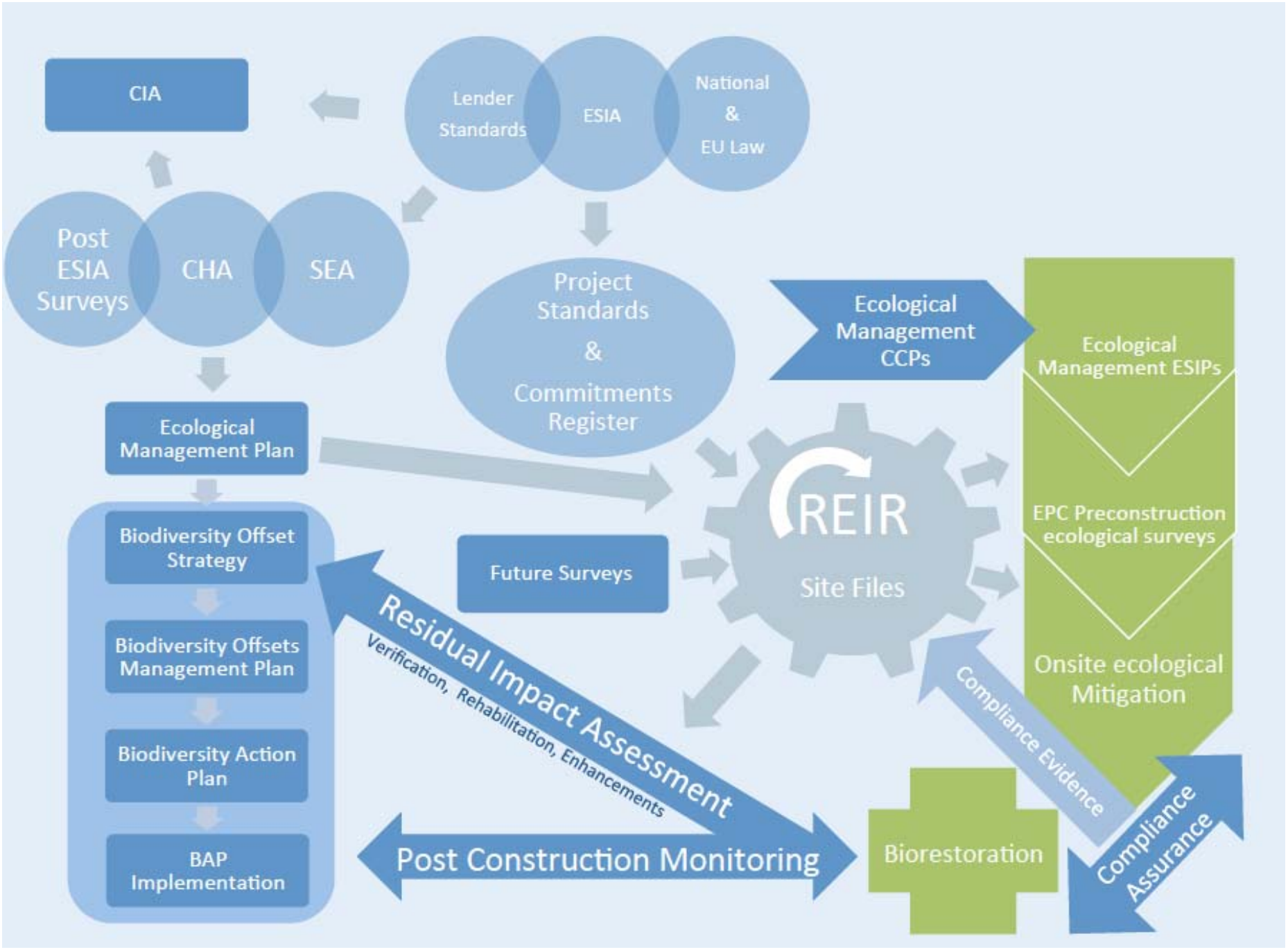


Figure 11 TAP Document map

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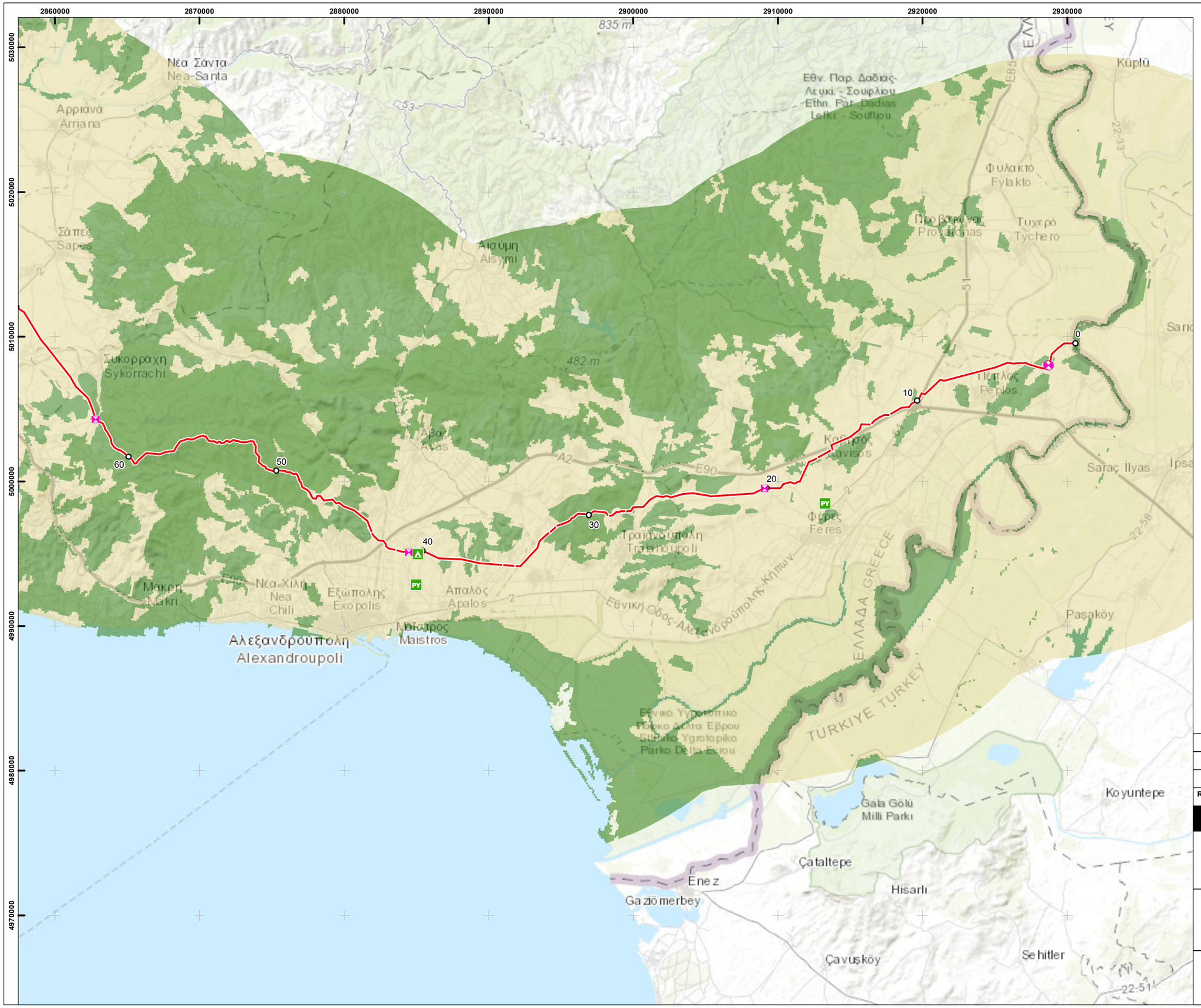
APPENDIX 1
FIGURES

Figure 12 Natural and modified habitats



TAP base case route centreline

Kilometre points (KP)

Compressor station

Block valve station

Camp site

Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

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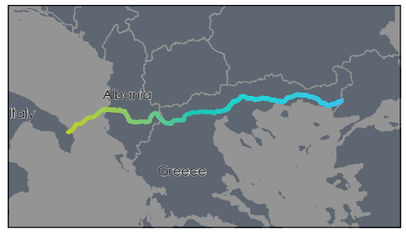
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

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Trans Adriatic Pipeline

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Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 365 of 545, Sheet 1 of 12

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2780000 2790000 2800000 2810000 2820000 2830000 2840000 2850000

5060000 5050000 5040000 5030000 5020000 5010000 5000000

Εχίνος
Echinos

Σάτρες
Satres

Чакаларово
Chakalarovo

Шумнатица
Shumnatitsa

Тихомир
Tihomir

ΡΟΔΟΠΗ ΟΡΟΣ

ΟΝΗ ΧΑΝΤΗ

Σέλερο
Selero

Αμαξάδες
Amaxades

Ίασμος
Iasmos

Σώστης
Sostis

Ηφαιστος
Ifaistos

Κομοτηνή
Komotini

Κάλχας
Kalchas

Γρατινή
Gratini

Φίλλυρα
Fillyra

Egnatia Odos

120

130

110

Αίγειρος
Aigeiros

Παραδείμη
Paradimi

100

Κόσμιο
Kosmio

90

Άρατος
Aratos

Αρίσβη
Arisvi

80

E90

Βιστωνίδα
Vistonida

Εθν. Παρκ. Ανατολ. Μακεδ. - Θράκης
Ethn. Park. Anatol. Makedon. Thrakis

Λίμνη Βιστωνίδα
Limni Vistonida

Πόρπη
Porpi

Νέο Σιδηροχώρι
Neo Sidirochori

Μανδρα
Mandra

Ege Denizi

Μέση
Mesi

Παραλία Μέσης
Paralia Mesis

Ξυλαγανη
Xylagani

Ίμερος
Imeros

Προσκυνητες
Proskynites

Παλαιά Κρωβύλη
Palaia Krovyli

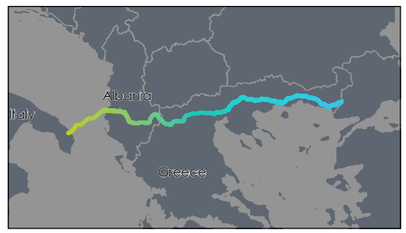
Στρύμη
Strymi

Μαρώνεια
Maroneia

70

666 m

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

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TAP Supplementary Ecological Assessment

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Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 366 of 545, Sheet 2 of 12

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Kilometers
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2700000 2710000 2720000 2730000 2740000 2750000 2760000 2770000

5050000 5040000 5030000 5020000 5010000 5000000 4990000

Μύκη
Myki

Δαφνώνας
Dafnonas

Σταυρούπολη
Stavroupoli

Δράμας–Ξάνθης

Υψηλή Ράχη
Ypsili Rachi

Νικηφόρος
Nikiforos

Ορεινό
Oreino

Καλλίκαμπος
Kallikampos

Ξάνθη
Xanthi

Χρύσα
Chrysa

Εύμοιρο
Evmoiro

Διομήδεια
Diomideia

Παραδείσος
Paradeisos

Εγνατία Οδός

140

150

160

170

180

190

200

Κορυφές
Koryfes

Φίλιπποι
Filippoi

Κρηνίδες
Krinides

Ζυγός
Zygos

Γραβούνα
Gravouna

Χρυσούπολη
Chrysoupoli

Προάστιο
Proastio

Τόπειρος
Topeiros

Μυρωδάτη
Myrodati

Ερατεινό
Erateino

Καβάλα
Kavala

Νέα Καρβάλη
Nea Karvali

Αγία Φωτεινή
Agia Fotini

Ελευθερούπολη
Eleftheroupoli

Παλιό
Palio

Αγίασμα
Agiasma

Εθν. Παρκ. Ανατολ. Μακεδον. Θρακης
Ethn. Park. Anatol. Makedon. Thrakis

Κόλπος Καβάλας
Kolpos Kavalas

Κεραμωτή
Keramoti

ΞΑΝΘΗ ΧΑΝΤΗΣ

Ελεύθερες
Eleftheres

Νέα Πέραμος
Nea Peramos

Ελαιοχώρι
Elaiochori

TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

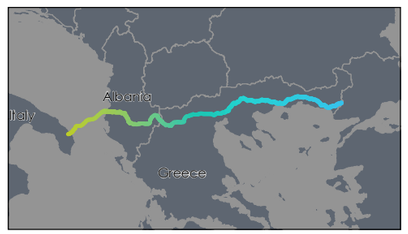
Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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Page 367 of 545, Sheet 3 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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2620000 2630000 2640000 2650000 2660000 2670000 2680000 2690000

5040000 5030000 5020000 5010000 5000000 4990000

Ορεινή
Oreini

Μικρόπολη
Mikropoli

Προσοτσάνη
Prosotsani

Πετρούσσα
Petroussa

Ξηροπόταμος
Xiropotamos

Δράμας-Βουλγαρικών Συνόρων

Μυλοπόταμος
Mylopotamos

Δράμα
Drama

Σιταγροί
Sitagroi

Καλός Αγρός
Kalos Agros

Χωριό
Chori

Σέρρες
Serres

Επταμύλοι
Eptamyloi

Εμμανουήλ Παππάς
Emmanouil Pappas

Δαφνούδι
Dafnoudi

Αλιστράτη
Alistrati

Καλαμπάκι
Kalampaki

Νέα Ζίχνη
Nea Zichni

Στρυμώνας
Strymonas

Σκουτάρι
Skoutari

Γάζωρος
Gazoros

Κορμίστα
Kormista

Πρώτη
Proti

Παγγαίο
Pangaio

Αχινός
Achinos

Δραβήσκος
Draviskos

Θέρμα
Therma

Ίβηρα
Ivira

Τράγιλος
Tragilos

Μεσοδρόμης-Αμφίπολης

Ροδόλιβος
Rodolivos

1938 m

Παλαιοκώμη
Palaiokomi

1185 m

Πιέρεις
Piereis

Πλατανότοπος
Platanotopos

Αηδονοχώρι
Aidonochori

Ποδοχώρι
Podochori

Αμφίπολη
Amfipoli

Egnatia Odos-E90

Φωλιά
Folia

Οφρύνιο

260 270 250 240 230 220 210

PY

TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

Habitat Type

Natural Habitat
Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
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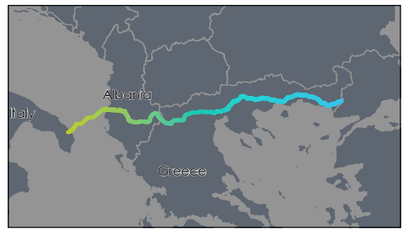

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CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 368 of 545, Sheet 4 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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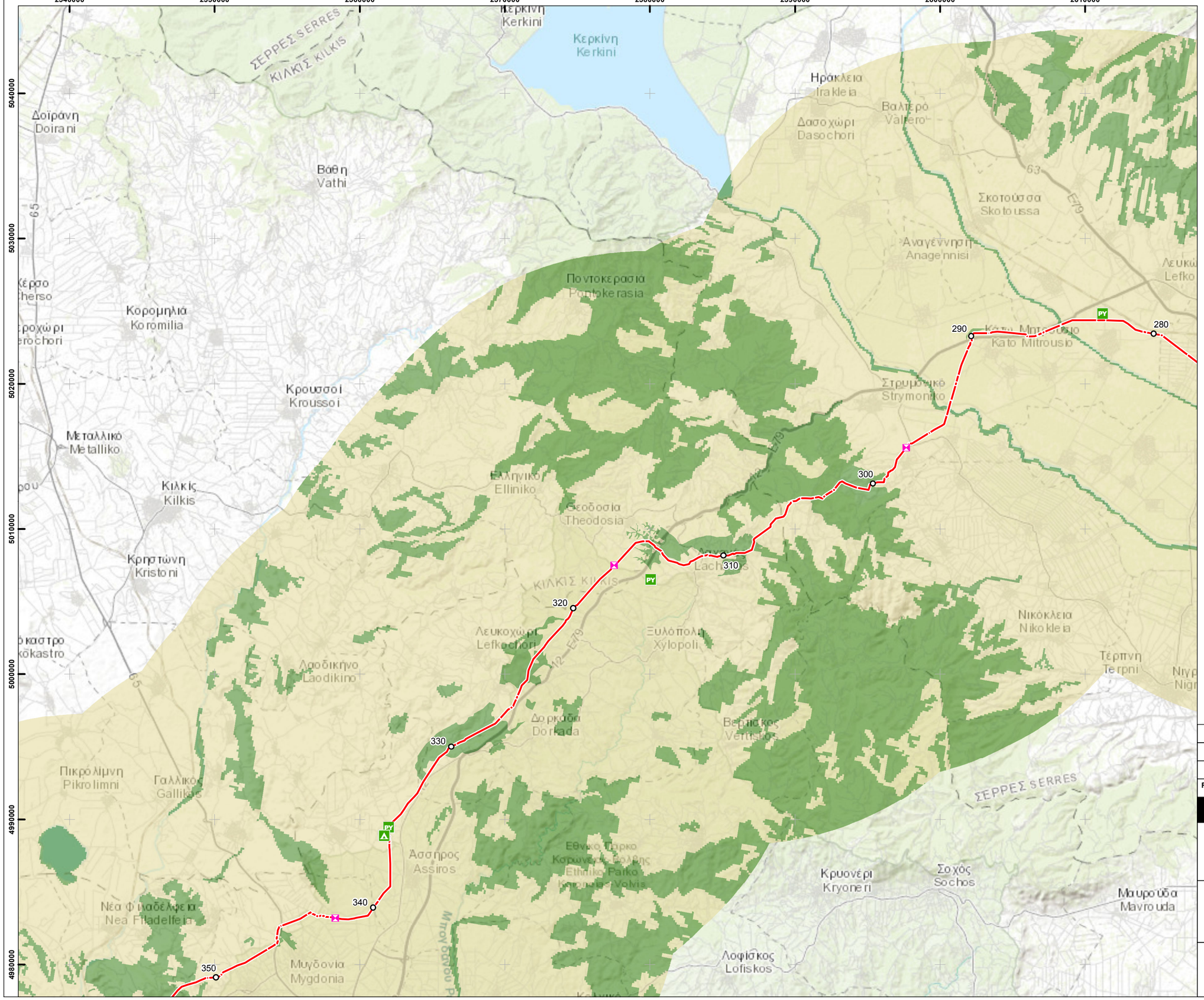

TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

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Projection: Mercator Auxiliary Sphere
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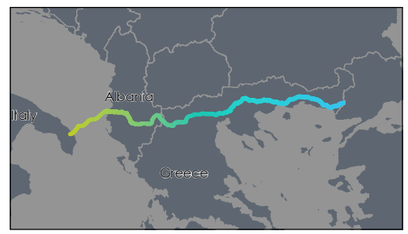
Units: Meter



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Page 369 of 545, Sheet 5 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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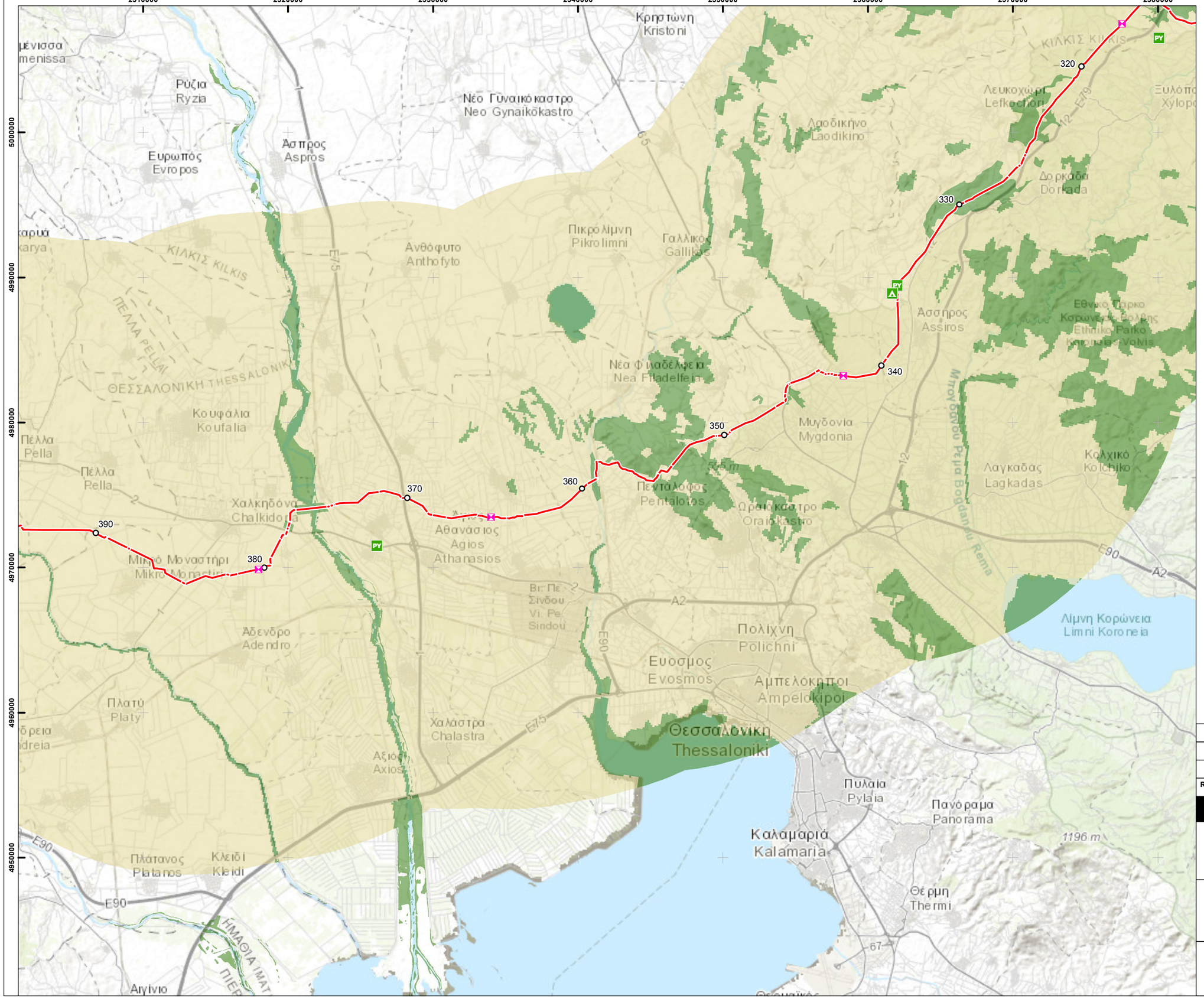

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CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 370 of 545, Sheet 6 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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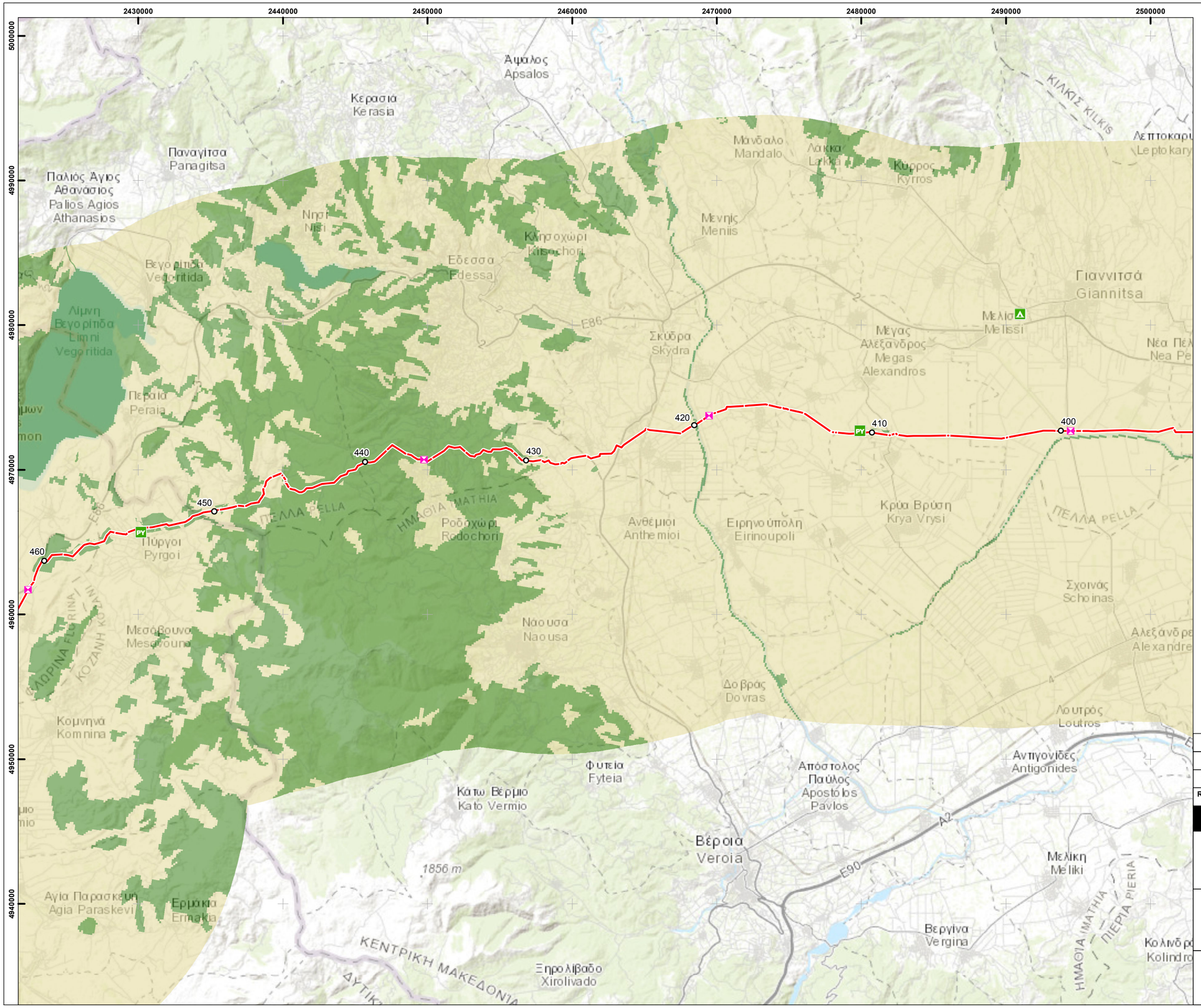


TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

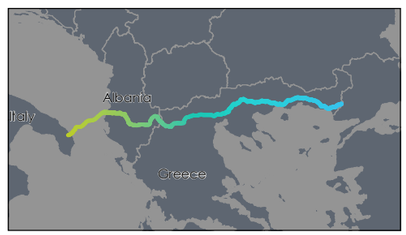
Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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Page 371 of 545, Sheet 7 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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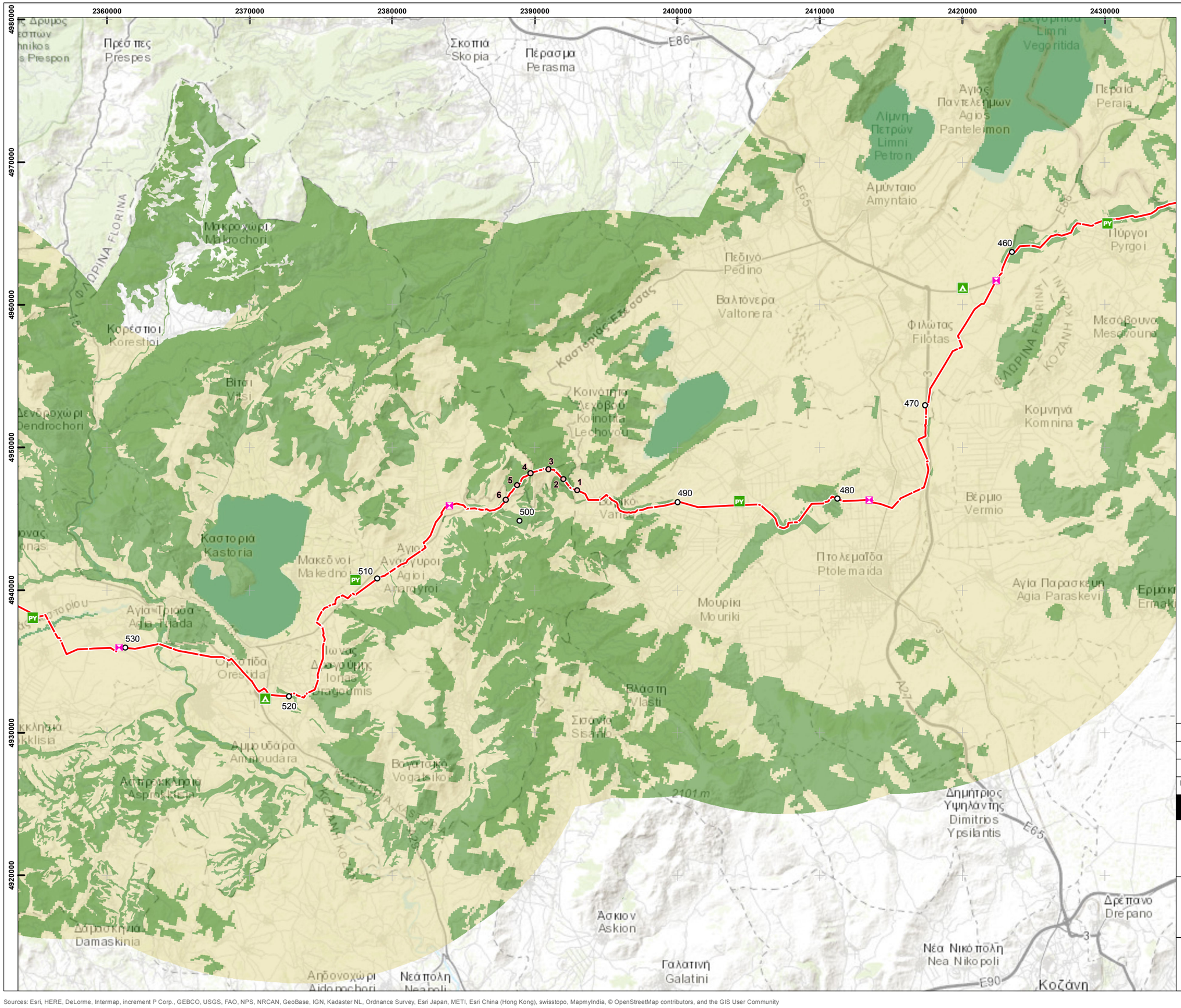

TAP base case route centreline

Kilometre points (KP)

Kilometre points - Reroute (KP)

Block valve station

Camp site

Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter

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TITLE:

Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 372 of 545, Sheet 8 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

N W E S

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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

TAP base case route centreline

Kilometre points (KP)

Compressor station

Block valve station

Camp site

Pipe yard

Habitat Type

Natural Habitat

Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter

Rev	Date	Description	Drn	Chk	App
A	01/08/2016	First draft	TOD	NOD	CY

TAP Supplementary Ecological Assessment

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Trans Adriatic Pipeline

TITLE:

Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 373 of 545, Sheet 9 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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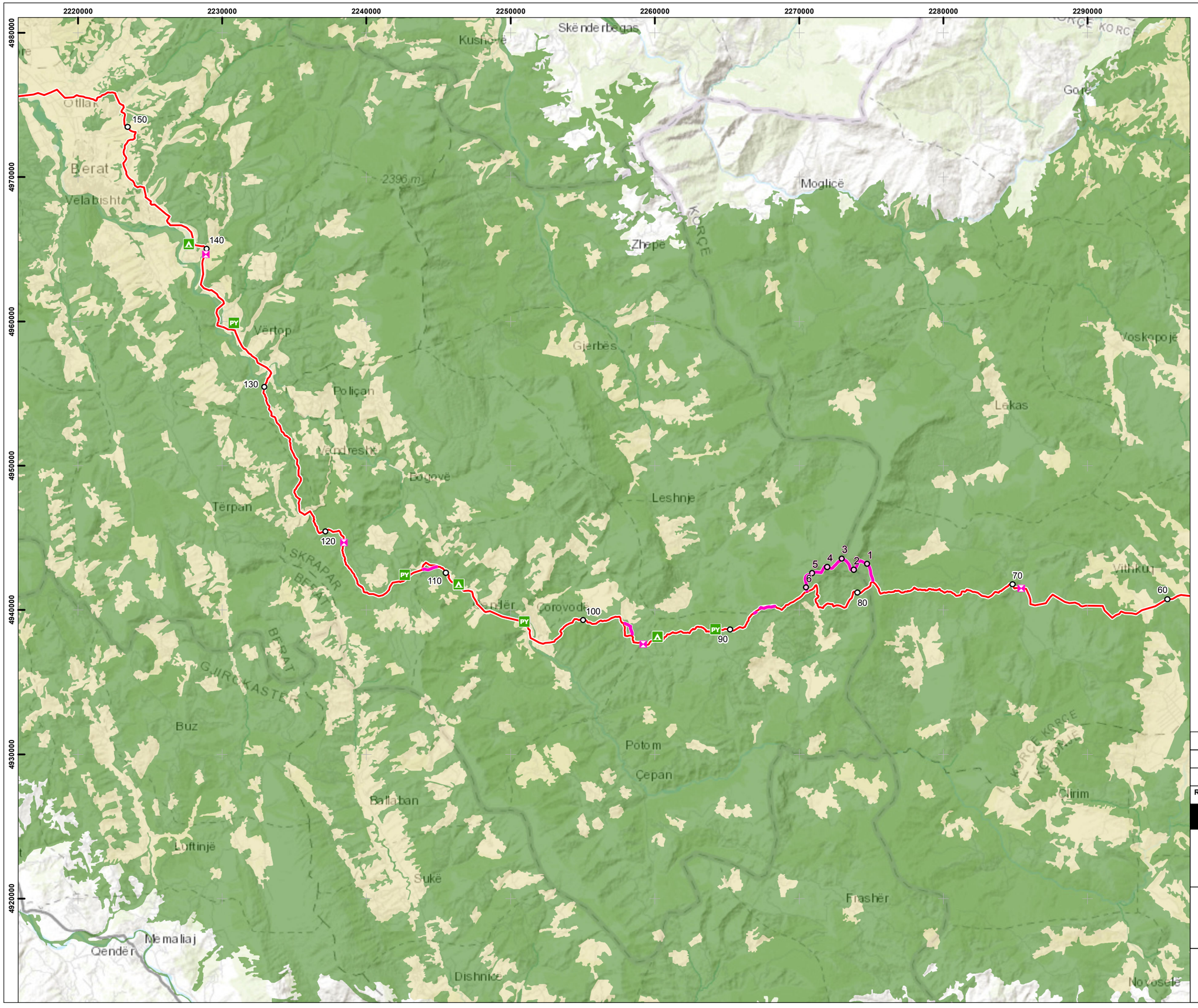
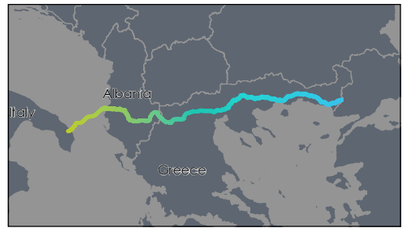


- TAP base case route centreline
- Re-route centreline
- Kilometre points (KP)
- Kilometre Points - Reroute (KP)
- Block valve station
- Camp site
- Pipe yard

Habitat Type

- Natural Habitat
- Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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A	01/08/2016	First draft	TOD	NOD	CY

TAP Supplementary Ecological Assessment

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Trans Adriatic Pipeline

TITLE:

Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 374 of 545, Sheet 10 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 375 of 545, Sheet 11 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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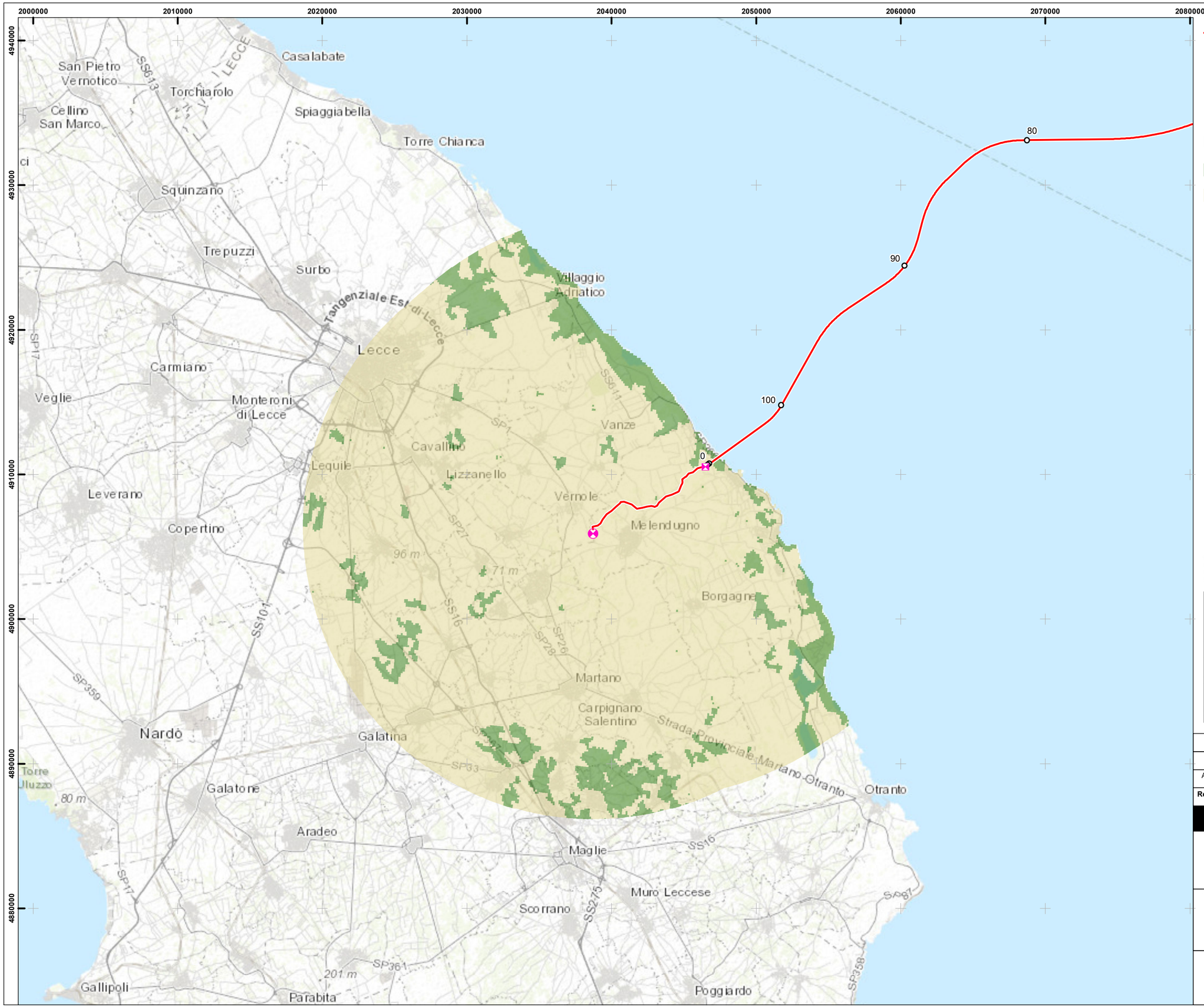


TAP base case route centreline

Kilometre points (KP)

Compressor station

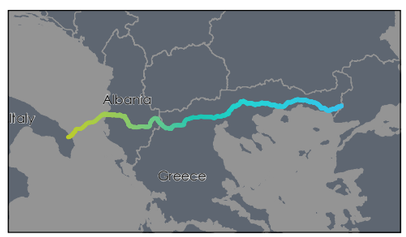
Block valve station

Habitat Type

Natural Habitat

Modified Habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Natural and Modified Vegetation
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 376 of 545, Sheet 12 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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Figure 13 Critical habitat DMUs

2860000 2870000 2880000 2890000 2900000 2910000 2920000 2930000

5030000 5020000 5010000 5000000 4990000 4980000 4970000

0 10 20 30 40 50 60 PY PY PY

TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

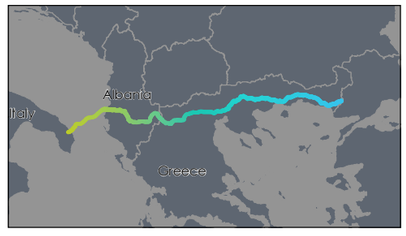
Critical Habitat

Criterion 1: Threatened species
Criterion 4: Highly threatened or unique ecosystems
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 378 of 545, Sheet 1 of 12

0 5 10
Kilometers
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2780000 2790000 2800000 2810000 2820000 2830000 2840000 2850000

5060000 5050000 5040000 5030000 5020000 5010000 5000000

130 120 110 100 90 80 70 PY

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

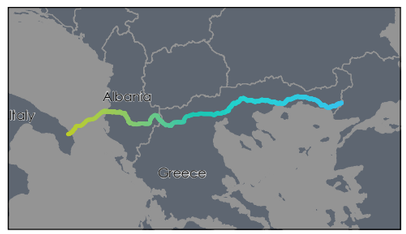
Critical Habitat

Criterion 1: Threatened species
Criterion 2: Endemic / restricted range species
Criterion 4: Highly threatened or unique ecosystems
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 379 of 545, Sheet 2 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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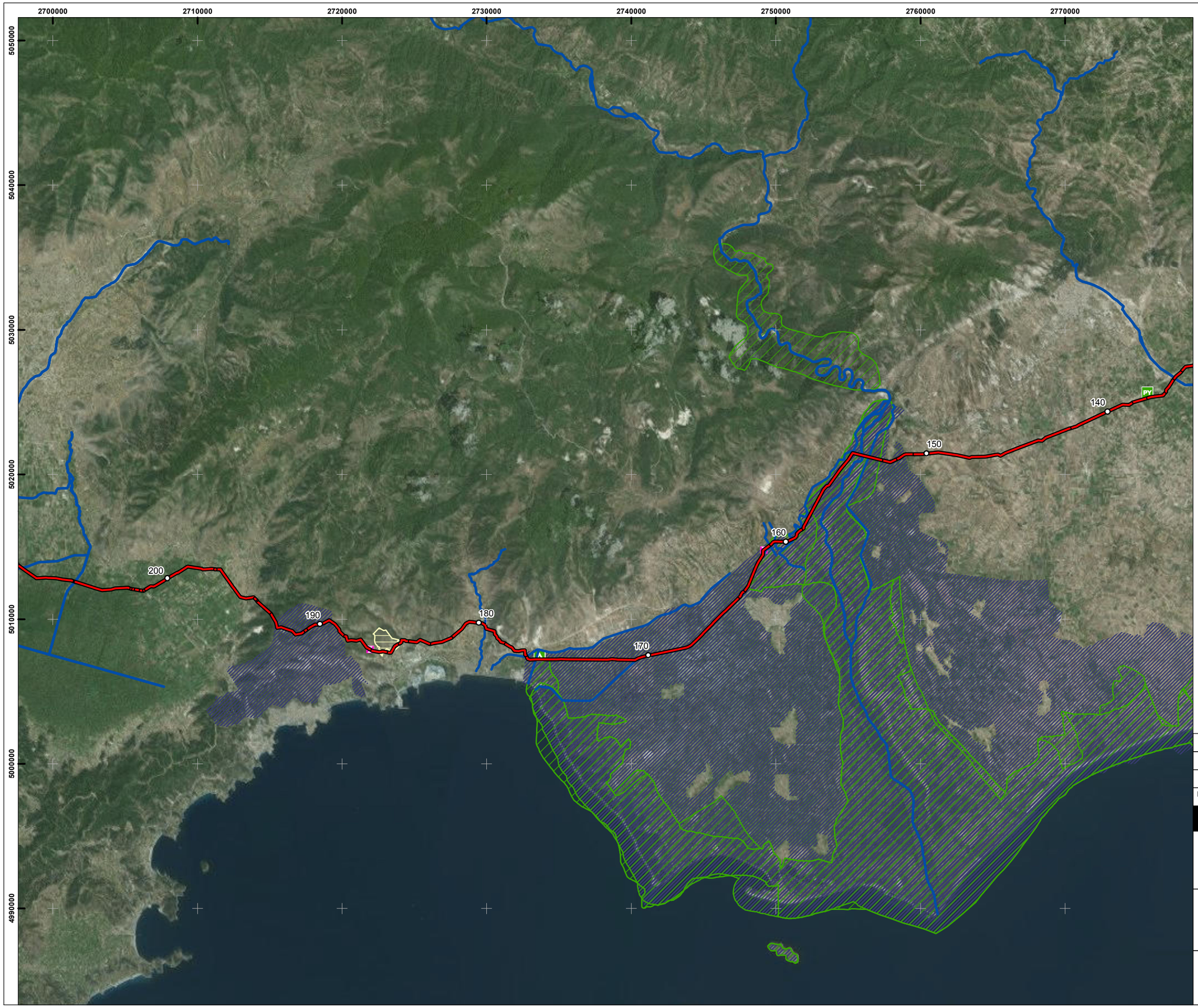


TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Critical Habitat

Criterion 1: Threatened species

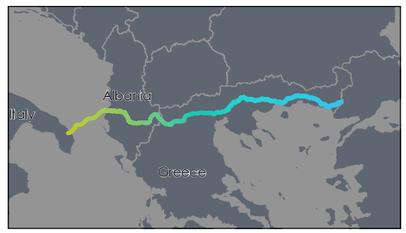
Criterion 2: Endemic / restricted range species

Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

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Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 380 of 545, Sheet 3 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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2620000 2630000 2640000 2650000 2660000 2670000 2680000 2690000

5040000 5030000 5020000 5010000 5000000 4990000

270 260 250 240 230 220 210 PY PY

TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

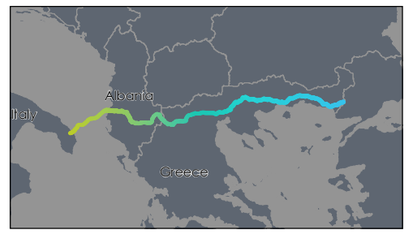
Critical Habitat

Criterion 3: Migratory / congregatory species
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 381 of 545, Sheet 4 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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2540000 2550000 2560000 2570000 2580000 2590000 2600000 2610000

5040000 5030000 5020000 5010000 5000000 4990000 4980000

290 280 PY 300 310 320 PY 330 340 350

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

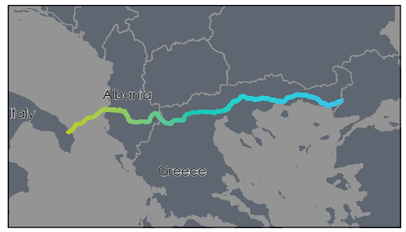
Critical Habitat

Criterion 1: Threatened species
Criterion 3: Migratory / congregatory species
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 382 of 545, Sheet 5 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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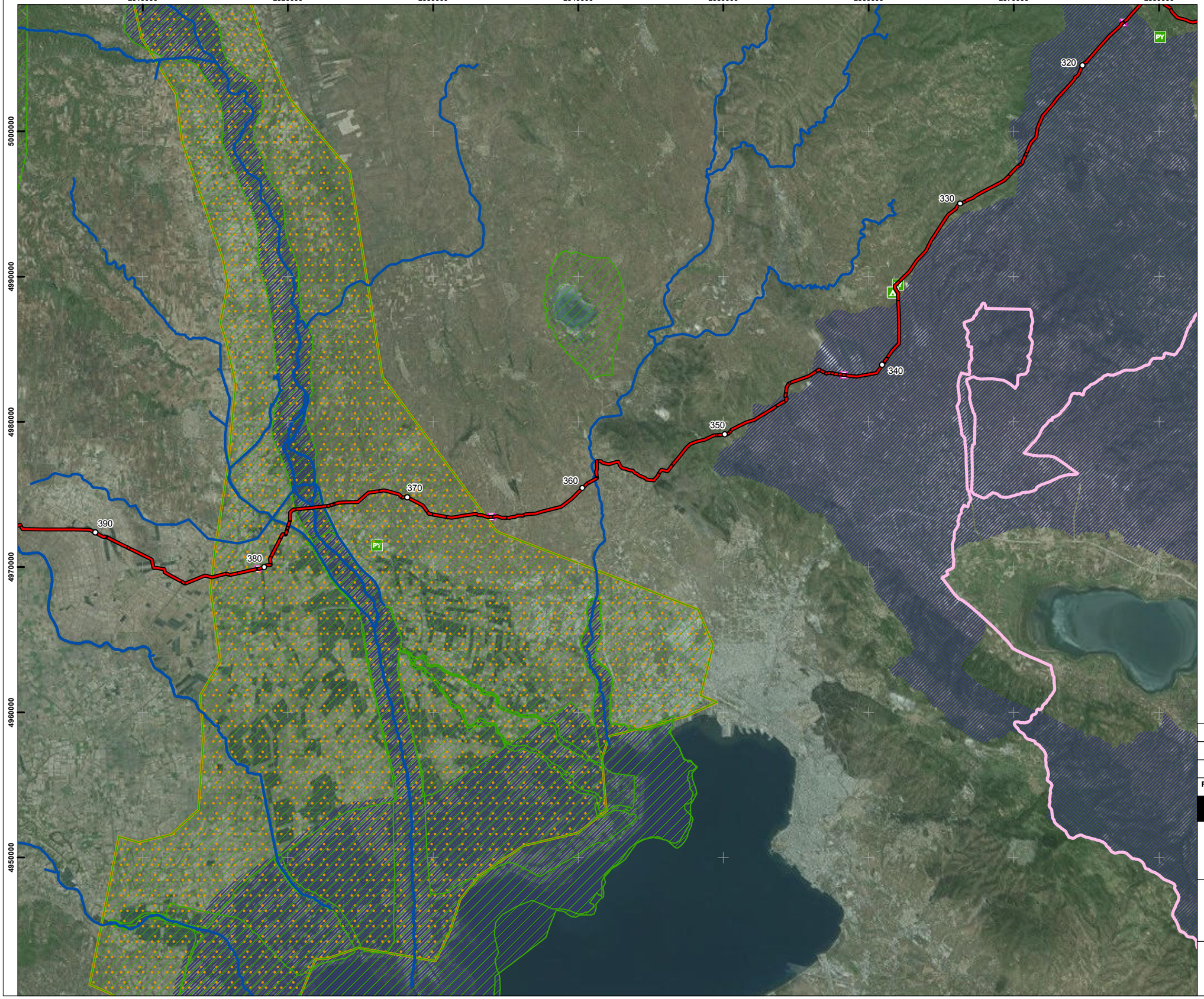

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

Critical Habitat

Criterion 1: Threatened species
Criterion 3: Migratory / congregatory species
Criterion 5: Evolutionary processes
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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Datum: WGS 1984
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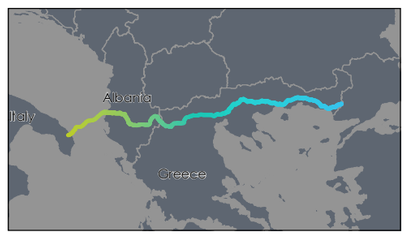

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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 383 of 545, Sheet 6 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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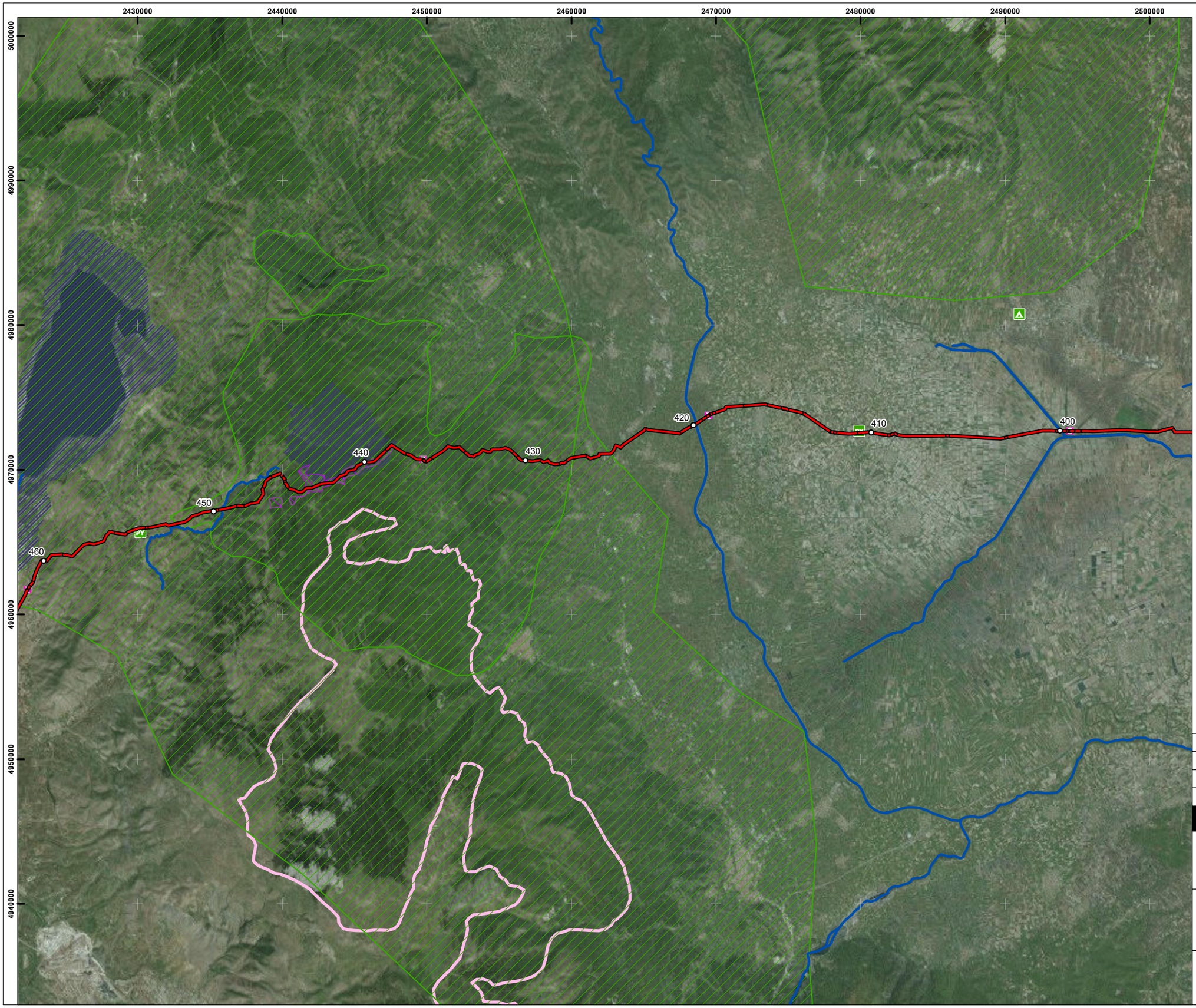


TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Critical Habitat

Criterion 1: Threatened species

Criterion 3: Migratory / congregatory species

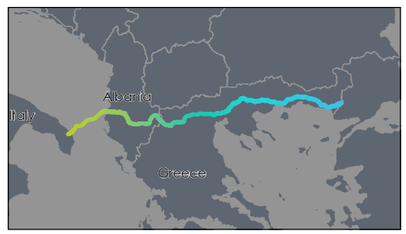
Criterion 4: Highly threatened or unique ecosystems

Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 384 of 545, Sheet 7 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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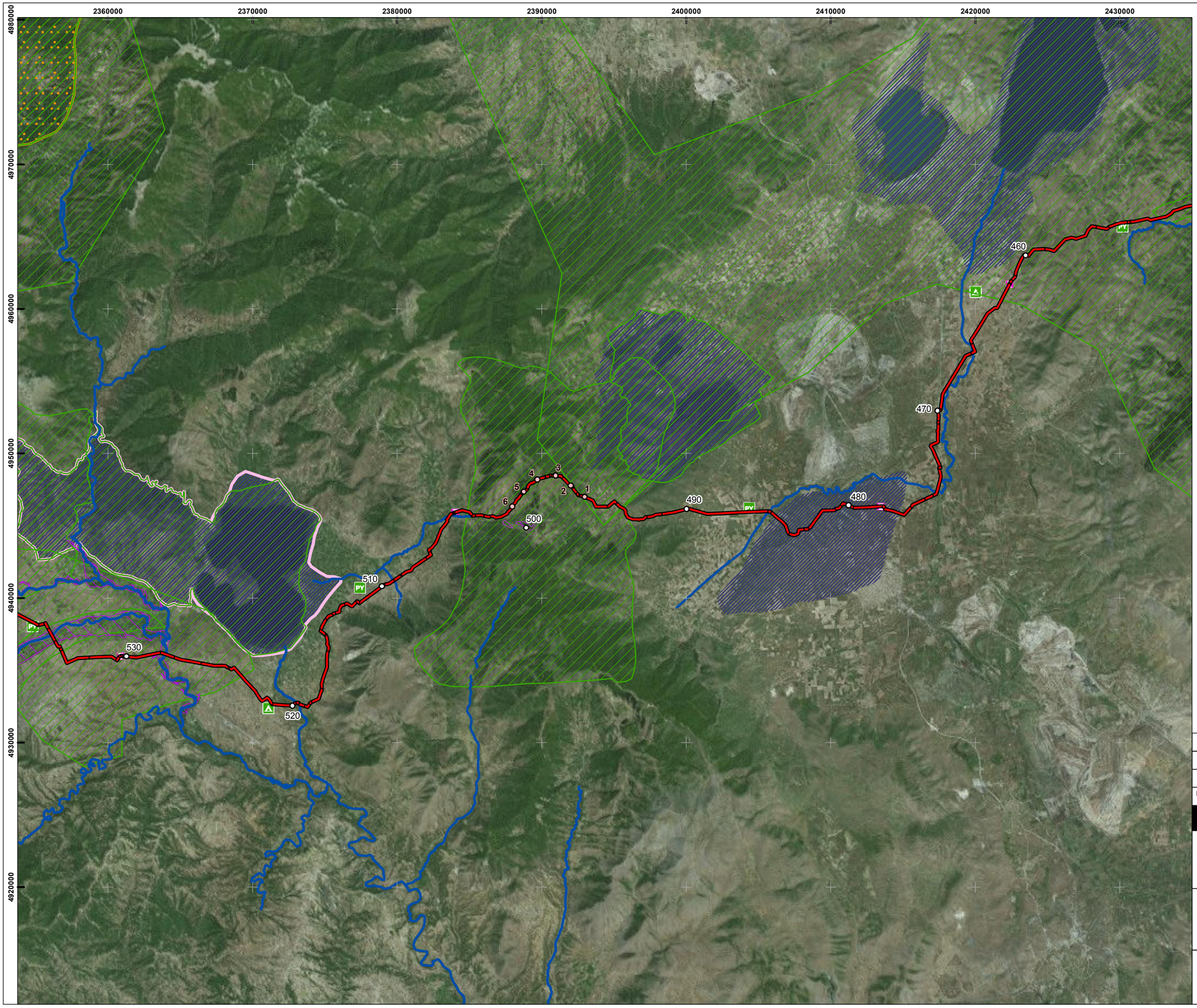

TAP base case route centreline

Kilometre points (KP)

Kilometre points - Reroute (KP)

Block valve station

Camp site

Pipe yard

Critical Habitat

Criterion 1: Threatened species

Criterion 3: Migratory / congregatory species

Criterion 4: Highly threatened or unique ecosystems

Criterion 5: Evolutionary processes

Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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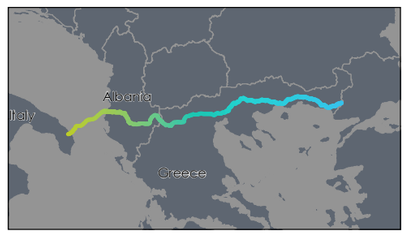
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 385 of 545, Sheet 8 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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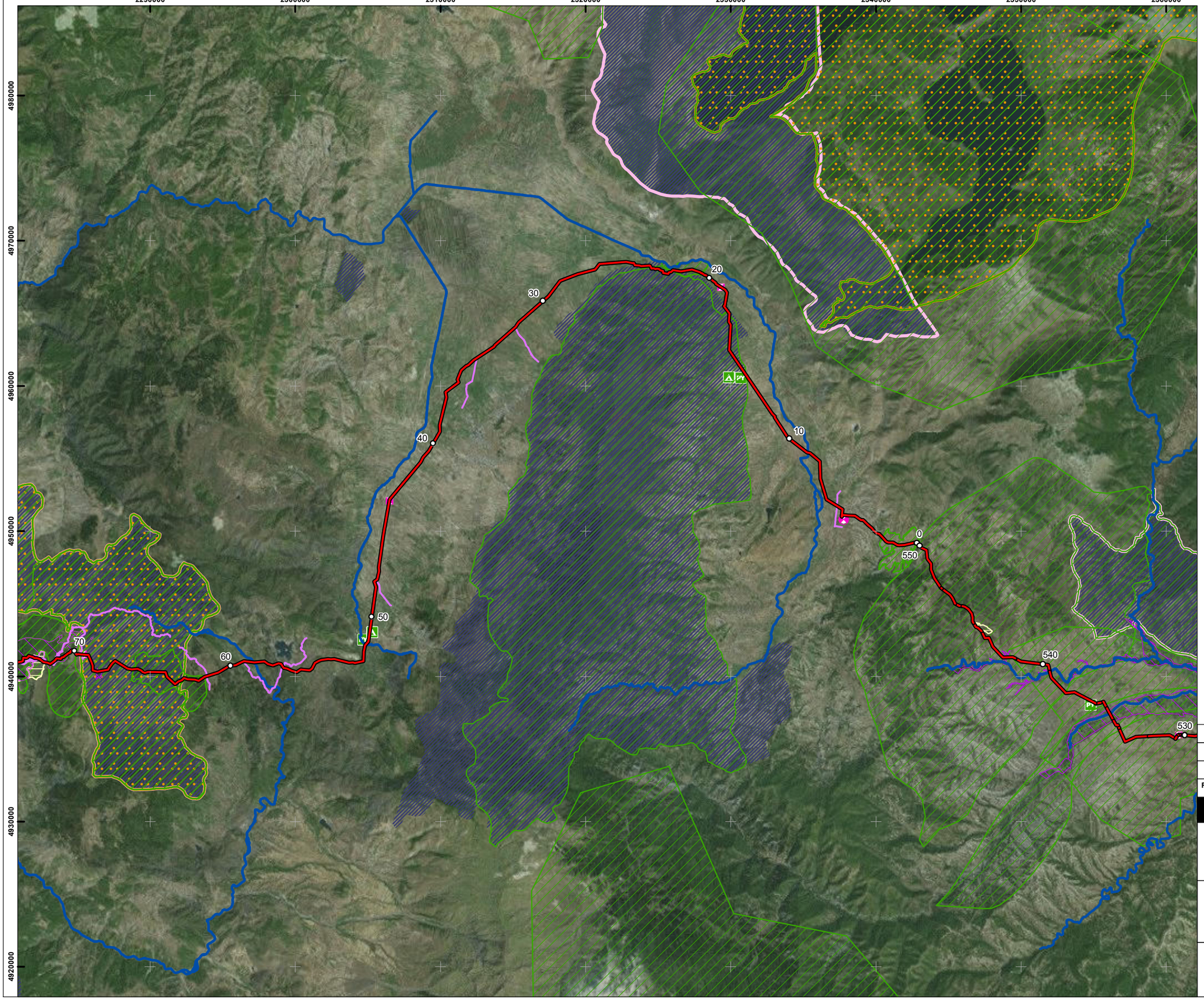


TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

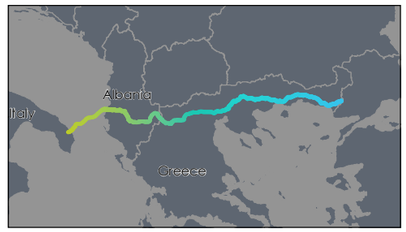
Critical Habitat

Criterion 1: Threatened species
Criterion 2: Endemic / restricted range species
Criterion 3: Migratory / congregatory species
Criterion 4: Highly threatened or unique ecosystems
Criterion 5: Evolutionary processes
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 386 of 545, Sheet 9 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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2220000 2230000 2240000 2250000 2260000 2270000 2280000 2290000

4980000 4970000 4960000 4950000 4940000 4930000 4920000

150 140 130 120 110 100 90 80 70 60

PY

TAP base case route centreline
Re-route centreline
Kilometre points (KP)
Kilometre Points - Reroute (KP)
Block valve station
Camp site
Pipe yard

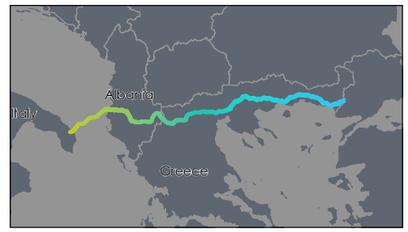
Critical Habitat

Criterion 1: Threatened species
Criterion 2: Endemic / restricted range species
Criterion 3: Migratory / congregatory species
Criterion 4: Highly threatened or unique ecosystems
Criterion 5: Evolutionary processes
Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 387 of 545, Sheet 10 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

N W E S

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- TAP base case route centreline
- Re-route centreline
- Kilometre points (KP)
- Kilometre Points - Reroute (KP)
- Compressor station
- Block valve station
- Camp site
- Pipe yard

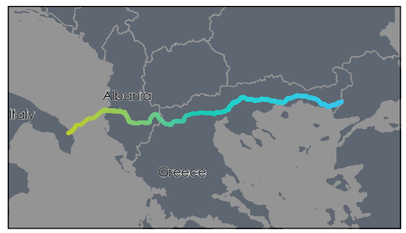
Critical Habitat

- Criterion 1: Threatened species
- Criterion 3: Migratory / congregatory species
- Criterion 4: Highly threatened or unique ecosystems
- Criterion 1: Threatened species (Aquatic)

Protected/Designated Area:

- Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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0	12/12/2016	Final Issue	TOD	NOD	CY
B	02/11/2016	Second draft	TOD	NOD	CY
A	01/08/2016	First draft	TOD	NOD	CY

TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 388 of 545, Sheet 11 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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2000000 2010000 2020000 2030000 2040000 2050000 2060000 2070000 2080000

4940000 4930000 4920000 4910000 4900000 4890000 4880000

0 80 90 100

TAP base case route centreline

Kilometre points (KP)

Compressor station

Block valve station

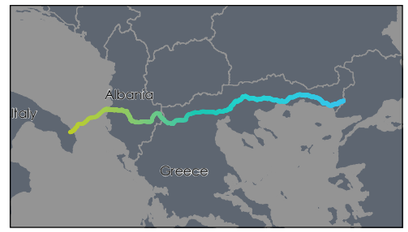
Critical Habitat

Criterion 4: Highly threatened or unique ecosystems

Protected/Designated Area:

Protected/Designated Site

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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RSK Trans Adriatic Pipeline

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Critical Habitat Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 389 of 545, Sheet 12 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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Figure 14 Priority Biodiversity Features

2860000 2870000 2880000 2890000 2900000 2910000 2920000 2930000

5030000 5020000 5010000 5000000 4990000 4980000 4970000

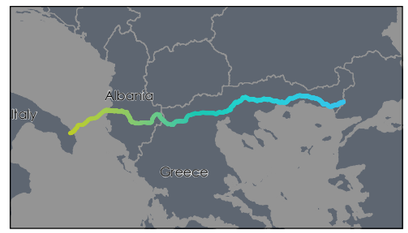
0 25 50 PY PY

TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 391 of 545, Sheet 1 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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5060000 5050000 5040000 5030000 5020000 5010000 5000000

125 100 75

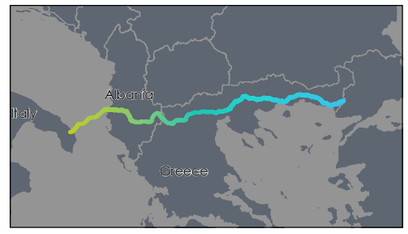
PY

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 392 of 545, Sheet 2 of 12

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Kilometers
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5050000 5040000 5030000 5020000 5010000 5000000 4990000

150 175 200 PY

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
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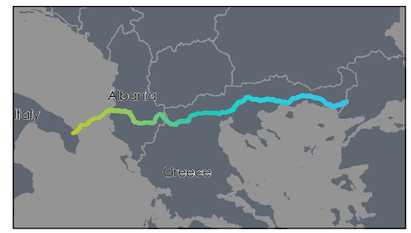
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

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Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 393 of 545, Sheet 3 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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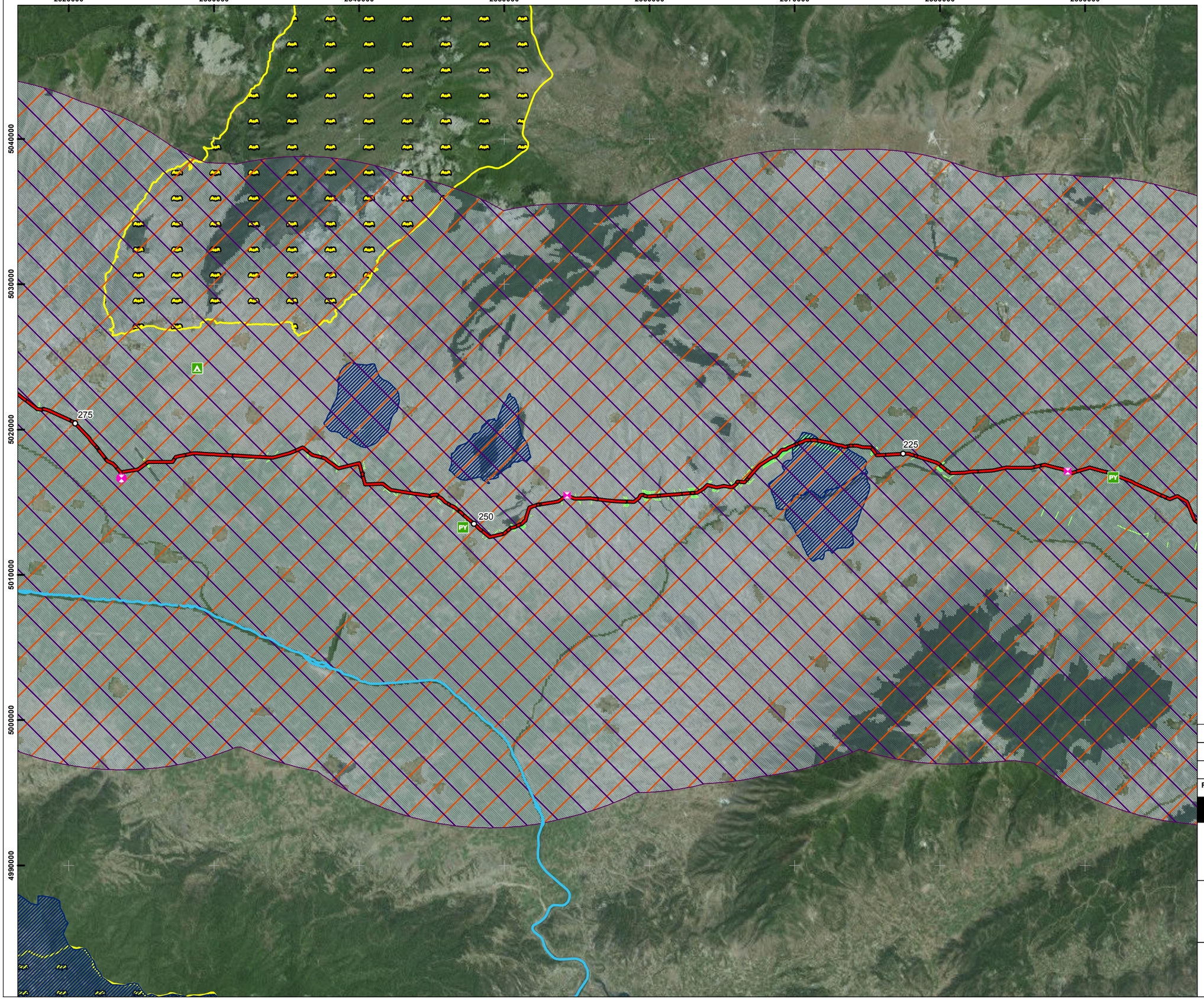


TAP base case route centreline

Kilometre points (KP)

Compressor station

Block valve station

Camp site

Pipe yard

Priority Biodiversity Feature

Bat DMU

Amphibian DMU

Reptile DMU

Threatened habitats not qualifying as critical habitat

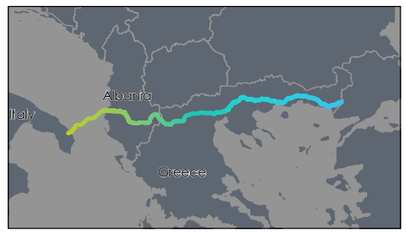
Open Habitat Bird DMU

Forest Bird DMU

Designated/Protected Site not qualifying as critical habitat

Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 394 of 545, Sheet 4 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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2540000 2550000 2560000 2570000 2580000 2590000 2600000 2610000

5040000 5030000 5020000 5010000 5000000 4990000 4980000

300 325 350 PY PY PY

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Bat DMU
Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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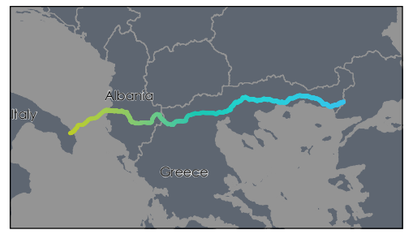

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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 395 of 545, Sheet 5 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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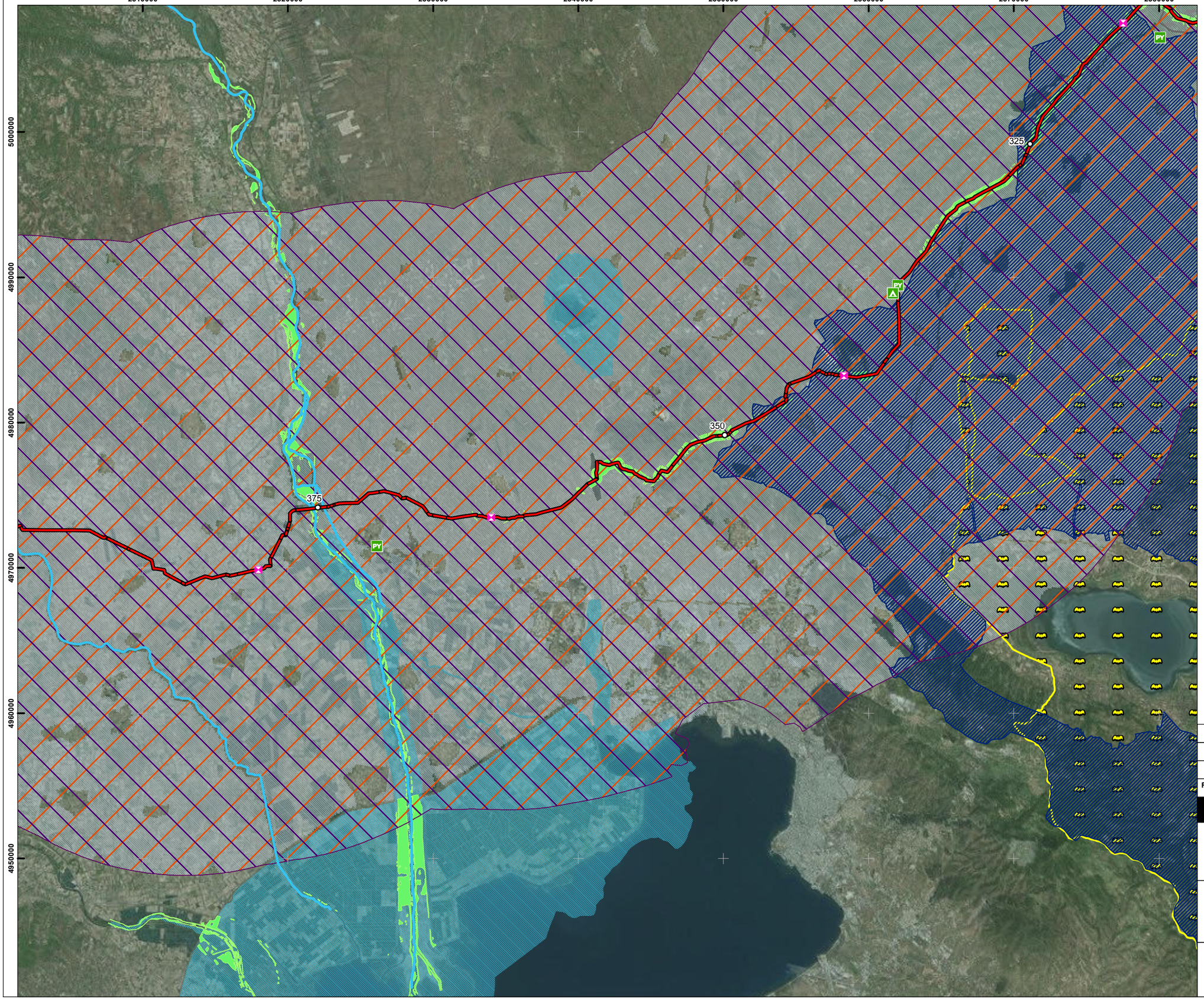

TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Priority Biodiversity Feature

Grey wolf DMU

Bat DMU

Amphibian DMU

Reptile DMU

Threatened habitats not qualifying as critical habitat

Open Habitat Bird DMU

Forest Bird DMU

Wetland Bird DMU

Designated/Protected Site not qualifying as critical habitat

Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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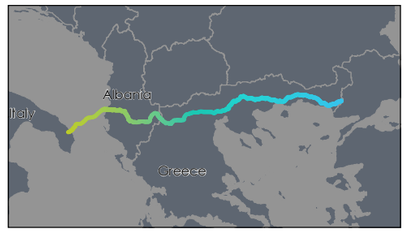

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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 396 of 545, Sheet 6 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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5000000 4990000 4980000 4970000 4960000 4950000 4940000

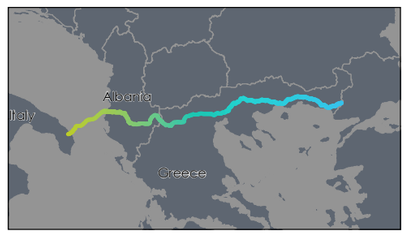
425 450 400 PY PY PY

TAP base case route centreline
Kilometre points (KP)
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Bat DMU
Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Mountain Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter



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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 397 of 545, Sheet 7 of 12

0 5 10
Kilometers
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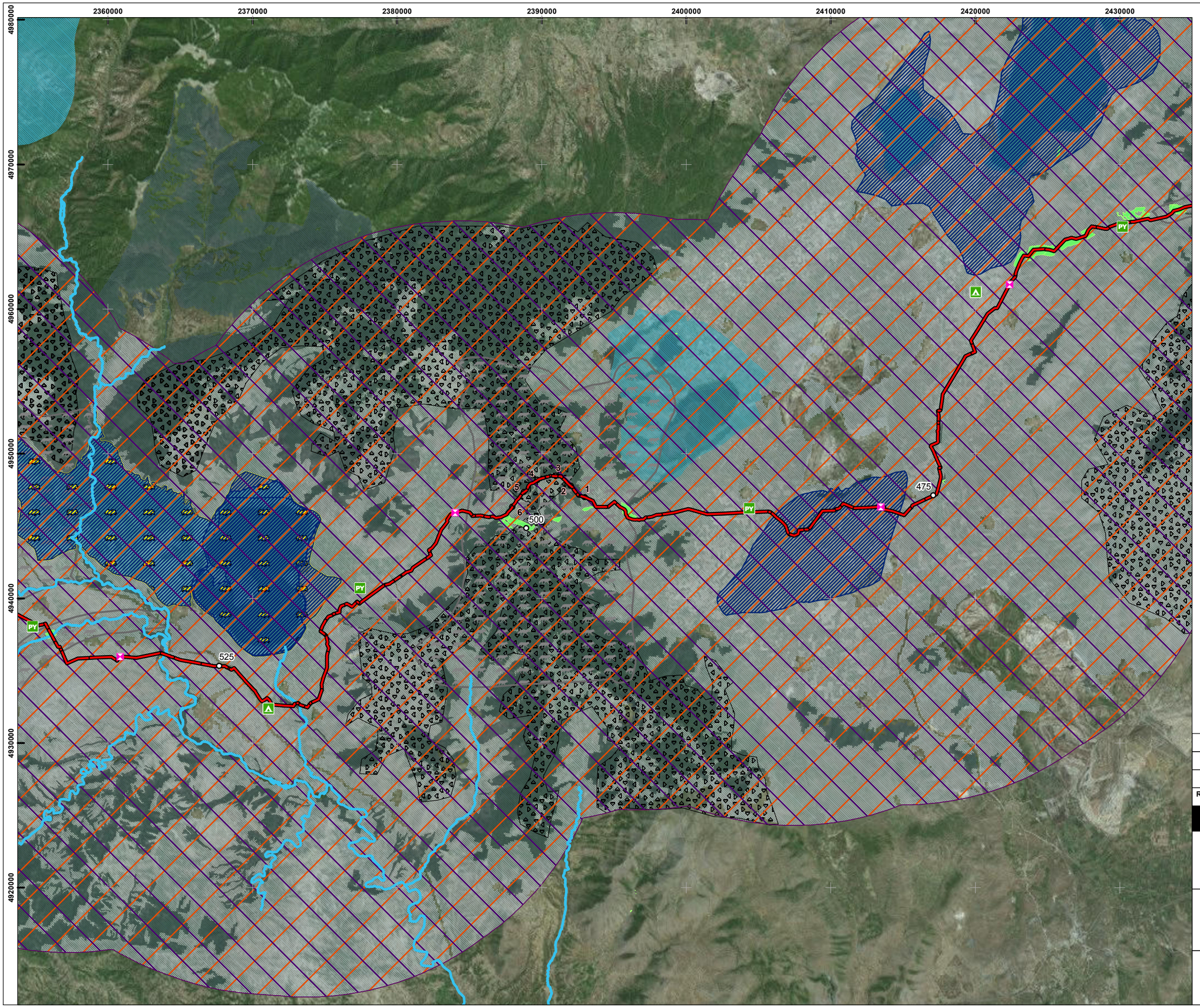

TAP base case route centreline

Kilometre points (KP)

Block valve station

Camp site

Pipe yard

Priority Biodiversity Feature

Grey wolf DMU

Bat DMU

Amphibian DMU

Reptile DMU

Threatened habitats not qualifying as critical habitat

Open Habitat Bird DMU

Forest Bird DMU

Wetland Bird DMU

Mountain Bird DMU

Designated/Protected Site not qualifying as critical habitat

Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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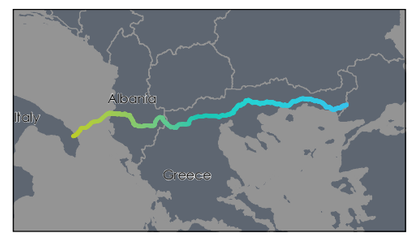
Units: Meter



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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 398 of 545, Sheet 8 of 12

0 5 10
Kilometers
SCALE: 1:250,000 @ A3

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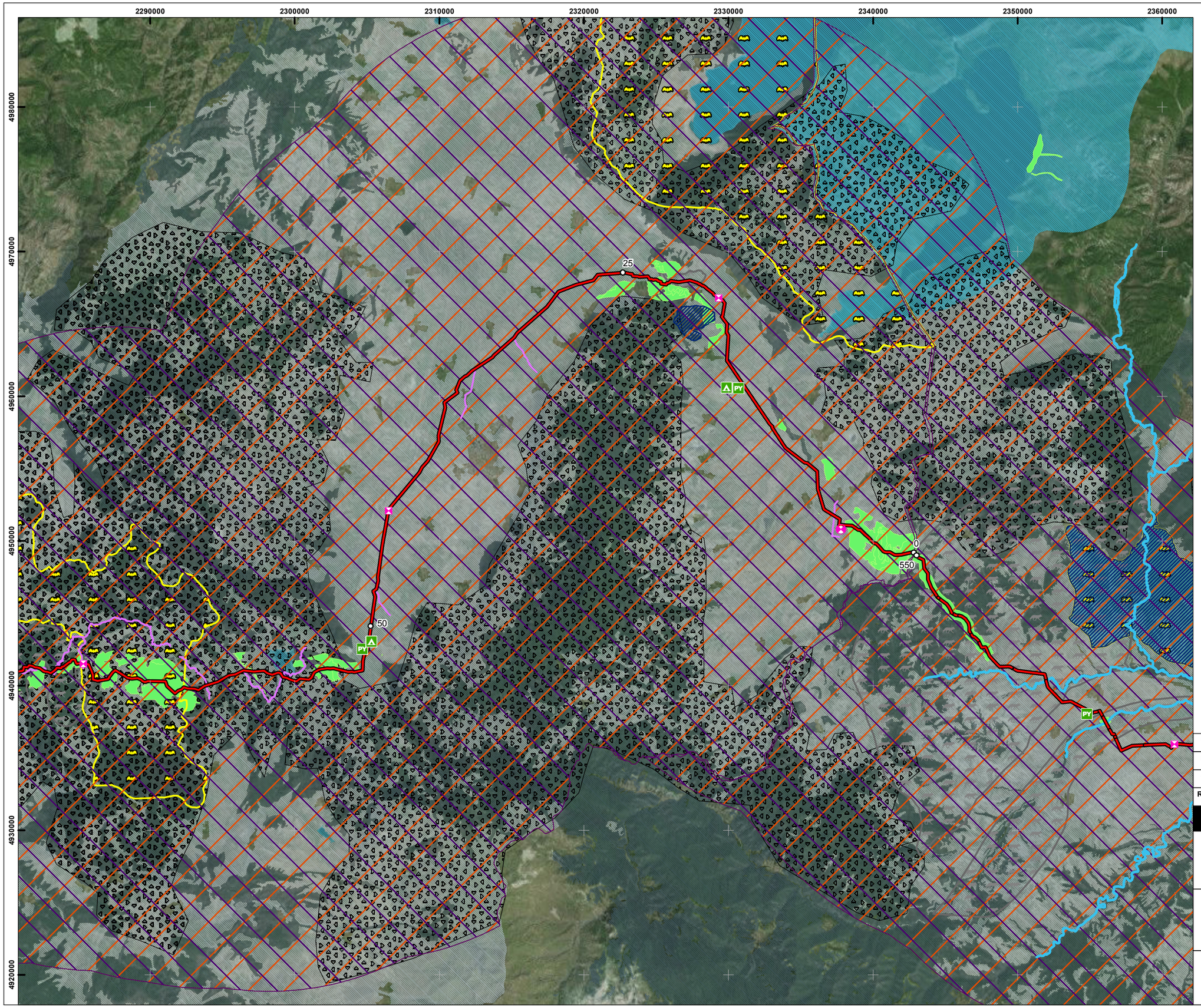

TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Bat DMU
Amphibian DMU
Reptile DMU
Threatened habitats not qualifying as critical habitat
Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU
Mountain Bird DMU
Designated/Protected Site not qualifying as critical habitat
Fish DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
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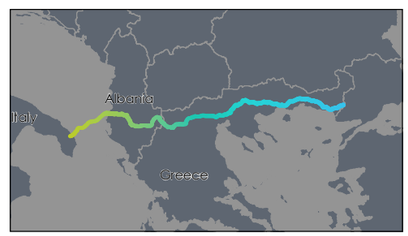

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TAP Supplementary Ecological Assessment

RSK
Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 399 of 545, Sheet 9 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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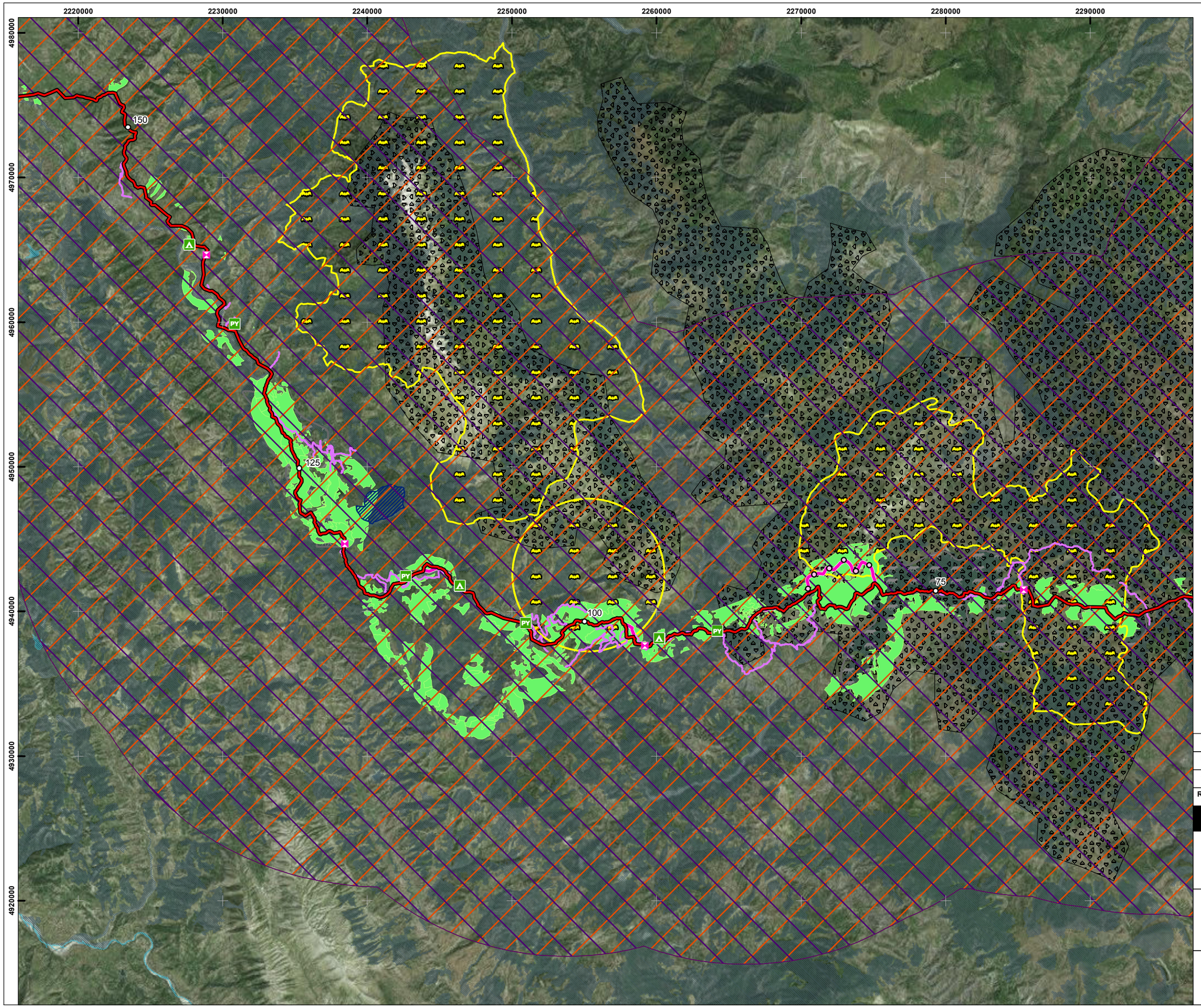

TAP base case route centreline

Re-route centreline

Kilometre points (KP)

Kilometre Points - Reroute (KP)

Block valve station

Camp site

Pipe yard

Priority Biodiversity Feature

Grey wolf DMU

Bat DMU

Amphibian DMU

Reptile DMU

Threatened habitats not qualifying as critical habitat

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Forest Bird DMU

Wetland Bird DMU

Mountain Bird DMU

Designated/Protected Site not qualifying as critical habitat

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Projection: Mercator Auxiliary Sphere
Datum: WGS 1984
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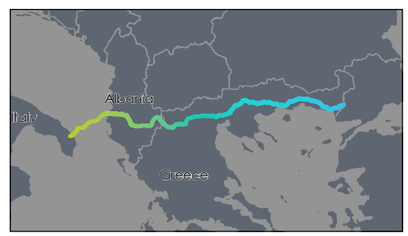

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TAP Supplementary Ecological Assessment

RSK

Trans Adriatic Pipeline

TITLE:

Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 400 of 545, Sheet 10 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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PV PY

TAP base case route centreline
Re-route centreline
Kilometre points (KP)
Kilometre Points - Reroute (KP)
Compressor station
Block valve station
Camp site
Pipe yard

Priority Biodiversity Feature

Grey wolf DMU
Bat DMU
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Reptile DMU
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Forest Bird DMU
Wetland Bird DMU

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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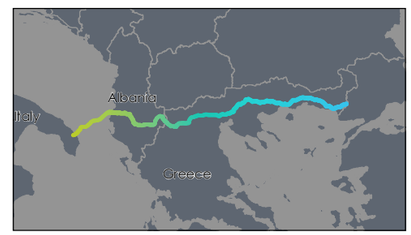

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TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 401 of 545, Sheet 11 of 12

0 5 10
Kilometers
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4940000 4930000 4920000 4910000 4900000 4890000 4880000

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TAP base case route centreline
Kilometre points (KP)
Compressor station
Block valve station

Priority Biodiversity Feature

Open Habitat Bird DMU
Forest Bird DMU
Wetland Bird DMU

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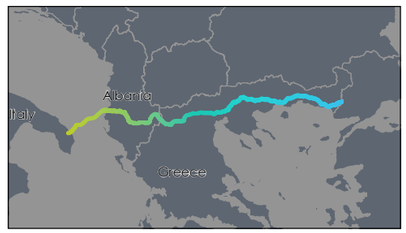
Units: Meter



Rev	Date	Description	Drn	Chk	App
0	12/12/2016	Final Issue	TOD	NOD	CY
B	02/11/2016	Second draft	TOD	NOD	CY
A	01/08/2016	First draft	TOD	NOD	CY

TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:
Priority Biodiversity Features Overview
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 402 of 545, Sheet 12 of 12

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Kilometers
SCALE: 1:250,000 @ A3

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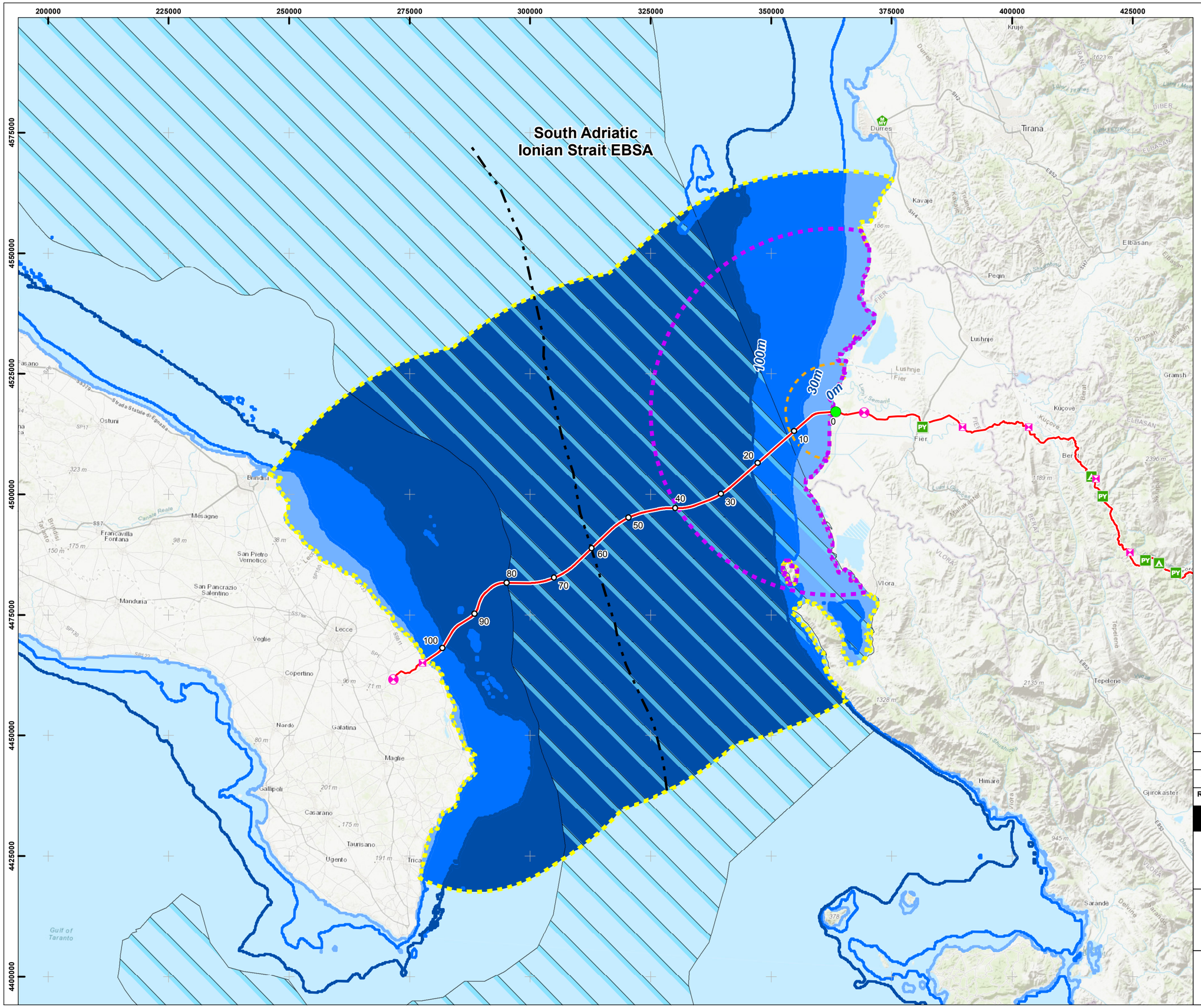
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 15 Marine DMUs



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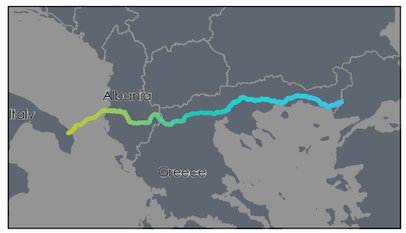

Rev	Date	Description	Drn	Chk	App
1	02/02/2016	Final Issue	TOD	NOD	CY
0	12/12/2016	Final Issue	TOD	NOD	CY
A	01/08/2016	First draft	TOD	NOD	CY

TAP Supplementary Ecological Assessment

RSK Trans Adriatic Pipeline

TITLE:

Marine DMUs
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 404 of 545, Sheet 1 of 1

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Kilometers
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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Figure 16 Offshore sensitive areas at the Italian landfall

279000
279500
280000
280500
4467000
4466500
4466000
102
103
TAP base case route centreline
Kilometre points (KP)
Sheet Piling
Dredging Area
Survey Area
Bioturbated Shape boundary
Bioconstruction Status (GES) Coralligenous bioconstructions
Good
Moderate
Scarce
Bad
No Data
Seagrass Distribution
Patches of *Posidonia Oceanica*
Dense or Dense with Sparse Patches *Cymodocea nodosa*
Sparse or Sparse with Dense Patches *Cymodocea nodosa*
Sparse with Very Sparse Patches or Very Sparse *Cymodocea nodosa*
Sand
Coarse Mixed Sediment
Coordinate System: WGS 1984 UTM Zone 34N
Projection: Transverse Mercator
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Units: Meter
Albania
Italy
Greece
Rev	Date	Description	Drn	Chk	App
0	01/03/2017	First Issue	TOD	AL	NOD
A	01/08/2016	First draft	TOD	AL	NOD
TAP Supplementary Ecological Assessment
RSK
Trans Adriatic Pipeline
TITLE:
Offshore Sensitive Areas
Italian Landfall
CAL00-C5577-640-Y-TRS-0002_Appendix 1
Page 406 of 545, Sheet 1 of 1
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APPENDIX 2
LEGISLATIVE FRAMEWORK FOR BIODIVERSITY IN ALBANIA (ONSHORE)

Introduction

This section reviews the legislative framework related to biodiversity that apply to TAP's activities in Albania, on three levels:

- the applicable international requirements such as international agreements to which Albania is part, as well as European Union (EU) frameworks
- applicable Albanian national legislation, permitting related to forests and other relevant approval conditions (such as permits to cross fish-bearing watercourses)
- existing relevant national and local Albanian Biodiversity Action Plans (BAPs), and corresponding species and habitat action plans.

International biodiversity treaties

Albania has ratified the following international biodiversity treaties.

Convention on Biological Diversity, 1992 (Rio Convention)

The 1992 Rio Convention is a multilateral treaty that outlines the key issues of conservation of biological diversity (or biodiversity), sustainable use of its components, and fair and equitable sharing of benefits arising from genetic resources.

The Rio Convention describes requirements for ratifying countries so they can address key biodiversity issues through the development and implementation of national strategies focusing on the conservation and sustainable use of biological diversity, such as National Biodiversity Strategies and Action Plans (NBSAPs). The convention also describes requirements to ensure that these strategies are mainstreamed into the planning and activities of those sectors whose activities could have an impact (positive or negative) on biological diversity.

Cartagena Protocol on Biological Safety, 2003 (the Biosafety Protocol)

As a supplement to the Rio Convention, the Biosafety Protocol aims to protect biological diversity from potential risks posed by genetically modified organisms resulting from modern biotechnology.

The Biosafety Protocol demands products from new technologies to be based on the precautionary principle to allow developing nations to balance public health against economic benefits.

Nagoya Protocol, 2010

As a second supplementary agreement to the Rio Convention, the 'Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity' provides a transparent legal framework for the implementation on the fair and equitable sharing of benefits arising out of the utilisation of genetic resources, thereby contributing to the conservation and sustainable use of biodiversity.

United Nations Convention to Combat Desertification, 1994 (UNCCD)

The UNCCD aims to combat desertification and mitigate the effects of drought through national action programmes that incorporate long-term strategies supported by international cooperation and partnership arrangements.

The UNCCD is based on the principles of participation, partnership and decentralisation: the backbone of good governance and sustainable development.

Bern Convention on the Conservation of European Wildlife and Natural Habitats, 1982 (Bern Convention)

The Bern Convention addresses aspects of nature conservation and natural heritage in Europe and some African countries. It is particularly concerned about protecting natural habitats and endangered species, including migratory species. Its overall goals are to conserve wild flora and fauna and their natural habitats, promote cooperation between states and give particular attention to endangered and vulnerable species including endangered and vulnerable migratory species.

Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1983 (Bonn Convention)

The Bonn Convention requires contracting parties to cooperate in the aim to conserve migratory species and their habitats.

These goals are implemented by providing strict protection for endangered migratory species (as listed in Appendix I) with relevant provisions outlined in Article III, paragraphs 4 and 5 (parties that are Range States to Appendix I species are obliged to afford them strict protection), multilateral agreements for the conservation and management of migratory species that require or would benefit from international cooperation (as listed per Appendix II), and by undertaking cooperative research activities.

Several conservation agreements, relevant for Albania, have been concluded to date under the auspices of the Bonn Convention, including

- EUROBATS: populations of European bats
- ACCOBAMS: Cetaceans of the Mediterranean Sea, Black Sea and contiguous Atlantic area
- AEWA: African-Eurasian migratory waterbirds
- ACAP: albatrosses and petrels.

Agreement on the Conservation of Populations of European Bats, 1991 (EUROBATS)

The Agreement on the Conservation of Populations of European Bats is an international treaty that binds the Parties on the conservation of bats in their territories.

The overall goal of the Agreement is to provide a framework for bat conservation for the member states and those that have not yet joined. According to the agreement text, member states prohibit the deliberate capture, keeping or killing of bats except for research purposes for which a special permit is required. Furthermore, the member states identify important sites for bat conservation, survey the status and trends of bat populations and study their migratory patterns. Based on the result of these monitoring activities the Agreement develops and reviews recommendations and guidelines that shall be implemented by the Parties on national levels.

The Bat Agreement aims to protect all 53 European bat species through legislation, education, conservation measures and international co-operation with Agreement members and with those who have not yet joined. The Agreement provides a framework of co-operation for the conservation of bats throughout Europe, Northern Africa and the Middle East.

Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1999 (AEWA)

AEWA is an intergovernmental treaty dedicated to the conservation of migratory water birds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago.

Developed under the framework of the Bonn Convention and administered by UNEP, AEWA aims to unite countries and the wider international conservation community in the effort to establish coordinated conservation and management of migratory water birds throughout their entire migratory range.

All AEWA species cross international boundaries during their migrations and require good quality habitat for breeding as well as a network of suitable sites to support their annual journeys.

AEWA covers 255 species of birds that are ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, flamingos, ducks, swans, geese, waders, terns, auks and even the South African penguin.

Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES)

The CITES treaty aims to protect endangered plants and animals, particularly ensuring that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild.

CITES accords varying degrees of protection, as listed in its Appendices I, II and III, to more than 35,000 species of animals and plants.

- Appendix I comprises about 1,200 species that are threatened with extinction and are, or may be, affected by trade. Commercial trade in wild-caught specimens of these species is illegal (permitted only in exceptional licensed circumstances).
- Appendix II covers about 21,000 species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilisation incompatible with the survival of the species in the wild. International trade in specimens of Appendix

II species may be authorised by the granting of an export permit or re-export certificate.

- Appendix III includes 170 species that are listed after a member country has asked other CITES parties for assistance in controlling trade in a species. The species are not necessarily threatened with extinction globally. However, in all member countries, trade of these species is only permitted with appropriate export permitting and a certification of origin from the state of the member country who has listed the species.

Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 1971 (Ramsar)

The Ramsar Convention is an international treaty aiming to conserve and encourage the sustainable use of wetlands, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.

The Ramsar Convention provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources including the requirement to designate wetlands of international importance.

EU biodiversity framework

Although Albania is currently not an EU-member state, it is undergoing preparations to accede to the Union. In recognition of this, and in order to maintain consistency across the three host countries, TAP intends to approach its activities within Albania as if it were already a member state.

Biodiversity Strategy

In 2011, the European Commission adopted a new strategy aimed to halt the loss of biodiversity and ecosystem services within the EU by 2020. The strategy is aligned with the commitments made at the tenth meeting of the Rio Convention held in Nagoya, Japan in 2010.

The Biodiversity Strategy aims that by 2050 European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided.

The strategy contains 6 targets and 20 actions. The six targets cover

- full implementation of EU nature legislation to protect biodiversity
- better protection for ecosystems, and more use of green infrastructure
- more sustainable agriculture and forestry
- better management of fish stocks
- tighter controls on invasive alien species
- a bigger EU contribution to averting global biodiversity loss.

Biodiversity legislation

The EU has adopted four key directives in relation to biodiversity legislation for wildlife and nature conservation.

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive)

The Birds Directive acknowledges that wild bird populations are most threatened through habitat loss and degradation. The directive places great emphasis on the protection of habitats for endangered bird species, as well as migratory species, especially through the establishment of a coherent network of special protection areas comprising all the most suitable territories for these species.

The Birds Directive bans activities that directly threaten birds, such as the deliberate killing or capture of birds, the destruction of their nests and taking of their eggs, and associated activities such as trading in live or dead birds, with a few exceptions.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)

The Habitats Directive was adopted in 1992 as an EU response to the Bern Convention. It aims to promote the maintenance of biodiversity by requiring member states to take measures to maintain or restore natural habitats and wild species listed in the Directive's annexes at a favourable conservation status through the introduction of robust protection for those habitats and species of European importance.

In applying these measures, member states are required to take account of economic, social and cultural requirements, as well as regional and local characteristics.

The directive is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. Overall, the directive protects over 1,000 animal and plant species and over 200 so-called 'habitat types' (special types of forests, meadows, wetlands, etc.) that are of European importance.

Directive 2000/60/EC Water Framework Directive (WFD) of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

The purpose of the water policy directive is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. It expands the scope of water protection to all waters and sets out clear objectives that must be achieved by specified dates. It will ensure that all aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands meet 'good status' by 2015.

The directive requires member states to establish river basin districts and, for each of these, a river basin management plan.

National biodiversity framework

On a national level, various laws and policies address and implement the international biodiversity framework signed and/or ratified by the Albanian government.

Albania's general nature protection principles are guaranteed through Law No. 10431 "On Environmental Protection", dated 09/06/2011. Article 5 of the law defines "conservation of biological diversity" as one of the environmental elements.

Additional legislation includes the following (described in more detail below):

- Law no. 68, dated 3/07/2014, Official Journal No.115, publishing date 03/07/2014, page 115 “On some addings and amendments in the law no. 9587, date 20.07.2006 “On Biodiversity Protection”
- Law No. 61, dated 2/06/2016, Official Journal No. 115, publishing date 23/06/2016 pages 8225 “On Hunting Ban in The Republic of Albania”
- Law No. 87, dated 8/09/2016, Official Journal No. 177 publishing date 23/09/2016, pages 20605“On accession of Republic of Albania in the Convention of the European Landscape”
- Law no. 9587, dated 20/07/2006, Official Journal No. 84, publishing date 09/08/2006, page 2847, “On Biodiversity Protection”, amended in 2012
- Law no. 8906, dated 06/06/2002, Official Journal No. 29, publishing date 26/06/2002, “On protected areas”, amended in bylaw 9868, date 04/02/2008 ‘On some addendums and changes in Law No.8906, date 06/06/2002 “On protected Areas”, published in Official Journal No 18, Year 2008, page 640, publishing date 19/02/2008, and amended in 2012
- Law no. 10006, dated 23/10/2008, Official Journal No. 168, publishing date 31/10/2008, page 8273, “On Wild Fauna Protection”, amended in 2012
- Law no. 9867, dated 31/1/2008, Official Journal No. 18, publishing date 19/02/2008, page 629, “On rules and procedures for international trade of endangered species of flora and fauna”, amended in 2012
- Law no. 10253, date 11/03/2010, Official Journal No.39 publishing date 12/04/2010, pages 1433 “On hunting”
- Pending legal initiatives at the moment are (not approved yet):
- Draft Law “On protected areas” – at the moment it is in the phase of public consultation
- Proposed decision of Council of Ministers “On promulgating the National Park of the Albanian Alps”
- Draft law “On some amendments in Law no. 10253, date 11/03/2010, “On hunting”"
- Proposed decision of Council of Ministers “On promulgating the Underwater National park Porto Palermo”

Supportive bylaws have been published to complete the legal basis for specific elements of nature protection, including, for example, the listing of protected fauna and flora species published in the Red Book of Albanian Flora and the Red Book of Albanian Fauna.

With this set of laws, protection of species of interest is accomplished through specific provisions of the biodiversity law and the wild fauna protection law. The biodiversity law also contains provisions for invasive species and protection measures for species conservation.

Habitat protection is accomplished through the provisions of the law on protected areas, and the network of protected areas. This network serves to identify and establish the Natura 2000 ecological network. Important habitats for birds in general and migratory birds in particular are included in the law on wild fauna protection.

To date, the National Biodiversity Strategy and Action Plan of 2000 as well as the relevant legal framework have contributed to the following achievements:

- The protected areas network has been extended from 5.8% in 2005 to about 16%. The protected areas network currently covers 460,021 hectares.

- The red list of fauna and flora species has been completed and a bylaw published to give a legal basis for their protection.
- Single species action plans have been developed for six species and habitats: brown bear (*Ursus arctos*), lynx (*Lynx lynx*), pygmy cormorant[50] (*Phalacrocorax pygmeus*), cetaceans[51], *Posidonia* oceanic meadows, marine turtles[52] and their natural habitats.
- Ten management plans for protected areas, especially for national parks, have been developed and another 10 management plans are currently being drafted. The implementation of existing management plans for priority action species has contributed to the improvement of conservation status for those species.
- The elaboration of a new law “On hunting” of 2010 and the amendment of the law “On protected areas” ensured an improved legal basis for the protection of species and habitats.

With this framework of national environmental legislation and policies, alignment with the respective EU environmental framework and its related environmental principles and targets, is achieved for a potential joining in the future.

The national biodiversity strategy and action plan (NBSAP), its implementation, and the mainstreaming of biodiversity

The NBSAP reviews the current legislative framework in place. The framework is based on internationally recognised principles such as those of

- "careful decision making"
- "prevention"
- "exclusion/avoiding of injuries"
- "displacement in other areas in order to minimise the damage”
- “who damages or defiles pays"
- "ecological compensation"
- "preservation of ecological integrity"
- "restoration" and "re-creation"
- "best technology and practice"
- “public participation and the public's right to get information”.

Update on biodiversity status, trends, and threats and implications for human well-being

The first chapter of the NBSAP addresses Albania’s biodiversity and ecological status, describing its three main ecological zones (the coastal plain zone, the hilly transition sub-mountainous zone, and the mountainous zone) and 13 sub-zones that contribute to the country’s rich biodiversity.

Forests cover 36% of the country’s territory, agricultural land about 26% and pastures about 15%. Approximately 60% of the pastures are alpine and sub-alpine pastures and meadows.

Albania’s biodiversity comprises about 3,200 species of vascular plants, 2,350 species of non-vascular plants and 15,600 species of invertebrates and vertebrates. Albania is an important

[50] prepared in cooperation with MEDASSET
[51] prepared in cooperation with MEDASSET
[52] prepared in cooperation with MEDASSET

migration route for birds. Approximately 30% of European flora and 42% of European mammals occur in Albania. There are 32 plant species with 150 subspecies that are endemic in Albania and another 160 plant species that are sub-endemic in the Balkan region.

The chapter also lists the major changes in the status and trends of biodiversity in Albania, as well as protection of species and habitat according to the new Red List of wild fauna and flora approved in December 2013, by Ministerial Order no. 1280 of 20/11/2013.

Albania supports 405 protected flora species, increasing from 361 in the previous Red List of 2007. It has 575 protected fauna species, representing the same number since 2007.

The NBSAP lists the current total number of protected areas, being 798 (including nature monuments), covering an area of more than 455,854 hectares, which represents just under 16% of the territory of Albania.

The main threats to biodiversity include industrial development, urbanisation, deforestation, illegal hunting, fishing, soil erosion, energy and mining, transport and tourism. Other endangering factors listed are uncontrolled pollution, alteration of river courses and hydro technical works, mineral resource extraction and overexploitation of biological resources.

Fifth National Report of Albania to the United Nations Convention on Biological Diversity (CBD) - Revision and Update of the NBSAP – May 2014

In accordance with Law no. 9587, dated 20/07/2006 "On the protection of biodiversity", including amendments and additions (Article 8 on the requirement of a national strategy and action plan of biodiversity, see Section 0) and the Rio Convention, the Albanian government regularly publishes a report on NBSAP. The latest revision (May 2014) is the fifth report originating from the 1999 Albania CBD National Report Biodiversity Strategy and Action Plan.

The strategy represents Albania's overarching policy on biodiversity and environmental protection. It is split into three main chapters:

- update on biodiversity status, trends, and threats and implications for human well-being
- the national biodiversity strategy and action plan (NBSAP), its implementation, and the mainstreaming of biodiversity
- progress towards the 2015 and 2020 Aichi Biodiversity Targets (address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; reduce the direct pressures on biodiversity and promote sustainable use; improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity; enhance the benefits to all from biodiversity and ecosystem services; and enhance implementation through participatory planning, knowledge management and capacity building) and contributions to the relevant 2015 Targets of the Millennium Development Goals.

Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals

The third section of the NBSAP lists progress of Albania's environmental and biodiversity programme towards the 2015 and 2020 Aichi Biodiversity targets. It includes the following progress made:

- Law no. 7/2014 “On the declaration of hunting ban in the Republic of Albania”, dated 30/01/2014 was drafted and approved. According to the provisions of this law, hunting activity in the country is banned for a two-year period. The law was published in the Official Journal on 28 February 2014 and entered into force on 16 March 2014.
- Minister's Order no. 1280, dated 20/11/2013 "On approval of the red list of wild fauna and flora" of Albania, which represents the review and update of the existing red list compiled for the first time in Albania in 2007
- Order of Prime Minister no. 121, dated 20/03/2014 “On the re-organization of the cross-sectoral working group ‘Man and biosphere’”
- DCM no. 489, dated 06/13/2013 "On the designation of the natural complex of the Prespa Lakes and surrounding territories, specially protected area and its inclusion in the list of wetlands of international importance, especially as waterfowl habitat (Ramsar)". With the designation of these areas, the total area of specially protected areas as Ramsar wetlands reached 98,180.6 ha or 3.42% of the total area of the country. Protected areas coverage currently stands at 455,854 ha or just below 16% of the territory, of which 13,261.2 hectares is offshore.

Additionally, the strategy outlines the following major national targets to 2020:

- By 2020, ensure full approximation and implementation of the EU framework in the field of nature protection.
- By 2020, establish a conservation target of 17% of terrestrial and inland water areas and 5% of marine and coastal areas. Establish the National Ecological Network of Albania as an integral part of the Pan-European Ecological Network (PEEN), in line with Aichi target 11.
- Restore at least 15% of degraded areas through conservation and restoration activities, in line with Aichi targets. This action will be achieved through the implementation of management plans for protected areas and through the implementation of single species action plans for species and habitats.
- Ensure more sustainable agricultural and forestry processes, in line with Aichi targets;
- Implement the Nagoya protocol on access and benefit sharing of genetic resources and benefits that arise from their use, in line with Aichi targets.

The strategy also recognises major challenges for the future, including

- preparing for the identification and establishment of the Natura 2000 network of conservation areas important for the European community
- implement management plans for those protected areas who already have such plans drafted and approved;
- Elaboration of Management Plans for Protected Areas that do not yet have such plans;
- Strengthening law enforcement and administrative capacity building of staff of protected areas administrations and control structures for the conservation of flora and fauna.

Law no.10431, dated 09/06/2011, “On the protection of Environment”, as amended

This law comprises high-level legislation for the general approach and requirements of environmental protection in Albania.

The law aims to protect, maintain and improve the environment; prevent and reduce risks to human life, health and safety; improve the quality of life for the benefit of generations present and future; and provide conditions for sustainable development of the country.

This law is fully aligned with Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage.

The law outlines the following principles of environmental protection:

- sustainable development
- prevention and taking precautions
- conservation of natural resources
- substitution and/or compensation;
- an integrated approach
- mutual responsibility and cooperation
- "polluter pays"
- the right to information and public participation
- promoting environmental protection activities.

It establishes an overall framework for environmental protection in the planning process by demanding environmental strategies and plans, local plans of action for the environment, development plans, strategic environmental assessment and environmental impact assessments as part of the process.

Furthermore, it addresses requirements for pollution prevention and control, as well as monitoring.

It also establishes an environmental information system to serve the protection and integration of environmental management and its components, monitoring the implementation of environmental policies at national and international level, as well as to provide public information.

Other aspects within the law include environmental liability and a framework for environmental permitting for activities causing pollution to the environment, which are equipped with environmental licences, to ensure that activities/installations will meet the requirements of environmental legislation in force.

The approval of environmental permits is determined by a system consisting of three levels, based on the size and type of activity proposed, and the possibility that its activities could cause pollution to the extent that could bring harm to the environment and endanger human health. Three categories (A, B and C) apply.

Categories of activities and the boundaries between the three levels are defined in Law no. 10448, dated 14/07/2011 “On the Environmental Permits”, as amended.

Law no. 10448, dated 14/07/2011, “On the Environmental Permits”, as amended

Environmental permit types A, B and Care dependent on the capacity limit of industrial productions.

The competent authorities for environmental permitting of types A, B and C are as follows:

- The National Business Centre (NLC) processes the permit application for all categories.
- The Minister has the authority to approve type A and B environmental permits, after they have been reviewed and prepared by the National Environment Agency.
- The National Environment Agency is responsible for verifying the accuracy of the information provided by operator in his application for a type A or B environmental permit and providing a recommendation to the Minister for the issue of this permit, the conditions detailed, etc. The permit is then issued by the NLC.
- The regional environmental agency is responsible for verifying the accuracy of the information provided by the operator in his application for a type C environmental permit and deciding on whether to issue the permit, the conditions detailed, etc. The permit is then issued by the NLC.
- The State Inspectorate is the competent authority for verifying fulfilment of the conditions by the operator of this permit, after its issuance by the NLC.

Type A, B and C environmental permit conditions can be reviewed at any time by the ministry or regional environment agency, for example if there are changes in relevant environmental legislation or if the following occurs:

- new ecological issues arise that were unknown at the time of the original permit issue
- new environmental legislation enters into force that explicitly requires permit condition changes
- changes to pollution norms enter into force
- fundamental changes to the permitted activity occur
- improvements in the best techniques available are implementable industry wide, allowing significant reduction in discharges into the environment without disproportionate cost.

"On the protection of biodiversity", including amendments and additions, as per Law no. 68/2014

The aim of this law is to ensure the protection and conservation of biological diversity and to regulate the sustainable use of the components of biological diversity through the integration of key elements of biodiversity in strategies, plans, programmes and decision making at all levels.

The key cornerstones of this legislation are as follows:

- requirement of a NBSAP (Article 8)
- network inventory and monitoring of biodiversity (Article 9)
- planning for emergencies, through action plans and procedures for handling of unexpected human activities or natural events that threaten biodiversity (Article 10)

The law also addresses ecosystems, habitats and landscapes that are outside the network of protected areas, while considering protective measures for all species types on land, water and sea. It also involves the identification, protection and management of native species.

Law no. 7/2014 "For declaring a moratorium for hunting in the Republic of Albania", amending Law no. 10253, dated 03/11/2010, "On hunting"

The purpose of this law, which is amending Law no. 10253, dated 03.11.2010, "On hunting", is to improve the situation of wild fauna species subject to hunting and therefore suspends the right to hunt in the entire territory of the Republic of Albania.

Law no. 8294, dated 02/03/1998, "On ratification of the Bern Convention"

The aim of this law is the ratification of the Bern Convention, as described in Section 0.

Law no. 8906, dated 06/06/2002 "On Protected Areas"

The object of this law is the declaration, preservation, administration, management and usage of protected areas and their natural and biological resources. It also deals with the facilitation of conditions for the development of environmental tourism, for the information and education of the general public and for economic profits, direct or indirect, by the local population and the public and private sectors.

The purpose of this law is to provide special protection of important components of natural reserves, of biodiversity and the natural environment as a whole, through the establishment of protected areas.

Protected areas are set to provide the preservation and regeneration of natural habitats, of species, of natural reserves and landscapes.

This law regulates the protection of six categories of protected areas applied in the territory of the Republic of Albania. The categorisation of areas and level of protection for each area is based on the criteria of World Conservation Monitoring Centre.

The law declares important or endangered parts of the territory protected areas, according to the following categories:

- strictly natural reserve/scientific reservation/ (Category I)
- national park (Category II);
- national monument (Category III) (including caves)
- natural managed reservation/area of management of habitats and species (Category IV)
- protected landscape (Category V)
- protected area of managed resources/protected area with multipurpose utilisation (Category VI), including regional natural parks.

The law outlines criteria for the selection, protection level and management process of the designated areas. It clarifies on the requirement of management plans for each protected area and the implementation of these plans, as well as monitoring of protected areas.

Law no. 10006, dated 23/10/2008, “On the protection of wild fauna”

The law aims to protect, manage and control wild fauna, with the aim of preserving types, populations, habitats and migration routes to ensure their needs for food, shelter and breeding are preserved. The law considers wild fauna in the Republic of Albania a national asset, which is administered and protected by law, in line with relevant international treaties to which the Republic of Albania is a party.

The following key targets of wild fauna protection are outlined:

- maintaining the recovery of the diversity of species and their genetic integrity
- protection of habitats, migration routes and propagation conditions
- maintaining the integrity of natural communities
- use of wild fauna for scientific research purposes, to ensure their regeneration
- re-introduction of fauna species that are extinct or endangered.

The law particularly considers types of threatened and endemic species, defined in the red list, and provides special legal protection in accordance to the Bern Convention, ratified by the Republic of Albania with the law no. 8294, dated 02/03/1998.

It considers the protection of habitats, migration routes and breeding conditions; protection from adverse effects of climate change; protection from materials and hazardous waste; and recovery of populations of keystone species.

It also outlines special measures for the preservation of wildfowl and species of wild fauna, the planning and recovery of species of wild fauna and the monitoring of wild fauna.

Law no. 9867, dated 31/01/2008, "On establishing the rules and procedures for international trading in endangered species of fauna and wild flora"

This law establishes rules and procedures for implementing the provisions of the CITES Convention so that international trade does not endanger their survival and to ensure animals are not mistreated during international trading.

Law no. 10234, dated 18/02/2010, on the accession of the Republic of Albania in the protocol "for integrated management of the coastal zone in the Mediterranean Sea"

This law is the implementation of the Barcelona Convention for integrated management of the Mediterranean area (as outlined in Section 0), within the Albanian territory.

Law no. 10120, dated 23/04/2009, “On the protection of medicinal, essential oil and tannin plants”

This law aims to protect medicinal and essential oil plants that grow in the territory of the Republic of Albania, and to promote and develop their natural habitats. It sets out the conditions governing their collection and harvest and further promotes activities aimed at their cultivation and rehabilitation.

The law, which considers medicinal plants to be a national asset, is composed of the following chapters:

- general provisions
- protection and administration of the plants’ fund
- harvesting, packaging and transport of plants
- control and monitoring
- public consultations
- penalties
- final provisions.

Law no. 9385, dated 05/04/2005, on "forest[s] and forestry service"

The object of this law is to define common rules for relationships, duties, rights and responsibilities of state institutions, local government, nongovernmental organisations, and private and business owners for the conservation, management and use of national forest, forest land and its natural biological resources.

This law regulates the protection, social and ecotourism management of the national forest fund and administrative forests types, according to the principles of sustainability and multifunctional farming, which is reflected in the strategy and development of forest and pastures sector policies.

It also regulates the organisation and functioning of the Albanian forest service's administration, legal relationships, responsibilities and duties to create a sustainable and professional forestry service.

Law no. 68, dated 3/07/2014, Official Journal No.115, publishing date 03/07/2014, page 115 "On some addings and amendments in the law no. 9587, date 20.07.2006 "On Biodiversity Protection"

This law aims:

1. To ensure the protection and conservation of biological diversity.

2. To regulate the sustainable use of components of biological diversity through integration of key elements of biodiversity strategies, plans, programs and decision-making all levels.

This law is applied:

a) for all geographic areas, terrestrial, aquatic and marine of the Republic of Albania, public or private property;

b) for all components of biological diversity, that are found on the premises referred to in letter "a" of paragraph 1 of this Article.

c) by state authorities, acting within the law or other laws in this field, of natural and legal persons, public and private, domestic and foreign, whose activities have impact on biodiversity, as well as social organizations and the public.

Genetic material and genetically modified organisms (GMOs) are not subject to this law.

Law No. 61, dated 2/06/2016, Official Journal No. 115, publishing date 23/06/2016 pages 8225 "On Hunting Ban in The Republic of Albania"

The purpose of this law is the prohibition of the exercise of hunting activity in order to improve the species of wildlife, hunting objects.

This law establishes rules that will apply during the detention of the exercise of hunting in the territory of the Republic of Albania.

Law No. 87, dated 8/09/2016, Official Journal No.177, publishing date 23/09/2016, "On accession of Republic of Albania in the Convention of the European Landscape"

The purposes of this Convention are to promote the protection, management and planning of landscapes, and to organize European cooperation on landscape issues.

According to the provisions of Article 15, this Convention is valid throughout the territory of the Parties and covers natural, rural, urban and interurban areas. It includes land areas, inland waters and marine.

The Scope of the Convention includes landscapes that might be considered special, landscapes and everyday environment and degraded landscapes.

Draft Law "On protected areas" –

At the moment this law is in the public consultation phase.

Law No.12, dated 26/02/2015, Official Journal No.38, publishing date 26/02/2015 page 1741, On some amendments on the Law No.10440, date 07/07/2011, "On Environmental Impact Assessments"

This law aims to provide:

a) high level of environmental protection through prevention, mitigation and compensation of damages to the environment from the proposed projects before approving them for development;

b) Provision of an open decision-making, the identification, description and assessment of the negative impacts on the environment, as and when appropriate, as well as the involvement of all stakeholders in it.

The object of this law is to define the requirements, responsibilities, rules and procedures for the assessment of significant adverse impacts on the environment of the Republic of Albania, of the proposed projects, private or public.

Biodiversity management plans

As per the NBSAP, the following species action plans are in place within the Albanian framework.

Invasive alien species action plan

The Albanian action plan on invasive alien species aims to coordinate and harmonise measures to minimise or prevent adverse impacts on current or future biodiversity, economy and health arising as a result of invasive alien species.

The plan acknowledges invasive alien species (IAS) as alien species whose introduction and/or spread threatens biological diversity. They are the second biggest cause, after damage to habitats, of the significant losses of biodiversity, with harmful effects on the environment, economy and social life.

The purpose of the action plan on invasive alien species is defined through the Rio Convention for all taxonomic groups and to all levels (species, subspecies, varieties, etc.). The IAS action plan does not include genetically modified organisms.

The overall goals of this plan are to

- make people aware of the issues associated with IAS and mechanisms for their control
- establish priorities in the list of actions for implementation at a national and regional level

- establish a cooperating science, state and government network focussing on IAS
- prevent new introductions of invasive species
- build capability for quick responses to new introductions
- reduce the impacts of existing invading species
- recover native species and restore natural habitats and ecosystems that are currently affected by biological invasions.

The plan outlines a methodology for the identification and prevention of invasion, as well as mechanisms for rapid response to invasion.

It addresses IAS in all three natural environments (freshwater, marine and terrestrial) and establishes a biological baseline of currently known species that fall under these categories that are present in Albania, including but not limited to molluscs, insects, fish, marine worms and mammals.

The plan prioritises IAS according to the species' risk level and whether they pose a threat to biological diversity or cause economic or health problems.

It recommends potential improvements to the current situation in Albania. In terms of tackling the introduction of invasive species, the following problems are outlined:

- lack of coordination between government agencies, state and other groups dealing with the introduction and impact of IAS
- lack of public awareness about the introduction of invasive species
- lack of priorities and overall plans for action
- inadequate and outdated legislation
- lack of monitoring capacity
- lack of measures to respond quickly to new threats
- lack of general information, its fast and effective collection and distribution, and quick responses
- lack of and inadequate scientific information.

The IAS action plan, while considering the above-mentioned issues, has outlined the following actions and priorities:

- education and public awareness raising, including the creation of an information centre, brochures, e-newsletter, seminars, workshops
- capacity building of experts, authorities and stakeholders' cooperation on national and international levels, including creation of an IAS working group, lectures at universities, and national and international workshops
- investment in research and monitoring, including management and updating of key research data, scientific study of impacts and mitigation measures of IAS on ecology, monitoring of IAS, and development of predictive models
- implementation of sound legal and organisational structures, including the development of preventive measures as per Rio Convention prevention principles, a review of the current legislative framework, the development of recommendations for actions, and the harmonisation of national and international practices.

The implementation of the IAS action plan will be launched primarily for those species that are invasive or potentially invasive and could cause problems for nature conservation or the

economy. It will also take into consideration the species that pose a risk to human health or veterinary science.

Brown bear action plan

The brown bear action plan for the Republic of Albania is the first comprehensive document to offer guidelines for brown bear conservation in Albania.

The plan is based on scientific and ecological knowledge, which is placed within the legislative, administrative, cultural, economic and social frameworks that are present in Albania, such as

- Law on Hunting, approved by the Parliament of the Republic of Albania in 1994 including latest amendments (Section 0)
- Law on Forest and Forestry Service (Section 0)
- Law on Biodiversity Protection (Section 0)
- National Strategy and Action Plan for the Protection of Biological Diversity (Section 0)
- Recommendations of the Bern Convention for the Brown Bear Conservation Action Plan in Albania (Section 0)

It is also based on the accepted and ratified international conventions, plans and recommendations related to brown bear conservation and protection worldwide and in Europe, especially the Alps-Dinara-Pindus region, particularly

- Rio Convention
- Bern Convention
- CITES
- Habitats Directive
- European Community (EC) Regulation No. 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade.

The brown bear in Albania is a wildlife species that inhabits an ecologically conserved area of more than 4500 km². The area is part of the wider Alps-Dinara-Pindus region, which is home to a strong brown bear population. The development and implementation of the action plan also needs to be coordinated at the regional (Balkan) level.

This action plan tries to encompass the current knowledge related to brown bear management. However, it must also promote modern, ecologically based wildlife management, which includes protection and conservation of biological and ecological balance in natural habitats, as well as their sustainable use.

The general goal of this action plan is to conserve a stable brown bear population in Albania in numbers that will ensure its viability and coexistence with humans.

- Objective 1: improvement and preservation of the bear habitats
- Objective 2: improved wildlife management as part of forest management plans
- Objective 3: increased legal enforcement and implementation of the international regulations
- Objective 4: avoidance/prevention of danger for humans and their property
- Objective 5: increased economic profit for local inhabitants through tourism development

- Objective 6: increased public awareness and involvement of the interest groups in decision making related to bear management
- Objective 7: increased knowledge on bear ecology through increasing support to research and monitoring

All objectives will be categorised in priority and timescale.

The following actions have been recommended to meet the action plans goals:

- Enforce the legal protection of the species and its key sites all over Albania.
- Stop trade in bear taxidermy.
- Promote sustainable development in mountain areas.
- Conserve bear habitats.
- Manage bear habitats outside protected areas, including specific measures for habitat conservation and management, such as adoption of long-term forestry development guidelines.
- Improve wildlife management as part of forest management plans, supplemental feeding to keep bears in designated areas and increase capacity for wildlife management.
- Support research and monitoring, to increase knowledge of bear ecology, through monitoring of population dynamics and mortality.
- Implement measures to prevent the appearance of problem bears, including measures for dealing with problem bears, by creating an intervention group.
- Address bear and tourism interaction, including bears in the wild and visitor needs, as well as bears in captivity.
- Prevent and compensate damages caused by bears, by introducing measures to be undertaken by forest/wildlife/protected area managers to prevent damages, introduce measures to be undertaken by the land users and compensate damages.
- Improve public information and participation in decision making, including education and information campaigns for different target groups, identification and involvement of interest groups as representatives of the public in bear management, improve involvement through consultations and joined planning, the development of a lasting protocol of cooperation with the local population and monitor public attitudes toward bears.
- Improve international cooperation for transboundary habitats and designated areas.

The action plan is anticipated to be an active document, to be expanded upon as needed. It will provide the basis for changes and improvements to the existing legal provisions regulating hunting, protection of biodiversity and landscape diversity, as well as other sectors.

Action plan for the conservation of pygmy cormorants

The pygmy cormorant *Phalacrocorax pygmeus)* was until recently classified by the International Union for Conservation of Nature (IUCN) as Endangered, as a result of its small population and continuous decline. Under the new criteria established by the IUCN (Mace and Stuart, 1994), this species has been reclassified as Least Concern. In Albania, the pygmy cormorant was originally classified as Rare (Albanian Red Book, 1999) but according to new versions of the Albanian Red Book (2007), it is now considered Endangered. This species is strictly protected in Albania and hence the need to prepare a specific action plan.

This action plan is a document that identifies threats and key actions to be taken in order to increase the pygmy cormorant population and revive its habitat.

This action plan has two purposes:

- short term: prevention of a population decline below the 1992–1993 level
- long term: increase the size of the pygmy cormorant population to a level considered not to be an extremely endangered species in Albania.

The main goals and objectives to realise the short- and long-term objectives are grouped into four areas:

- Improve policy and legislation:
- Improve and implement legislation
- Reduce and prohibit avian use for tourism purposes
- Ban trade in animal taxidermy
- Promote sustainable development in wetlands
- Strengthen international cooperation
- Secure and protect the habitat type:
- Provide protection zone (control of hunting, etc.)
- Provide potential areas for cormorant nesting
- Complete appropriate area management
- Perform appropriate vegetation management
- Encourage nesting through the use of artificial structures
- Improve hydrological management
- Conduct monitoring and research:
- Monitor nesting birds
- Monitor winter birds
- Monitor ecological change of the network
- Take measures against pesticides and heavy metals
- Monitor prey populations
- Identify causes of deaths
- Increase public awareness
- Conduct training.

Action plan for the conservation of lynx

The lynx action plan provides fundamental guidelines for the protection and conservation of lynx in Albania.

Based on scientific and ecological knowledge, the plan conforms to the existing legislative, administrative, cultural, economic and social framework and development in Albania.

It is also based on ratified international conventions, approved plans and recommendations relating to the protection and conservation of lynx worldwide and in Europe, particularly the southern Balkan region.

The purpose of this plan is "to preserve and save populations in order to allow for the long term survival of the Balkan lynx, as an essential element of forest ecosystems in the Balkan

peninsula." This will be facilitated through the reversal of the current trend of declining populations of the Balkan lynx.

The action plan outlines the following objectives:

- Increase the size of the existing population of the Balkan lynx to the levels necessary to ensure long-term survival, and maximise the connection between isolated subpopulations, especially small ones, in order to reduce the risk of extinction of them.
- Favour natural colonisation or, where required, assist initially in areas where lynx has disappeared in recent decades or in other areas where a successful reintroduction is possible.
- Develop new and alternative means to restore many functional elements in highland ecosystems.
- Strengthen law enforcement and implementation of international regulations.
- Increase public awareness and participation of stakeholders in the process of decision making related to the management of lynx.
- Increase knowledge on the ecology of lynx through increased support for research and monitoring.

Key actions include

- improving and implementing legislation
- banning the trade in lynx taxidermy
- supporting appropriate development of key mountain areas
- improving coordination and planning of lynx protection
- protecting and restoring habitats
- rehabilitating natural hunting capacities and prey
- reducing the causes of mortality from, for example, illegal hunting
- improving education and public outreach, through awareness campaigns
- protecting areas with actual presence of the species and support area connection
- reducing the risks of isolated subpopulations becoming extinct
- aiding reproduction by ensuring special protection for dens
- monitoring and study, through assessing the presence and abundance, evaluation of population dynamics, genetic variation, population structure, reproduction, distribution, rate and causes of mortality patterns of a healthy population
- designating and maintaining habitat
- landscape ecology and conservation of lynx: designing corridors
- training programmes to support research and monitoring
- identifying public values and attitudes towards the conservation of Balkan lynx.

Decisions and orders

Within the biodiversity framework, the following decisions and orders relate to TA's activities.

Orders

- Order to approve the list of coastal wetland areas that serve as habitats for migratory birds
- Order approving the red list of wild flora and fauna
- Order defining the boundaries of Divjakë - Karavasta national park
- Order defining the boundaries of Mount Tomori national park
- Order No. 283, dating 10/04/2013 “On approving the list of wetland seaside surfaces that serve as habitats for migratory birds”
- Order No. 121, dating 20/03/2014 “On reorganization of the cross-sectorial working group “Man and biosphere”
- Order No. 1792, dating 09/05/2014 ”On approving the management plan of Prespa National Park”
- Order No. 2025, dating 31/12/2014 ”On approving the management plan of National Park ”Bredhi i Hotoves””
- Order No. 2026, dating 31/12/2014 ”On approving the management plan of water/land protected landscape of Pogradec”
- Order No. 2027, dating 31/12/2014 ”On approving the management plan of National Park ”Mali i Tomorrit””
- Order No. 2028, dating 31/12/2014 ”On approving the management plan of Protected landscape ”Mali me Gropa-Bize Martanesh””
- Order No. 2029, dating 31/12/2014”On approving the management plan of the natural park ”Korab-Koritnik””
- Order No. 750, dating 24/11/2015 ”On approving the management plan of the national park of the natural sea ecosystem close to Karaburun peninsula and Sazan island”
- Order No. 782, dating 30/12/2015 ”On approving the management plan of the national park of the natural ecosystem Divjake - Karavasta”
- Order No. 182, dating 20/09/2016 ”On approving the regulation of treatment to the wild fauna species when they are in zooparcs and other environments where the individuals are exposed to the public”

Decisions

- Decision no. 866, dated 12/10/2014, "On approval of lists of types of natural habitats, plants, animals and birds, of interest to the European Union"
- Decision no. 532, dated 10/05/2000, for the approval of the study "Strategy and Action Plan for Biodiversity"
- Decision no. 676, dated 20/12/2002, "For addition to protected area of natural landmarks Albania"
- Decision no. 687, dated 19/10/2007 for the addition to the area of Divjakë-Karavasta national park
- Decision no. 84, dated 27/01/2009, "On setting the standards for the network Inventory and monitoring of biodiversity"
- Decision no. 546, dated 07/07/2010, "On approval of the list of species of wild fauna, hunting objects
- Decision no. 472, dated 18/07/2012 for addition to the area of Mount Tomori national park

- Decision No. 31, dating 20/01/2016, “On the approval of the Document of Strategic Policies for the protection of biodiversity in Albania”
- Decision No. 272, dating 7/05/2014 “On the creation, organization and the function of the rescue centres for wild fauna species”

Licences and permits

Within the Albanian biodiversity legislative framework, the following environmental permits and licences may apply to TAP:

Licences through National Business Centre (NBC)

Expertise and/or professional services linked to environmental impact

Specific licence actions:

- Environmental impact assessment
- Environmental auditing

Specific criteria:

- Certificate of the technical director

Legal basis:

- Law no. 10431, dated 09/06/2011, "On protection of environment", as amended, DCM no. 1124, dated 30/07/2008

Licence information:

- Field: Environment and main environmental resources
- Category: Expertise and/or professional services concerning environmental impact
- Sub category: Expertise activities linked to environmental impact
- Code:III.2.A
- Type of category: licence, Group 2

Expertise and/or professional services linked to pastures and forests

Specific criteria:

- Certificate of the technical director

Legal basis:

- Law no. 9385, "On forests and forest service", dated 04/05/2005, amended Regulation no. 3 dated 08/07/2009 "On certification of expertise and professional services in forests and pastures"

Licence information:

- Field: Environment and main environmental resources
- Category: Expertise and/or professional services linked to main environmental resources
- Sub category: Expertise and/or professional services linked to forests or pastures

- Code:III.7.A
- Type of category: licence, Group 2

Permits through NBC

Environmental permit of Type C

Legal basis:

- Law no.10448, dated 14.07.2011 “On environmental permits”

Licence information:

- Field: Environment and main environmental resources
- Category: On environmental impact
- Sub category: Simple environmental permit
- Type of category: C

Environmental permit of Type B

Legal basis:

- Law no. 10431 dated, 9.6.2011, “On environmental protection”
- Law no.10448, dated 14.07.2011 “On environmental permits”

Licence information:

- Field: Environment and main environmental resources
- Category: On environmental impact
- Sub category: Environmental permit
- Code:III.1.B
- Type of category: B

1.7.2.3 Environmental permit of Type A

Legal basis:

- Law no. 10431 dated, 9.6.2011, “On environmental protection”
- Law no.10448, dated 14.07.2011 “On environmental permits”
-

Licence information

- Field: Environment and main environmental resources
- Category: On environmental impact
- Sub category: Integrated environmental permit
- Type of category: A

Licences without NBC

Not applicable

Permits without NBC

Exploitation, use and/or management of flora (land and/or aquatic)

Legal base:

- Law no. 8934, dated05/09/2002, “On environmental protection”
- Law no. 9385, dated04/05/2005, “On forests and forestry service)
- Law no. 9693, dated 19/03/2007, “On pasture fund”
- Law no. 10120, dated 23/04/2009, “On the protection of natural medicinal, essential oil and tanifer plants”

Licence information:

- Field: Environment and main environmental resources
- Sub category: "Exploitation, use and/or management of flora (land and/or aquatic)"
- Type of category: permit, without NBC

Exploitation of waters (ground and /or underground) and/or exploitation of basins and their materials

Licence information:

- Field: environment and main environmental resources
- Sub category: Exploitation of waters (ground and/or underground) and/or exploitation of basins and their materials
- Type of category: permit, without NBC

APPENDIX 3
LEGISLATIVE FRAMEWORK FOR BIODIVERSITY IN ALBANIA (OFFSHORE)

Introduction

This section reviews the legislative framework related to marine biodiversity that apply to TAP's activities in Albania, on three levels:

- the applicable international requirements such as international agreements to which Albania is part, as well as European Union (EU) frameworks
- applicable Albanian national legislation, permitting related to forests and other relevant approval conditions (such as permits to cross fish-bearing watercourses)
- existing relevant national and local Albanian BAPs, and respective species and habitat action plans.

Legislation already listed in Appendix 2 (in relation to terrestrial biodiversity) is not repeated here.

International biodiversity treaties

In addition to the international treaties listed in Appendix 2, Albania has ratified the following international treaties that are directly relevant to marine biodiversity values.

Barcelona Convention for Protection against Pollution in the Mediterranean Sea, 1976 (Barcelona Convention)

As a more regionally based treaty, the Barcelona Convention aims to prevent and abate pollution from ships, aircraft and land-based sources in the Mediterranean Sea. Such pollution includes but is not limited to pollution due to dumping or discharges from ships and airplanes; incineration at sea; pollution caused by prospection for, and exploitation of, the continental shelf, the seabed and its subsoil; land-based pollution; and pollution due to transboundary movements of dangerous wastes.

The Barcelona Convention requires cooperation and assistance in dealing with pollution emergencies, monitoring and scientific research within the convention area, as well as the application of relevant environmental legislation and sustainability principles to protect biodiversity and facilitate public access to information and public participation.

The Barcelona Convention and all relating protocols, together with the Mediterranean Action Plan, form part of the United Nations Environment Programme (UNEP) Regional Seas Programme.

Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1983 (Bonn Convention)

The Bonn Convention requires contracting parties to cooperate in the aim to conserve migratory species and their habitats.

These goals are implemented by providing strict protection for endangered migratory species (as listed in Appendix I) with relevant provisions outlined in Article III, paragraphs 4 and 5 (parties that are Range States to Appendix I species are obliged to afford them strict protection), multilateral agreements for the conservation and management of migratory species that require or would benefit from international cooperation (as listed per Appendix II), and by undertaking cooperative research activities.

Several conservation agreements, relevant for Albania, have been concluded to date under the auspices of the Bonn Convention, including

- EUROBATS: populations of European bats
- ACCOBAMS: Cetaceans of the Mediterranean Sea, Black Sea and contiguous Atlantic area
- AEWA: African-Eurasian migratory water birds
- ACAP: albatrosses and petrels.

Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area, 2001 (ACCOBAMS)

ACCOBAMS is a cooperative tool for the conservation of marine biodiversity in the Mediterranean and Black Seas, with the purpose of reducing threats to cetaceans in Mediterranean and Black Sea waters and improving knowledge.

It aims for participants to take coordinated measures to achieve and maintain a favourable conservation status for cetaceans, by prohibiting and taking all necessary measures to eliminate (where this is not already done) any deliberate taking of cetaceans, as well as cooperate to create and maintain a network of specially protected areas to conserve cetaceans.

In addition, parties shall apply, within the limits of their sovereignty and/or jurisdiction and in accordance with their international obligations, the conservation, research and management measures that shall address

- adoption and enforcement of national legislation
- assessment and management of human-cetacean interactions
- habitat protection
- research and monitoring
- capacity building, collection and dissemination of information, training and education
- responses to emergency situations.

EU biodiversity framework

Biodiversity legislation

In addition to the three directives listed in Appendix 2, the following is directly relevant to marine biodiversity values.

Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy: Marine Strategy Framework Directive (MSFD)

The MSFD aims to protect the European marine environment to ensure it is healthy, productive and safeguarded for the use of future generations.

As many of the threats to Europe's marine resources require cooperation and collective action to be tackled effectively, this coherent framework for joined up governance of the marine environment has been developed.

The MSFD outlines a transparent, legislative framework for an ecosystem-based approach to the management of human activities, which supports the sustainable use of marine goods and services. The overarching goal of the directive is to achieve 'Good Environmental Status' by 2020 across Europe's marine environment.

National biodiversity framework

The national biodiversity framework described in Appendix 2 is also directly relevant to marine biodiversity values. Note there is a proposed marine protected area currently out for public consultation, the Bay of Porto Palermo-Llamani, as illustrated in the figure below.

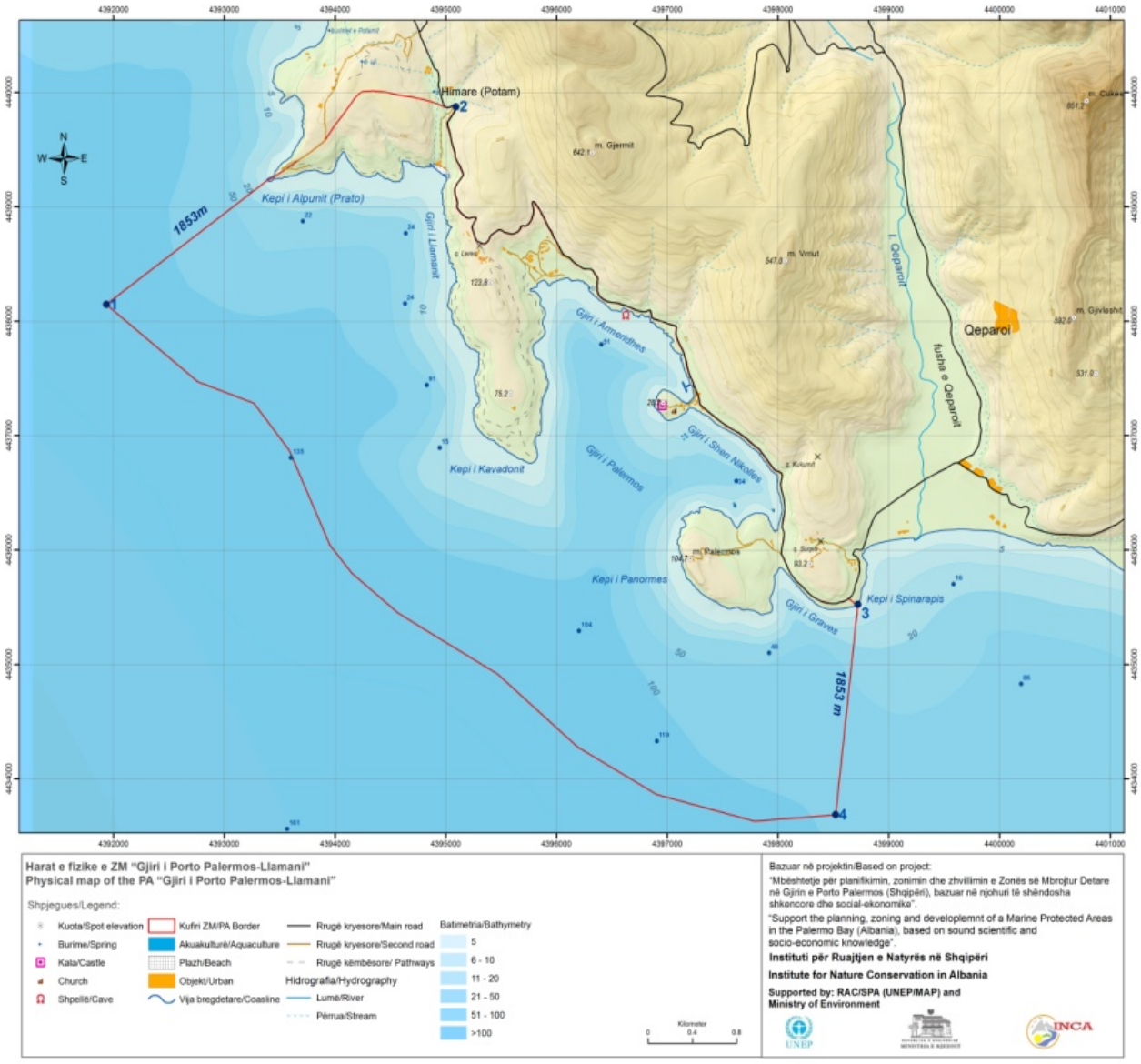

Figure 1 Map of the territory "Bay of Porto Palermo-Llamani" (proposed marine protected area)

Biodiversity management plans

Under the NBSAP, the following species action plans are in place within the Albanian framework that have relevance to marine biodiversity values, in addition to those listed in Appendix 2.

Action plan for the conservation of cetaceans in Albanian waters

The main objective of the cetacean action plan is to promote conservation, creating appropriate conditions for the protection of cetaceans in Albania. To achieve this objective, the action plan includes a series of activities that aim to

- increase knowledge about the biology and ecology of cetaceans in Albania
- reduce negative interactions between cetaceans and human activities

- ensure efficient protection of cetaceans and their habitats
- Strengthen national capacities in relation to the conservation of cetaceans.

The implementation of the plan will also enable Albania to fulfil its commitments against ACCOBAMS, the Rio Convention and the Barcelona Convention.

The aims and objectives of the plan, being in accordance with the obligations and requirements of international agreements, while taking into account the specificities of national Albanian context are

- Goal 1: Increase knowledge about cetaceans in Albanian waters:
- Objective 1.1: Improve information available about the presence and distribution of cetacean species in Albanian waters
- Objective 1.2: Assess the abundance of cetacean populations in Albanian waters
- Goal 2: Reduce the interaction between human activities and cetaceans:
- Objective 2.1: Evaluate the degree of interaction between cetacean and human activities
- Objective 2.2: Reduce the impacts of interaction between cetaceans and fishing activities
- Goal 3: Provide protection for cetaceans and their habitats:
- Objective 3.1: Improve the legal framework for the preservation of cetaceans in Albania
- Objective 3.2: Protect important habitats for cetaceans.

Action plan for marine turtles

The long-term goal of the Action Plan for the Conservation of Marine Turtles and their Habitats in Albania (Mediterranean Association to Save the Sea Turtles, 2012) is to preserve sea turtles in Albanian seas and protect these endangered species and their habitats under Albanian law.

Three of the seven species of marine turtle are found in the Mediterranean: loggerhead and green nest whilst leatherback is an occasional visitor. Recent studies (citations in doc) confirm the near and offshore presence of marine turtles in Albania throughout the year, and identify Drini Bay as supporting an important population of green turtles. Primary threats were identified as interactions with fisheries and anthropogenic pollution; future threats could include climate change on marine habitat. A contingency plan (to address extreme or unusual events) should be developed. Albania aspires to develop a tagging program affiliated with (for example) seaturtle.org and to establish a Scientific Advisory Committee.

The protection of sea turtles and their habitats in the territory is an obligation to which Albania is committed according to a number of regional and international conventions including

- the Bern Convention
- the Bonn Convention.

In order to achieve the strategic goals and objectives, actions were identified and proposed that follow four objectives:

Objective 1: Set sea turtle conservation as a national priority

- Establish the national authority responsible for sea turtle conservation

- Establish a scientific advisory committee
- Inter-institutional implementation of the action plan for marine turtles
- Education, training and awareness raising
- Academic and professional training
- Establish an Institute of Marine Sciences and research centre
- Provide/improve education at primary and secondary level
- Educate relevant stakeholders
- Increase public awareness
- Legislation (orders and regulations that reinforce conservation, approved as necessary)

Objective 2: Monitor populations and habitats of sea turtles

- Research (proposals, approval and permits)
- Determine national marine areas
- Undertake long-term monitoring of changing sea turtle populations
- Create a national database for observations
- Creating a monitoring network for turtles emergence along the coast
- Develop sea turtle veterinary treatments and establishment of a rescue centre
- Issue and suspend licences and permits

Objective 3: Identify and mitigate threats to sea turtles and their habitats

- Provide guidance on how to relocate sea turtles
- Research better treatment procedures for sea turtle
- Monitor and reduce non-object capture as fishing, illegal fishing and illegal trade
- Reduce pollution and manage waste

Objective 4: Identify critical habitats, provide legal protection and establish a functional network of marine protected areas (including coastal and estuarine)

- Identify critical habitats and provide legal protection
- Announce protected areas
- establish a functional network of protected areas.

Decisions and orders

The Decisions and Orders listed in Appendix 2 are also directly relevant to marine biodiversity values.

Licences and permits

The licences and permits listed in Appendix 2 are also directly relevant to marine biodiversity values.

APPENDIX 4
LEGISLATIVE FRAMEWORK FOR BIODIVERSITY IN ITALY (ONSHORE)

Introduction

This section reviews the legal framework related to biodiversity within which the BAP will be conducted and the environmental and socioeconomic regulatory requirements that will apply to BAP activities, on three levels:

- the applicable international requirements such as international agreements to which Italy is part, as well as European Union (EU) frameworks
- applicable Italian national legislation, permitting related to forests and other relevant approval conditions (such as permits to cross fish-bearing watercourses)
- existing relevant national and local Italian BAPs, and respective species and habitat action plans.

This section lists all relevant national and international legislation, guidance and policy to provide a framework for the development of the BAP, and any relevant legislation or policies relating to the identification and conservation of rare and endangered species or habitats.

International biodiversity treaties

Italy has ratified the following international biodiversity treaties. These are as described in Appendix 2, with additions specific to Italy below

- Convention on Biological Diversity, 1992 (Rio Convention)
- Cartagena Protocol on Biological Safety, 2003 (the Biosafety Protocol)
- Nagoya Protocol, 2010
- United Nations Convention to Combat Desertification, 1994 (UNCCD)
- Bern Convention on the Conservation of European Wildlife and Natural Habitats, 1981 (Bern Convention)
- Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1983 (Bonn Convention)
- Agreement on the Conservation of Populations of European Bats, 1991 (EUROBATS)
- Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1999 (AEWA)

Memorandum of understanding on the conservation of migratory birds of prey in Africa and Eurasia, 2008 (Raptors MOU)

The CMS Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU) aims to promote internationally coordinated actions to achieve

and maintain the favourable conservation status of migratory birds of prey throughout their range in the African-Eurasian region, and to reverse their decline when and where appropriate.

The Raptors MOU currently covers 93 species of birds of prey and owls (Pandionidae 1 species, Accipitridae 65 species, Falconidae 15 species, and Strigidae 12 species) which occur in 131 Range States in Africa, Europe and Asia.

Convention United Nations Educational, Scientific and Cultural Organization (UNESCO)

The United Nations Educational, Scientific and Cultural Organization (UNESCO) developed and promoted scientific programs and treaties in order to protect world heritage, including ecosystems and biodiversity.

Italy agreed with the following UNESCO programs:

- Man and the Biosphere program (MaB)
- World Cultural and Natural Heritage convention
- Convention for the Safeguarding of the Intangible Cultural Heritage

International Treaty on Plant Genetic Resources for Food and Agriculture, 2004

The International Treaty on Plant Genetic Resources for Food and Agriculture was adopted by the Thirty-First Session of the Conference of the Food and Agriculture Organization of the United Nations in 2001.

The treaty is aimed to recognize the enormous contribution of farmers to the diversity of crops that feed the world; to establish a global system to provide farmers, plant breeders and scientists with access to plant genetic materials and to ensure that recipients share benefits they derive from the use of these genetic materials with the countries where they have been originated

EU biodiversity framework

Biodiversity Strategy

In 2011, the European Commission adopted a new strategy aimed to halt the loss of biodiversity and ecosystem services within the EU by 2020. The strategy is aligned with the commitments made at the tenth meeting of the Rio Convention held in Nagoya, Japan in 2010.

The Biodiversity Strategy aims that by 2050 European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided.

The strategy contains 6 targets and 20 actions. The six targets cover

- full implementation of EU nature legislation to protect biodiversity
- better protection for ecosystems, and more use of green infrastructure
- more sustainable agriculture and forestry
- better management of fish stocks

- tighter controls on invasive alien species
- bigger EU contribution to averting global biodiversity loss.

Biodiversity legislation

EU biodiversity legislation is as described in Appendix 2, with some additional items relevant to Italy discussed below.

Directive 2000/60/EC Water Framework Directive (WFD) of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Other important European directives are associated to the WFD, such as:

- Directive 2006/118/CE for groundwater protection
- Directive Bathing Water 2006/7/CE, for bathing;
- Directive Drinking Water 98/83/CE regulating the drinking water resource;
- Directive 80/778/CE regarding waters for human use;
- Directive UWWT 91/271/CE for wastewater treatment;
- Directive Nitrates 91/676/CE;
- Directive Hazardous substances 89/68/CE e 2006/11/CE;

European Directives for environmental impact (85/337/CEE and Directive 2001/42/EC)

The Environmental Impact Assessment Directive 85/337/CEE (EIA Directive) and subsequent amendments introduced the environmental impact assessment for a wide range of defined public and private projects, which are defined in Annexes I and II:

- Mandatory EIA: all projects listed in Annex I are considered as having significant effects on the environment and require an EIA (e.g. long-distance railway lines, motorways and express roads, airports with a basic runway length ≥ 2100 m, installations for the disposal of hazardous waste, installations for the disposal of non-hazardous waste > 100 tonnes/day, waste water treatment plants > 150.000 p.e.).
- Discretion of Member States (screening): for projects listed in Annex II, the national authorities have to decide whether an EIA is needed. This is done by the "screening procedure", which determines the effects of projects on the basis of thresholds/criteria or a case by case examination. However, the national authorities must take into account the criteria laid down in Annex III. The projects listed in Annex II are in general those not included in Annex I (railways, roads waste disposal installations, waste water treatment plants), but also other types such as urban development projects, flood-relief works, changes of Annex I and II existing projects…).

Further European legislation regarding the environmental impact assessment for certain public and private projects is the Directive 2011/92/UE.

The Strategic Environmental Assessment Directive 2001/42/EC introduced the assessment of the effects of certain plans and programs on the environment (SEA Directive). The SEA Directive applies to a wide range of public plans and programmes (e.g. on land use, transport, energy, waste, agriculture, etc). The SEA Directive does not refer to policies. The SEA Directive does not

have a list of plans/programmes similar to the EIA. An SEA is mandatory for plans/programmes which are:

- are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, telecommunications, tourism, town & country planning or land use and which set the framework for future development consent of projects listed in the EIA Directive.
- have been determined to require an assessment under the Habitats Directive.

National biodiversity framework

On a national level, various laws and policies address and implement the international biodiversity framework signed and/or ratified by the Italian government.

This section addresses the Italian national biodiversity framework.

The National Biodiversity Strategy (NBS), its implementation, and the mainstreaming of biodiversity

In 2010 Italy adopted a National Strategy for Biodiversity as part of the commitment undertaken by Italy after the ratification of the Convention on Biological Diversity (CBD, Rio De Janeiro, 1992) by means of Law No. 124 of February 14, 1994.

The Convention has the following three main objectives:

- The conservation of biological diversity, at the levels of genes and species as well as communities and ecosystems;
- The long term or sustainable use of its components;
- The fair and equitable sharing of benefits arising out of the utilization of the genetic resources and by appropriate transfer of relevant technologies.

Title V of the Italian Constitution assigned the exclusive legislative power to the State in the field of “Protection of the environment and ecosystems” (Article 117, paragraph II, letter s of the Constitution) while it transferred specific management competence in various sectors to the Regions and other Local Bodies. The main principles of the CBD can be properly implemented through the cooperation between the State, the Regions and the Autonomous Provinces in relation to the specific powers conferred on them in the various areas, and through the planning and management of activities dealing with key sectors affecting nature conservation.

Therefore, the NBS is an important instrument in order ensure, with the national plans, the conservation and the sustainable use of natural resources, according to the goals and principles set by the European Strategy for Biodiversity.

The Italian NBS structure is structured in three different key issues:

- Biodiversity and ecosystems
- Biodiversity and climate change
- Biodiversity and economic politics

With regard to the three key issues, the identification of the three strategic objectives:

- *By 2020, ensure the conservation of biodiversity, or the variety of living organisms, their genetic diversity and the ecological complexes of which they*

are part, and ensure the protection and restoration of ecosystem services in order to guarantee their key role for life on Earth and human well-being.

- *By 2020, substantially reduce the nationwide impact of climate change on biodiversity, by defining the appropriate measures to adapt to climate changes and mitigate their effects and increasing the resilience of natural and semi-natural ecosystems and habitats.*
- *By 2020, integrate biodiversity conservation into economic and sectoral policies, also as potential for new employment opportunities and social development, while improving the understanding of the benefits from ecosystem services derived from biodiversity and the awareness of the costs of losing them.*

The main Italy's protection principles for nature, biodiversity and environment are guaranteed throughout the main following laws:

- Law No. 394 of December 6th, 1991 and subsequent amendment, "Protected areas", Official Journal No. 292; publishing date December 13th 1991;
- Law No. 157 of February 11th, 1992, "Protection of Warm-blooded Wild Fauna and Hunting. Wildlife", Official Journal No. 46; publishing date February 25th 1992;
- Presidential Decree No. 357 of September 8, 1997 and subsequent amendments, "Regulation implementing Directive 92/43/EEC on the conservation of natural and semi-natural habitats and of wild fauna and flora", Official Journal No. 248; publishing date October 23rd 1997;
- Legislative Decree No. 42 of January 22nd, 2004, "Code of the Cultural and Landscape Heritage", Official Journal No. 45; publishing date February 2nd 2004;
- Legislative Decree No. 152 of April 3rd, 2006, "Regulations on the environment" and subsequent amendments, Official Journal No. 88; publishing date April 4th 2006.

For details regarding the legislative framework in Italy and additional legislation see the following detailed paragraphs.

Supportive bylaws have been published to complete the legal basis for specific elements of nature protection.

Habitat protection is accomplished through the provisions of the laws on protected areas, and the network of protected areas. This network serves to identify and establish the Natura 2000 ecological network. Important habitats for birds in general and migratory birds in particular are included in the law on wild fauna protection. Italy provided through legislation lists of sites Natura 2000 and Sites of Community Importance (SCI).

Update on biodiversity status, trends, and threats and implications for human well-being

With about 58,000 species (only about 2% of which belongs to the Vertebrates), Italy has the highest number of animal species in Europe, with a high incidence of endemic species (nearly 30%).

Vascular flora has 6,711 species, 15.26% of which are endemic, Italy is the European country with the greatest floristic diversity, in addition to bryophytes (1130 species out of 1690 reported in

Europe), fungi that comprise over 20,000 species, lichens that account for 2,323 taxa and which place Italy among the richest European countries in terms of diversity of lichens and freshwater and marine algae.

The outlook in terms of threats to animal species within the national territory has been illustrated by a number of different authors in specific “Red Lists”, only with regard to Vertebrate Species. In evaluating the different levels of threat, the authors make reference to the IUCN categories (1994). An analysis shows that the percentage of Vertebrate species at risk in Italy fluctuates, depending on which author is consulted, from 47.5% to 68.4%.

According to the 5th Update of the EUAP (Official List of Protected Areas) of 1993, 772 protected areas were established in Italy, covering 2,911,582 hectares of terrestrial land surface and 2,820,673 hectares at sea, corresponding to 9.66% of the national territory. Information up until 2010 that can be found in the 6th EUAP Update, whose publication is under way, shows an increase of 99 protected areas for a total of871 areas and 3,163,591 land hectares, equivalent to 10.42% of the national territory, and a total of 2,853,034 sea hectares.

During the implementation process of the Habitats Directive, 2,288 SCIs and 597 SPAs have been identified in Italy; the Natura 2000 Network areas cover a land surface of over 20% of the Country.

There are three bio-geographical regions in Italy and the SCI lists have been adopted for each one of them as a result of the following selection decisions of the European Commission which were later updated:

- decision 2003/69/EC for the sites of Community Importance for the Alpine biogeographical region;
- decision 2004/798/EC for the sites of Community Importance for the Continental bio-geographical region;
- decision 2006/613/EC for the sites of Community Importance for the Mediterranean bio-geographical region.

About 42% of the national territory is intended for agricultural activities (ISPRA, 2010), that part of it, approximately 21% of the Utilized Agricultural Area (UAA), is covered by High Natural Value (HNV) Farmland and Natura 2000 areas, in terms of biodiversity of genes, species and landscape, which also act as links between natural spaces.

According to INFC 2005 (National Inventory of Forests and Forest Carbon Sinks), the Italian forest area is estimated at 10,673,589 hectares, equal to 34.7% of the national territory.

Freshwater ecosystems cover only 0.8% of the Earth's surface but contain 10% of all animal species, including more than 35% of vertebrates. They are the most exploited natural resource: the impact of continuous and intense human pressure, in particular the pollution resulting from production activities and the increased levels of collection and exploitation obtained through new concessions.

In Italy the main threats to biodiversity may be summarized as follows:

- loss of soil and change of its intended use as well as habitat modification and fragmentation;
- intensification of agricultural activities and abandonment of traditional agriculture in mountain and sub-mountain areas, simplification of agro-

ecosystems in hilly and plain regions, use of fertilizers and plant protection products;

- pollution to environmental media (water, air, soil and acoustic and light pollution);
- physical and morphological alterations due to river channeling, the construction of water infrastructures, dams and dykes, dredging operations, soil use change and urbanization of perifluvial and lake areas;
- habitat loss and degradation due to population growth rate and increasing unsustainable use of water resources (agriculture, industry, hydropower, aquaculture, etc.)
- climate change resulting from variations of air pollutant concentrations such as CO2, CO, CH4, O3 and others, especially in mountain environments;
- spread of invasive alien species;
- indirect disturbance related to hunting pressure;
- poaching;
- construction of infrastructure in areas of biodiversity interest (MV/HV power lines, wind farms, lighting systems and large-scale photovoltaic plants).

Fifth National Report of Italy to the United Nations Convention on Biological Diversity (CBD) - Revision and Update of the NBS – 2009-2013

In accordance with the Rio Convention, the Italian government regularly publishes a report on NBS. The latest revision of 2013 is the fifth report

The strategy represents Italy's overarching policy on biodiversity and environmental protection. It is split into three main chapters:

- update on biodiversity status, trends, and threats and implications for human well-being
- the national biodiversity strategy and action plan (NBS), its implementation, and the mainstreaming of biodiversity
- progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 Targets of the Millennium Development Goals.

Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 targets of the Millennium Development Goals

The third section of the NBS lists progress of Italy's environmental and biodiversity programme towards the 2015 and 2020 Aichi Biodiversity targets.

The National Biodiversity Strategy and the relevant legal framework (national and local) have contributed to the following achievements:

- The protected area system is covering more than 21% of the Italian territory and more than 19% of territorial waters. Italy has 24 national parks, 134 regional parks, 30 protected marine areas and more than 2.500 areas of Natura 2000 network;
- Updating of national red lists IUCN for fauna species;
- Single species action plans and guidelines for 23 species of birds, mammals and fishes including specific plans and guidelines for habitats;

- Implementation of web portal Natura Italia aimed both common people and specialist to disseminate about biodiversity topics
- Activation of governance bodies of NBS (National Biodiversity Committee, National Biodiversity Observatory and Consultation Table)
- State incentives for energy efficiency
- Framework program for forestry
- Implementation of Common Fishery Policy with reduction of direct mortality by fisheries throughout new limitation of fishing efforts, limitation in use of specific fishing gear and establishment of periods of closure.
- Implementation of Barcelona Convention
- Rural development program 2007-2013
- Legislative decree No.150 August 14th 2012 on sustainable use of plant protection product and to reduce the risks and impact on human health, environment and biodiversity
- Inventory of terrestrial alien species of vascular plants
- Increase in coverage of protected areas at land and sea
- Approval of planning/management tools of the national and regional protected areas
- Adoption of the European Charter for Sustainable Tourism
- Guidelines for the protection of wetlands have been defined, it based on integration of both Ramsar and CBD Convention with the Bird and Habitat Directives, Water Framework Directive and the Marine Strategy Framework Directive.
- National guidelines for the in-situ conservation, on-farm and ex-situ biodiversity of plant, animal and microbial agricultural interest.
- Recognition and evaluation of germplasm banks of wild flowers considered in danger of extinction
- Implementation of "Water framework Directive" 2060
- Governance of National Biodiversity Strategy
- Studies and databases produced by MATTM and ISPRA
- Guidelines for the Translocation of Wild Plant species

Italian environmental code

Legislative Decree No. 152 of April 3rd, 2006,

The Legislative Decree 152/2006 "Norme in materia ambientale" (“Environmental Regulation Code”) covers different objectives, such as preventing and reducing pollution, promoting sustainable water usage, waste management, environmental protection, and improving aquatic ecosystems.

Following some issues associated with biodiversity protection and environmental impact:

EIA

Projects that are most likely to produce negative effects on the environment, listed in Annex II, III and IV to part II of Legislative Decree 152/2006, are submitted to the environment impact assessments (EIAs) procedure before the commencement of the project. More precisely, Annex

II projects (which have a major environmental impact) are assessed by the Ministry of Environment, while Annex III projects (which have a lower environmental impact than Annex II projects) are subject to the jurisdiction of the regions and provinces of Trento and Bolzano. Annex IV projects are subject to a simplified procedure (Screening) in order to assess if the projects themselves have to be submitted to EIA. Projects developed without prior EIA or Screening, if required, or not complying with the provisions provided for by EIA or screening decree, could be removed by the competent Authority (Article 29, Legislative Decree 152/2006).

Authorization issued without previous EIA or Screening, if required, are deemed annulled by the competent authority. Such authorization may also be requested at the administrative courts by third parties with a legitimate interest (for example, NGOs, neighbors claiming to have been damaged by the project).

As part of the implementing rules of Legislative Decree No. 152/06 and subsequent amendments, the following decree has been issued regarding the EIA:

- Ministerial Decree No. 52 of March 30th 2015: introducing guidelines for application assessment for EIA in case of projects with Regional (Annex IV, Section second of Legislative Decree 152/2006);
- Legislative Decree No. 128 of June 28th 2010: amendments and integration to Legislative Decree 152/2006, as reported Article 12 of Law No. 69 of June 18th 2009.

Further legislation is the Ministerial Guidelines 2015 for the preparation of the Environmental Monitoring Plan (EMP) in case of projects with EIA procedure. The Ministerial Guidelines of 2015 are a refreshment of previous Guidelines for the EMP in case of projects according to Law No. 443 of December 21st 2001 (rev. 2 of July 23rd 2007).Landscape

Legislative Decree No. 152 of April 3, 2006, “Regulations on the environment” and subsequent amendments, Part III, set out the actions to be implemented to ensure the protection and remediation of soil and subsoil, the hydrologic restoration of the area through the prevention of instability phenomena, the implementation of safety measures for risk situations, the protection of water resources and the fight against desertification.

Agriculture

The Legislative Decree stated that the District Basin Management Plan, which provides guidelines, regulations and technical and operational information, allows activities and terms of use to be planned in order to achieve the conservation, protection and enhancement of the soil and to ensure a correct use of waters, based on the physical and environmental characteristics of the land. This plan also includes measures to counter the effects of subsidence and desertification, also through programs and actions aimed at ensuring greater availability of water resources and the reuse of the same. Article 65, paragraph 3 letter o, Article 93.

Water

Italy has transposed the WFD through the third part of Legislative Decree 152/2006 and subsequent amendments which, by consolidating the existing legislation in a single text, has become the reference regulation for the protection of waters against pollution and water management, soil conservation and combating desertification.

As part of the implementing rules of Legislative Decree No. 152/06 and subsequent amendments, the following four decrees have been issued regarding the issue water:

- DM No. 131 of June 16th, 2008, entitled "Regulation on technical criteria for the characterization of water bodies (typing, analysis of pressure) and the amendment of the technical rules pursuant to Legislative Decree No. 152 of April 3, 2006, entitled: "Environmental Rules", prepared in compliance with Article 75, paragraph 4, of the same Decree";
- DM No. 65 of April 14, 2009, entitled "Regulation on «Technical criteria for the monitoring of water bodies and the identification of reference conditions for the amendment of the technical rules of Legislative Decree No. 152 of April 3, 2006 on Environmental Rules, prepared in compliance with Article 75, paragraph 3, of the same Decree»".
- DM No. 30 of March 16, 2009, entitled "Implementation of Directive 2006/118/EC on the protection of groundwater against pollution and deterioration".
- Decree of July 17, 2009 "Territorial information gathering and methods for collecting, exchanging and using data for the preparation of reports on the implementation of EU and national obligations regarding water."

The following are some of the innovations arising from Legislative Decree 152/06: systems of classification of water bodies, methods for defining environmental objectives, introduction of WFD monitoring requirements, organization and management of catchment/river basin districts, changes to the planning system through the introduction of the operational instrument of the Basin District Plans, custody and management of the integrated water system and introduction of new principles and new technical management structures. Legislative Decree No. 152/2006 has identified 8 river basin districts across the nation and, by transposing Article 13 of the WFD, has established the legal requirement to draw up the related Management Plans Districts (Article 117).

The following National legislation is reported with reference to specific issues: habitats and species; landscape; protected areas; genetic; agriculture; forests and water.

Habitats and species

Presidential Decree No. 448 of March 13th 1976

The decree is related to the Ramsar Convention and the protection of humid areas. This law is the ratification of the Ramsar convention, subsequently modified with Presidential Decree No. 187 of February 11th 1987.

Law No. 874 of December 19th 1975

Law No. 874 of December 19th 1975 and subsequent amendments is the ratification of the Washington Convention (Convention on International Trade in Endangered Species of Wild Fauna and Flora, known as CITES). The aim of the law is to control the trade of animals and plants (including products deriving from them) in order to ensure the habitat protection.

Law No. 503 of August 5th 1981

Italy ratified the Convention of Bern with the Law No. 503, which is an important instrument for nature protection in Italy.

Law No. 42 of January 25th 1983

Law No. 42 of January 25th 1983 is the ratification law of the Convention of Bonn, regarding the conservation of migratory species.

Law No. 403 of October 14th 1999

Italy ratified the Convention for Alps Protection with Law No. 403 of October 14th 1999. According to the Convention of Alps Protection, the member States have to apply conservation principles in order to ensure the protection of alpine habitats and species. The law includes protocols for the management of tourism, energy, transports, nature and landscape protection.

Law No. 150 of 7th February 1992

Law No. 150 of 7th February 1992 is the legislative application of the CITIES Convention and CEE Regulation No. 3626/82. The law disciplines the trade and detection of live mammals and reptiles which can represent a hazard for public health and security.

Law No. 157 of February 11th 1992,

The Law transposes Directive 79/409/EEC into Italian Law. Law No. 157 of February 11th 1992, subsequently amended by Law No. 221 of October 3rd, 2002, laid down the rules on the Protection of Warm-blooded Wild Fauna and Hunting. Wildlife is declared to be “State property” and is protected in the interest of the national and international community.

Wildlife includes all species of mammals and birds that exist in populations living permanently or temporarily in a country, in a state of freedom. Thus, all warm-blooded wildlife species are protected except for the huntable species listed under Article 18. Moreover, the species listed in Article 2 (Table 1) are specially protected species, also in terms of sanctions.

Legislative Decree No.251 of August 16th 2006

The Legislative Decree No.251 transposes the European Directive 79/409/CEE. The Law introduces urgency measures in the national legislation in order to ensure conservation and protection of Wild Fauna.

Presidential Decree No. 357 of September 8th, 1997

The Decree No.357 contains the Regulation implementing Directive 92/43/EEC on the conservation of natural and semi-natural habitats and of wild fauna and flora”. Law n. 357/1997, modified by several Laws in particular Law n. 120 of 12 March 2003, defines the procedure of “Appropriate Assessment” (“Valutazione d’Incidenza”).

It is the legislative instrument for the transposition of the Habitats Directive, which illustrates its goals, a roadmap of ways to achieve them, and conservation measures, including management plans and impact assessment.

The Presidential Decree was amended with Presidential Decree No.120 of March 12th 2002.

Decree of September 3rd 2002

The Decree of MATTM introduced the Guidelines for the management of sites in Network Natura 2000.

Presidential Decree No. 120 of March 12th, 2003

Presidential Decree No. 120 of March 12, 2003, is the legislative instrument for the modification and integration of Presidential Decree No. 357/97 which transposes the provisions of the Habitats Directive in a comprehensive manner, while complying with the Commission's requests.

Landscape

Law No. 14 of January 9th, 2006

Law No. 14 of January 9th, 2006, "Ratification and implementation of the European Landscape Convention, signed in Florence on October 20, 2000", gave full and complete effect to the European Convention.

Legislative Decree No. 42 of January 22nd, 2004

The Code of the Cultural and Landscape Heritage, issued through Legislative Decree No. 42 of January 22nd, 2004 of the Ministry for Cultural Heritage and Activities, Part III, (as amended by Legislative Decree No. 157 of March 24th, 2006 and Legislative Decree No. 63 of March 26th, 2008) regulates the protection of landscape assets, and indicates that the national implementation of the Convention must be carried out according to the specific division of competences established by one's own legal system, in compliance with one's own constitutional principles and administrative organization and with the principle of subsidiarity.

The Decree includes landscape in Cultural Heritage in the sense of "Cultural Landscape" pursuant to the 2006 European Landscape Convention. Articles 136 and 142 of the Decree provides a list of the landscape restrictions currently in force. The Decree gathers previous laws and decrees focused on landscape protection (Galasso Decree and Law, Galassini Decrees, D.Lgs n. 431/1985 etc.). Although the Decree replaces previous legislation, the nomenclature introduced by those laws is still commonly used to refer to landscape restrictions based on protected landscape values. The Decree sets to protect particular areas with natural landscape value (such as "coastal areas of marine and lakes, rivers and streams," "parks and nature reserves," "the territories covered by forests," etc.). Among the restrictions set by the Article 142 of the Decree, the protection of the following areas concerns the Project:

- the territories included in a coastal strip up to 300 m from the shore line, even for the high ground overlooking the sea;
- woods;
- rivers, streams (rivers included in the lists provided by the consolidated text of the legal provisions on water and electrical systems that were approved by Royal Decree 1775 dated 11 December 1933, and their banks or related walkways to a distance of 150 m each).
- Wetlands;
- Areas of archaeological interest.

The current operational phase involving the MATTM (Ministry for the Environment, Land and Sea Protection) calls for the participation in the drawing up of Territorial Landscape Plans, with the cooperation of the Regional Authorities which, on a voluntary basis, propose the signing of specific agreements. Within this regional context, it is important to support an interdisciplinary relationship among the various competences in order to ensure the best procedural requirements for valid project results.

Further legislation associated to the Code of the Cultural and Landscape Heritage (Legislative Decree No. 42 of January 22nd, 2004) is reported below:

- Presidential Decree No. 139 of 2010, Regulation of simplified procedure for landscape authorization in case of low impact projects;
- Presidential Decree of Ministerial Committee of December 12th 2005, necessary documentation for landscape compatibility assessment;
- Ministerial Decree of March 15th 2006, Establishment and tasks of National Observatory for Landscape and subsequent amendments (Ministerial Decree September 25th 2008)

Resolution No. 229 of December 21st, 1999,

Resolution No. 229 of December 21st, 1999, "National Program to Combat Drought and Desertification", issued by the CIPE (Interministerial Committee for Economic Planning), called for the identification of national activities to combat desertification, through the following main criteria:

- ensuring integrated protection of land, water, vegetation, landscape and human activities in the areas affected by degradation;
- implementing and exploiting existing national standards and existing EU legislative instruments, thereby promoting the enforcement of effective laws and programs by the Regions;
- ensuring connection and synergies with other global conventions on climate, biodiversity conservation and the protection of international waters;
- adopting measures for the sustainable development of affected areas;
- promoting the involvement of citizens and businesses in making choices and implementing measures.

Protected areas

Presidential Decree No. 357 of September 8th 1997

The Presidential Decree No.357 of September 8th 1997, as subsequently amended and integrated with Presidential Decree No.120 of March 12th 2003, ratified the Habitat Directive 92/43/CEE.

The law promotes the biodiversity conservation in the European territory through a network of areas (Natura 2000 network) protected as natural or semi-natural habitats for fauna and flora species listen in Annex I and II of Habitat Directive and Annex I of Birds Directive.

Law No. 394 of December 6th, 1991

The framework law on protected areas No. 394 of December 6th, 1991, as amended and supplemented by Law No. 426 of December 9th, 1998: "New measures in the environmental field", sets fundamental principles for the establishment and management of protected natural areas, to ensure and promote the conservation and enhancement of the natural heritage of the country.

The areas with significant natural and environmental value are subject to a special protection and management regime in order to especially achieve the following purposes:

- conservation of animal and plant species, plant or forest associations, unusual geological and paleontological formations, biological communities, biotopes, scenic and landscape values, natural processes, hydraulic and hydro-geological balance and ecological balance;
- implementation of management or environmental restoration methods that are suitable to integrate man with the natural habitat, also through the protection of anthropological, archaeological, historical and architectural values and agro-forestry and traditional activities;
- promotion of educational and training activities, scientific research, also of an interdisciplinary type, as well as compatible recreational activities;
- defence and recovery of hydraulic and hydro-geological balance.

Decree of September 3rd, 2002

The Decree of September 3rd, 2002, issued by the MATTM, titled "Guidelines for the management of the Natura 2000 Network sites" acts as technical and regulatory support for the development of appropriate conservation measures, including management plans for the Natura 2000 Network sites.

Decree No. 184 of October 17th, 2007

Decree No. 184 of October 17th, 2007, issued by the MATTM is the legal instrument to establish conservation measures for SPAs (Special Protected Areas) and SACs (Special Areas of Conservation), which the Regions had to comply with, by having their own regulations and provisions transpose the Decree into law, at least with regard to the SPAs.

The Decree also identifies the procedure for designating SACs and in fact, Article 2 requires that, in compliance with the decrees issued by the MATTM, adopted in consultation with the Regions and the concerned Autonomous Provinces, the SACs be designated and conservation measures be identified to maintain a favorable conservation status of habitats and species for which the site has been designated.

Resolution of March 26th, 2008

With Resolution of March 26th, 2008 issued by the Permanent Conference on relations between the State, the Regions and the Autonomous Provinces of Trento and Bolzano, which amended the Resolution of December 2, 1996 issued by the Committee on Natural Protected Areas, the sites of the Natura 2000 Network were classified as "protected areas" while distinguishing them from parks and reserves, because the latter are subject to the "conservation measures" established by the Regions and the Autonomous Provinces of Trento and Bolzano, in compliance with DM 184/2007.

Pursuant to the decrees issued by the MATTM, the lists of SCIs (Sites of Community Importance) found in Italy in the three bio-geographical regions, i.e., the Alpine, Continental and Mediterranean regions, are updated on a regular basis.

The Decree of June 19th, 2009

The Decree of June 19th, 2009 issued by the MATTM, titled "List of Special Protection Areas (SPAs)", classified pursuant to Directive 79/409/EEC, updates the list of designated SPAs in Italy.

Genetic

Legislative Decree No. 227 of May 18th, 2001

In order to preserve the biological diversity of national forests, Article 10 of Legislative Decree No. 227 of May 18th, 2001, recognized plants for forestry seeds in Pieve S. Stefano and Peri and the laboratory in Bosco Fontana as national centers for the study and conservation of forest biodiversity. In the same way, it called for the creation of a commission aimed at identifying additional plants that are sufficient in number and modality to represent homogenous areas, from an ecological standpoint, for forest biodiversity conservation.

Legislative Decree No. 386 of November 10th, 2003

Legislative Decree No. 386 of November 10th, 2003 (transposition of Directive 1999/105/EC) concerning the marketing of forest reproductive material provided the definition of Regions of Origin (for one species or subspecies, it is the territory or set of territories subject to sufficiently uniform ecological conditions on which autochthonous stands or seed sources are sufficiently homogeneous in terms of phenotype and, where evaluated, in terms of genotype, taking into account altitudinal boundaries, where appropriate) to learn about and better manage Italian forest genetic resources.

Law No. 101 of April 6th 2004

With regard to plant genetic resources for food and agriculture, Law No. 101 of April 6th 2004, ratifying the FAO Treaty on Plant Genetic Resources, established the competences of the Regions and Autonomous Provinces in terms of implementing and executing the Treaty and entrusted the MIPAAF (Italian Ministry of Agriculture, Food and Forestry Policies) with the task of reporting on the implementation of the Treaty and the monitoring of measures undertaken at an international level.

Moreover, In December 2005, the Italian Network of Germplasm Banks (RIBES – non-profit association of social promotion) was founded for the ex situ conservation of Italian wild flora, which has been very active nationally, regionally and internationally, through the work of its members who are mostly universities, national and regional parks, regional and local authorities.

Agriculture

Ministerial Decree of July 29th, 2009

Ministerial Decree of July 29th, 2009, to Council Regulation (EC) No. 73/2009, introduces measures aimed at improving the management of arable land in the agricultural areas of Central and Southern Italy, leading to better agro-environmental conditions of arable land where the sowing of autumn and winter cereals can be repeated over several years on the same land surface.

Moreover, the Rural Development National Strategic Plan (NSP) provides a formal framework for the planning of agricultural and forestry measures; it is the reference strategic document intended to provide guidance in the integration process between agriculture and environment and in the implementation of the National Strategy for Biodiversity with regard to the Natura 2000 agricultural and forestry areas, high nature value areas and the protection of animal and plant genetic resources.

Resolution CIPE No. 229/99

The Resolution CIPE (Interministerial Committee for Economic Planning) No. 229/99 “National Program to Combat Drought and Desertification” (PAN) identifies priority areas for action and defines measures to combat desertification and requires that specific actions be carried out regarding the following:

- land management that takes into account the characteristics and special vocation of the land for agricultural and non-agricultural activities;
- limiting agricultural land covered by crops in a protected environment;
- extensification of crops recording excess supply;
- incentive measures for promoting the cultivation of species according to the function of the environment (climate, soil, topography) with maximum energy eco-efficiency and minimum chemical support;
- adoption of farming systems compatible with the environment;
- implementation of strategies to achieve truly sustainable agriculture, capable of planning crops and rationalization of irrigation activities;
- adoption of codes of good agricultural, animal husbandry and agro-forestry practices.

Forests

Legislative Decree 386 of November 10th, 2003

The Council Directive 1999/105/EC, was transposed into Legislative Decree 386/2003, introducing regulations on seed collection, nursery production, marketing and "traceability" of the FRM (forest reproductive material), a term that indicates forest fruits and seeds, seedlings or plants from natural regeneration, rooted cuttings, striplings, grafted plants and in vitro-cultured plants of a large number of species, both trees and shrubs, used for "forestry purposes".

According to Legislative Decree 386/2003, the competent Regional authorities that are responsible for managing local forest resources, are called upon to fully and effectively enforce the rule and thus, Directive 1999/105/EC. The Regions also define the regions of origin, the areas for the collection of FRM, and their registration in the Regional Book of the Seed Woods.

Legislative Decree No. 227 of May 18th, 2001

Legislative Decree No. 227 of May 18th, 2001 has taken up a general regulatory significance which recognizes the critical need to link forest policy to be implemented at a national level to the commitments made by Italy at an EU and international level. This rule fills the gaps in the existing legislation, by introducing a suitable connection between the laws of the sector and those of the environmental landscape sector, while recognizing the importance of forestry in the active conservation of forest resources and setting principles assigning the Regions the power of establishing rules governing forestry activities and providing the legal definition of forest.

D.Lgs n. 227/2001 that is applied to woodlands. It defines in art. 4 that “The transformation of woodlands must be compensated by reforestation with native species, preferably of local origin, on non-forested areas”, and in art. 6 “The regions prescribe the method and timing of implementation of compensatory reforestation and the areas where it needs to be done”

Pursuant to Art. No. 3 of Legislative Decree No. 227/01, the “Guidelines on Forests” (Ministerial Decree June 16th, 2005) have been put in place in which, to support the Regions and the

Autonomous Provinces, the conservation, preservation, enhancement and development of the forestry sector were identified, taking into account ecological, social and economic components and in compliance with international commitments entered into by Italy, while identifying the following priorities: environmental protection, strengthening of the competitiveness of the forest-wood chain; improvement of social and economic conditions of people working in the field and promotion of scientific research.

Royal Decree No. 3267 of December 30th 1923

Royal Decree n. 3267/23, defines hydrogeological constraints, aimed at preserving the physical environment and to prevent erosion, loss of stability or disturbance of the water system. Under this law, any operation of earth movement and vegetation cutting shall be authorized by the Regional Forestry Department.

Water

Law No. 13 of February 28th, 2009

Law No. 13 of February 28th, 2009, has assigned specific coordination tasks to the National Basin Authority to ensure that, by December 22nd, 2009, the Authority and the Regions, whose territory lies in the river basin district, have drawn up the district management plans.

The Basin Authorities are organizations that carry out planning and scheduling activities for the whole catchment area, physiographic units where water cycle problems take place and on which the human system interacts, through the transformation of the territory, adjustment works and drainage systems, water collection and drawing, the release of pollutants and more.

The sustainable use of water systems must be guaranteed in the district management plans through integrated planning that should require the harmonization of competing uses or the improvement of knowledge of the overall status of aquatic systems, aimed at achieving an understanding of the effects arising from the impacts of human activities and climate change on physical systems and biological processes associated with it.

In particular, it is worth mentioning that among the various priorities for action is the achievement of the WFD objectives and the full implementation of the district water management plans, the rationalization of water resource uses, based on cognitive studies at the basin level, the reduction of drainage system measures and the hydro-morphological alteration of watercourses.

Regional Biodiversity framework

On a Regional level, various laws and policies address and implement the national biodiversity framework.

This section addresses the regional and local biodiversity framework in Region Apulia.

Regional Law No.19 of July 24th, 1997

This regional law, and following amendments, abrogated the previous law of 1977 introducing the regulation for the management of natural protected areas in Region Apulia.

The Regional Law No. 19 is the ratification of the Italian framework law for the protected areas (Law 394/91) and introduced the institution and management of natural protected areas with aim of ensure and develop the conservation of natural and environmental heritage in Region Apulia.

The law was integrated with Regional Law No.16 of July 24th, 2001

The law sets the guidelines to classify the regional territory in the following areas:

- *Regional natural parks:* homogeneous natural system with landscape, natural and cultural importance;
- *Regional natural reserves:* areas with one or more species (fauna and flora) of natural interest with important habitats for biodiversity and genetic resource conservation. The protection grade of Natural reserves can be integral (only scientific activities allowed) or oriented (activities of ecologic importance allowed)
- *Natural park and reserve* of provincial interest: according to the territory importance and provincial or local authority request.
- *Natural monuments*: sites with particular natural or environmental importance
- *Biotopes:* territorial areas that are ecological unit of relevant interest for the conservation of nature

Regional Law No.12 of August 25th, 2003

The law sets regulations for the trade and hunting of mushroom in territory of Region Apulia, as application of Law No. 352 of August 23rd 1993.

Regional Law 12/2012

Regional Law n. 12/2012, which is applied to woodlands. Under this law, in Woodland/Mediterranean maquis any operation of vegetation cut or earth movement is authorized by the Regional Forestry Department (a specific report is requested). As reported in the Art. 2, a) of this law, the authorization might be released after the alternative assessment ("alternative zero" included) and exclusively concerning projects of public utility and/or of public interest and/or public service

Regional Regulation No.7 of June 10th, 2016

The regional regulation introduced new management guidelines for the protection natural parks, natural areas and biodiversity.

Regional Regulation No.22 of March 5th, 2016

The regional regulation sets the protection of genetic resource of territorial interest.

Regional Law No.14 of June 4th 2007

Regional Law No. 14/2007 and subsequent modifications or supplements on "Apulia landscape and monumental olive trees safeguard". The Law protects monumental olive trees, even if isolated, due to their importance for agriculture production and their historic and cultural relevance in regional landscape characteristics. The protected monumental olive trees are identified by a Technical Commission in line with the features indicated in the Art.2. Pursuant to Art. 3, monumental olive trees are subject to landscape constraint. According to Art. 10 and 11 of

the Regional Law 14/2007, damage, cut and removal of monumental olive trees is prohibited, except solely for work of public utility. Derogation shall be granted by Apulia Region on the basis of binding opinion of the Technical Commission, which shall evaluate the possibility of trees removal, its purposes, the documented absence of alternative solutions, the existence of a special replanting project. The Regional List of Monumental Olive Trees is approved through Deliberation of Regional Committee (DGR) n. 357/2013.

Deliberation of Regional Committee (DGR) No.1576 of September 3rd 2013

The regional deliberation introduces operative measures regarding the Regional Law No. 14/2007 for guidelines for monumental olive trees.

Deliberation of Regional Committee (DGR) No.7310 of December 14th 1989

The national Law No. 144 of February 14th 1951 applies to the olive trees, not defined as "monumental". Cut and removal of olive trees is prohibited. Derogation shall be granted by Ufficio Provinciale Agricoltura (UPA – Agriculture Provincial Office) when it is essential for the realization of works of public interest (as defined by Law n. 239/2004). Through DGR n. 7310/1989 the Region has identified additional cases of derogation for cutting of trees in particular "when cutting is necessary in order to realize public work or work of public interest or building purpose":

Regional Law No.41 of October 8th 2014

The Regional Law 41/2014 sets conservation measures in the areas affected by Xylella fastidiosa.

The land areas with monumental olives trees removal, due to presence of Xylella, could not change the destination use for 15 years, in order to ensure the agricultural use of land in regional territory.

Regional Law No.7 of April 11th 2016

Regional law 41/2014 was modified in Article 1 with law n.7 April 11th 2016.

The land areas with monumental olives trees removal, due to presence of Xylella, could not change the destination use for 7 years, in order to ensure the agricultural use of land in regional territory. Exception is made for public works without any other possible location and with favorable EIA.

Deliberation of Regional Committee No.459 of April 8th 2016

The Regional Committee of Apulia sets the phytosanitary measures to be performed in order to reduce and control the Xylella fastidiosa (Pauca, CoDiRo).

Regional Determination of Section Agriculture (D.D.S.) No.203 of May 24th 2016

D.D.S. No.203 defined and modified the areas affected by Xylella fastidiosa according to European Decision (UE) 2016/764).

Regional Determination (DD) No. 7 of September 8th 2016

D.D. No. 7 approved procedures for subjects involved in trade, production and transport of plants and vegetal products in areas with Xylella fastidiosa (as set in D.D.S. No.203).

Biodiversity management plans

As per the NBS, the following biodiversity management plans and guidelines are in place within the Italian framework.

Specific management plans

The following specific management plans are in place:

- Marbled Duck (*Marmaronetta angustirostris*)
- Abruzzo chamois (Rupicapra pyrenaica ornata)
- Egyptian vulture (*Neophron percnopterus*)
- Italian roe deer (*Capreolus italicus*)
- Slender-billed curlew (*Numenius tenuirostris*)
- Rock partridge (*Alectoris graeca*)
- Eleonora's Falcon (*Falco eleonorae*)
- Adouin's gull (*Larus audouinii*)
- Lanner Falcon (Falco biarmicus feldeggii)
- Italian hare (*Lepus corsicanus*)
- Otter (Lutra lutra)
- Wolf (Canis lupus)
- Ferruginous duck (*Aythya nyroca*)
- Brown bear (*Ursus arctos*)
- Fresh water fishes
- Western swamphen (*Porphyrio porphyrio*)
- Grey partridge (*Perdix perdix*)
- Apennine yellow-bellied toad (*Bombina pachypus*)
- Other birds
- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE)
- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE), Animal species
- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE), Vegetal species

Specific guidelines

The following specific guidelines are in place:

- Coypu (Myocastor coypus)
- Grey squirrel (Sciurus carolinensis)
- Bats (Pipistrelli)
- Marine turtles

- Wild boar (Sus scrofa)
- Introduction of new species
- Mitigation of eletrical lines impact on birds
- Exotic mammals and birds in Italy, impact on biodivesity
- Migration of spontaneous vegetation species

APPENDIX 5
LEGISLATIVE FRAMEWORK FOR BIODIVERSITY IN ITALY (OFFSHORE)

International biodiversity treaties

Italy has ratified the following international biodiversity treaties, as described in Appendix 4 for the onshore environment and/or Appendix 3 in relation to marine biodiversity in Albania. Additional treaties not already described elsewhere in this document are described below.

- Convention on Biological Diversity, 1992 (Rio Convention)
- Cartagena Protocol on Biological Safety, 2003 (the Biosafety Protocol)
- Nagoya Protocol, 2010
- Bern Convention on the Conservation of European Wildlife and Natural Habitats, 1981 (Bern Convention)
- Barcelona Convention for Protection against Pollution in the Mediterranean Sea, 1976 (Barcelona Convention)
- Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1983 (Bonn Convention)
- ACCOBAMS: Cetaceans of the Mediterranean Sea, Black Sea and contiguous Atlantic area
- AEWA: African-Eurasian migratory waterbirds
- Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES)
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 1971 (Ramsar)
- Convention United Nations Educational, Scientific and Cultural Organization (UNESCO)

International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM)

Invasive aquatic species present a major threat to the marine ecosystems, and shipping has been identified as a major pathway for introducing species to new environments. The problem increased as trade and traffic volume expanded over the last few decades, and in particular with the introduction of steel hulls, allowing vessels to use water instead of solid materials as ballast. The effects of the introduction of new species have in many areas of the world been devastating. Quantitative data show the rate of bio-invasions is continuing to increase at an alarming rate. As the volumes of seaborne trade continue overall to increase, the problem may not yet have reached its peak.

However, the Ballast Water Management Convention, adopted in 2004 (entry into force: 8 September 2017), aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments.

United Nations Convention on the Law of the Sea (UNCLOS)

It is the international agreement that resulted from the third United Nations Conference on the Law of the Sea (UNCLOS III), which took place between 1973 and 1982. The Law of the Sea Convention defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.

MARPOL - International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto

MARPOL 73/78 is one of the most important international marine environmental conventions. It was developed by the International Maritime Organization in an effort to minimize pollution of the oceans and seas, including dumping, oil and air pollution. The objective of this convention is to preserve the marine environment in an attempt to completely eliminate pollution by oil and other harmful substances and to minimize accidental spillage of such substances.

All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail and member nations are responsible for vessels registered under their respective nationalities.

EU biodiversity framework

The EU has adopted five key directives in relation to biodiversity legislation for wildlife and nature conservation.

- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy Marine Strategy Framework Directive (MSFD)
- European Directives for environmental impact (85/337/CEE and Directive 2001/42/EC)

National biodiversity framework

The Italian national biodiversity framework is as described in Appendix 4, with some additions specific to marine biodiversity included here.

DPR no. 1639/1968

DPR modified by Legislative Decree 4/2012 affecting Marine Biological Protection Areas (Zone di Tutela Biologica Marina) providing for the safeguard of marine areas dedicated to the reproduction or the growth of marine species of economic importance. The area covered by this study does not include Marine Biological Protection Areas.

Law no. 220/1992, Sea Protection Measures ("Interventi per la Difesa del Mare")

The Law requires the completion of an EIA for the construction of offshore oil and gas pipelines.

Legislative Decree no. 190/2010, Marine Environment – Framework for a community action ("Ambiente marino - Quadro per l'azione comunitaria")

It establishes the timing for the Relevant Authority to define sea water quality and relating monitoring activities (by 2015).

MoE Ministerial Decree 16 June 2010 - National procedures for the issue of Type Approval Certification for treatment plants ballast water produced by Italian companies.

This decree defines the procedures necessary to recognition of conformity 'to the approved type of plants treatment of ships' ballast water as stipulated by Convention and the Guidelines on the certification systems treatment of ballast water of ships adopted by IMO by Resolution MEPC 174 (58) of 10 October 2008 and the Lines guidance on the certification of water treatment plants ballast of ships using active substances, adopted IMO by Resolution MEPC 169 (57) of 4 April 2008.

Law 8 February 2006, n. 61- Establishment of ecological protection zone beyond the outer limit of the territorial sea

In accordance 'with the provisions of the UN Convention on the Law of the Sea, with annexes and Final Act, signed in Montego Bay on 10 December 1982 as well as' for in the application of Part XI of the Convention, with Annexes, done at New York July 29, 1994, ratified and enforced in accordance with the law 2 December 1994 n. 689, and 'it authorized the establishment of ecological protection zones from the outer limit of Italian territorial sea and up to certain limits, pursuant to paragraph 3 of the Law.

Regional Biodiversity framework

The regional and local biodiversity framework is as described in Appendix 4.

Biodiversity management plans

As per the NBS, the following biodiversity management plans and guidelines are in place within the Italian framework.

Specific management plans

- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE)
- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE), Animal species
- Manuals for the monitoring of species and habitats of community concern, September 2016 (Directive 92/43/CEE), Vegetal species

Specific guidelines

The following specific guidelines are in place:

- Marine turtles
- Introduction of new species
- Marine benthos study and sampling methods manual (“Manuale di metodologie di campionamento e studio del benthos marino”) published by APAT-ICRAM;
- Guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys, by the UK Government (– Joint Nature Conservation Committee);
- Guidelines of ACCOBAMS – Agreement on the Conservation of Cetaceans of Black Sea, Mediterranean Sea and contiguous Atlantic area.

APPENDIX 6
GREECE BIODIVERSITY SURVEY METHODOLOGIES

Flora and Vegetation

The methodology was developed before the field survey and refined in the field as needed. The sampling approach adopted accounts of species of importance typically being concentrated in natural and semi-natural habitats. Surveying these habitats is therefore most likely to provide a representation of the habitat condition and abundance of species of conservation interest.

Sampling points

These were generated randomly using an algorithm in GIS, creating points along the pipeline corridor excluding agricultural areas, riparian sites and urbanised or semi-urbanised sites. Consequently, all sampling points fell where natural habitats were mapped during the ESIA. These randomly generated sampling points either fell in zone A (minimum distance 0 m/maximum distance 75 m from the pipeline impact zone – extremely likely to be impacted during construction) or in zone B (minimum distance 75 m/maximum distance 300 m from the pipeline) (control zone – linear construction so unlikely to affect areas outside ROW). A distance up to 75 m was used because vegetation on the pipeline right of way (ROW) was assumed similar to the adjacent vegetation, and the sampling method means quadrats did not need to be precisely relocated at each sampling point. This will allow future monitoring to locate plots in the same vegetation, but within the impacted area allowing for micrositing and alterations to the working width.

Two researchers undertook daily sampling between 5- 19th June 2015 of the predetermined, randomly generated sample points within both zones. By considering the impact and control areas as zones rather than distinct sample points, the results in either zone are thought to be less dependent on local perturbations or edge effects unrelated to the project.

The field team measured up to 5 plots per sample point in order to take into account high on-the-spot variability. The quadrats were located along a pseudo-random ‘W’ walk (JNCC, 2004a). This use of repeated small quadrats captures the habitat variability, meaning quadrats within the sampling point do not need to be precisely relocated during future monitoring (Hill et al., 2005). For statistical analysis purposes, all plot results were averaged per sampling point.

The random allocation of sampling points reduces the risk of expert bias in the choice of sampling positions and, in most cases, ensures that samples are independent from each other, as the distance between the sampling areas is quite long. This rule was occasionally broken (e.g. in order to increase the sample size, two points would be sampled in the vicinity of each other in each zone. Nevertheless, these points were few and even in these cases it was judged that the data were unlikely to be strongly dependent.

Given the variety of habitats recorded along the corridor, it was decided to analyse most ecological variables per habitat type instead of summing data up for the entire corridor, as this would introduce further aspects of variability due to dissimilar vegetation patterns along a single

data set. Exceptions to this are the taxa of conservation interest where the focus was to study the frequency of encounter and the pattern of distribution (following a Poisson distribution or not) along the whole corridor. Invasive species had been considered as appropriate to analyse in the same way (i.e. irrespective of habitat type), but hardly any were encountered along the corridor so the data set was too small to check for a Poisson distribution.

Despite the large number of sampling points, the sample size for each individual parameter compartmentalised per habitat type and, in some cases, per zone was small and did not allow for application of parametric tests. The statistical distribution of the variables of interest in these samples is unknown and unlikely to be deduced correctly. As a result, bootstrapping was applied to generate confidence intervals for means and medians. Although bootstrapping is a distribution-free method, it is still based on the quality of the original sample set. This data set is presumed to be representative of the actual condition in the field. The smaller the data set is the more likely it is to give rise to unrealistic results despite the use of bootstrapping. Nevertheless, to preserve a reference level, it was decided to apply bootstrapping even in cases where only a very small data set was available, mentioning that results be considered with caution. For example, bootstrapped confidence intervals for regeneration in zone A of the thermophilous oak forests are based on only three sample points.

Identification of plant species of conservation interest

The number of individuals belonging to taxa of conservation interest per sampling plot was one of the ecological variables assessed in the randomly selected sampling points. Taxa of conservation interest were also recorded wherever they were observed or searched for.

Plate 9 ***Campanula lingulata***

Pre-construction Before After Control Impact (BACI) habitat description and assessment

Following the TAP commitments, four habitat categories; grasslands, shrubland, forests and riparian habitats, were chosen for a monitoring scheme and entered into the BACI monitoring framework.

Shrubland - 23 random sampling sites were selected along the total extent of the pipeline in Greece. For some habitat types, five randomly selected plots were measured in each sampling

site, whilst one habitat type was limited to one plot due to restricted/fragmented occurrence. The size of each plot was 20m^2. Dominant species were regarded as at least 5% cover per plot. If in a subsequent plot, a previously dominant species was absent or present but with a cover of less than 5%, it was given 0% cover for this plot.

Grasslands – 24 sampling sites of grasslands, located along the total extent of the pipeline, with five randomly selected plots (2m^2) measured at each site. The percentage cover per plot of dominant species was estimated. Dominant species were regarded as species with at least 5% cover per plot. If in a subsequent plot, a previously dominant species was absent or present but with a cover of less than 5%, it was given 0% cover for this plot. The percentage cover of bare ground (including rocks) was also estimated.

Plate 10 Eastern sub-Mediterranean dry grasslands (*Scorzoneratalia villosae*)

Forests – 19 random sampling sites of forests, located along the total extent of the pipeline. In each sampling site, five (in some cases less) randomly selected plots were measured. The size of each plot was 20m^2. Dominant species were estimated as a percentage cover. This ranged from at least 5% coverage, to only 1% due to scarce occurrence of species in layers other than the tree layer.

The percentage cover estimation of dominant species was structured in layers:

- tree layer, including an estimation of the percentage of open canopy;
- shrub layer, including an estimation of the percentage of open space (herbs and bare ground)
- herb layer, including an estimation of the percentage of bare ground.

Species were attributed to the tree, shrub or herb layer based on a functional rather than a botanical (i.e. life form related) basis. For example, seedlings of a tree species would be counted as part of the herb layer, or their young (woody but less than 2 m high) individuals would be counted as part of the shrub layer. Therefore, one species may occur in more than one layer.

Riparian Habitats/River Crossings – 20 river crossings along the total extent of the pipeline, with 19 sites revisted. All crossing points with rivers of major discharge were considered as well as additional streams or tributaries know from past field surveys to preserve water in summer.

The narrow width of the riparian corridors meant the BACI monitoring could not be used, as no independent sampling points could be selected. Instead, the rivers were mapped using a modified form of the river corridor survey method (NRA, 1992).

The variables were measured from the proposed pipeline crossing point and 50 m either side of it, and extended away from the river as far as the riparian habitat continued, up to 50 m.

Channel dimensions

Features included:

- width at top of bank at crossing point
- width at waterline at crossing point
- depth of water at crossing point
- height of bank (above water) at crossing point: left and right banks
- bank slope at crossing point: left and right banks
- height of bank vegetation including trees average along 100 m stretch: left and right banks
- 50% of 100 m stretch with low bank (<1 m high): left and right banks
- 50% of 100 m stretch with shallow bank (<30˚): left and right banks.

Vegetation description;

Features for the 100 m stretch included:

- bank vegetation: left and right banks
- marginal vegetation: left and right banks
- channel vegetation (only recorded where visible).

Other features:

- Adjacent land use: left and right banks
- Occurrence of invasive species within 100 m stretch
- Occurrence of plant species of conservation interest within 100 m stretch
- Evidence of recent management within 100 m stretch

Plant Species Taxonomic Identification

The determination of dominant, invasive species and species of conservation interest was based on taxonomic identification that was either carried out in the field or later on based on plant specimens that were collected in the sampling sites and press-dried.

Field identifications were based on voucher specimens from past TAP surveys) (TAP, 2013a, 2013b) and the use of field guides (Lafranchis and Sfikas, 2009).

Identifications of collected specimens were carried out using standard floras, monographs of specific genera, online databases and other taxonomic and floristic literature (Tutin et al., 1964; Tutin et al., 1968–1980; Strid, 1986; Strid & Tan, 1991, 1997, 2002; Chochliouros, 2005; Dardioti, 2005; Clayton et al., 2006 onwards). Plant nomenclature follows Dimopoulos et al. (2013).

Botanical collection of voucher specimens should be used as comparative material during the 'after' surveys of the BACI framework.

Early Flowering Survey

Field surveys were carried out between 11- 15th April 2016, the following principles were applied;

1) survey all non-arable sections of the eastern route while reducing expert bias due to habitat preference and accessibility;

2) record all notable flora species identifiable in early spring and not just the conspicuous ones;
3) provide a detailed quantitative estimation of the sampling effort so that the corresponding results may be used in the comparative assessments in future surveys.

Sampling effort focused on sections of semi-natural habitat on the eastern section of the pipeline route, with arable land being excluded as it is highly unlikely to support early-flowering plant species of conservation interest.

Relevé survey of randomly-selected points. To eliminate expert bias in selecting sampling spots along the 85km of semi-natural habitats, stratified random sampling points next to or on the right of way (ROW) were randomly pre-selected using a GIS algorithm. The field survey team then visited a total of 70 random points, at each one sampling plot was surveyed within a maximum distance of 5m of the sample point.

To reduce expert bias towards the identification of readily conspicuous species (such as the Orchidaceae) compared to less easily spotted species, the Braun – Blanket method was used to assess dominance and species taxonomy in every sampled random point. Voucher specimens were taken to enable identification in the laboratory where needed.

Walkover survey of the pipeline route for rare species identification. Selected sections (100-3,000m) of the route were walked over and any species of conservation interest were recorded, 10.54km in total was surveyed. The route followed the TAP pipeline using GPS to navigate through sections of semi-natural habitat. Any flowering plant species encountered were identified.

Large carnivore surveys: Bear and wolf

Surveys for large carnivores, including interviews, took place between November 2016 and January 2017.

Survey point evaluation

These were undertaken to briefly evaluate and ground truth large carnivore habitat suitability modelling based on statistical analysis of field data gathered during survey periods and/or other periods involving implementation of third-party projects. An 'expert judgment' on habitat characterisation (homesite area, foraging area, rendezvous site area, resting area, movement corridor) was also used especially where adequate field data was lacking and to complement other field methods. This allowed for quick assessments and general identification of important large carnivore areas according to landscape and vegetation attributes. A series of study routes around the TAP alignment in a buffer zone (500-4000m) were selected based on landscape attributes that predispose an area as a wolf or a bear homesite (denning area, resting area, rendezvous site area).

Routes were covered mainly by four-wheel-drive and included numerous stops in areas over TAP or at the buffer zone at suitable vantage points for observation of landscape characteristics (survey points: SP). Sampling effort and spatial distribution was mainly related to the TAP alignment itself. In areas where the Project was considered to have potential effects on the local wolf population and selection of home sites, more dense survey points were set even in more distant sites from TAP ROW.

Interviews (shepherds, hunters)

During field visits efforts were made to find and interview local people who could have encountered large carnivores or provide any information regarding large carnivore presence and reproduction. These interviews took place mainly along the TAP alignment, and the location of each interview was recorded with a GPS. Topics covered in the interviews included large carnivore sightings, wolf howling, sightings of wolf pups and bears with cubs of the year, damage to livestock from wolves and bears, tree plantations and beehives from bears, trend of large carnivore populations, presence of wild ungulates species (roe deer and wild boar), known den sites and large carnivore behaviour (e.g. fearless large carnivores).

Interviews were conducted after summer and autumn months, periods when there was a greater chance for local inhabitants to have encountered wolf pups or bear cubs that have abandoned rendezvous sites, therefore providing as much information as possible regarding large carnivore reproduction for that year.

Camera Trapping

Camera trapping is a valuable and widely used tool in wildlife studies. Camera traps have the invaluable advantage of working independently of an observer once they have been set up, within the working capacity of their batteries and storage capabilities. This enables large areas to be sampled simultaneously for extended periods with relatively low personnel demands.

Due to the cryptic nature of wolves and bears and their large home ranges, camera trapping is considered an ideal sampling technique for these species. The camera-trap consists of a digital camera equipped with invisible infrared light, an infrared motion detector and a recording unit, the recording unit contains a flash memory card.

Camera traps are placed at points of interest (usually forest roads or trails) and at a short distance from them (<10 m). Once an animal passes in front of the camera, its bodyheat triggers the motion detector and one to five images per passage are recorded.
Camera locations were chosen to investigate the use of the TAP alignment by target species before construction and their use of highly suitable areas (for denning, resting, feeding etc.) intersected by or in the vicinity of the ROW. The camera locations can be divided into three categories:

1. cameras located over TAP alignment or in very close proximity (on forest roads or trails that intersect the alignment);
2. cameras located in possible home sites/resting areas to investigate the use of them by the target species;

3. cameras located in spots that ensure maximum detectability of the target species. By placing the cameras in such spots, the chances of "not detecting/false absence" when the species is indeed present in the area were reduced. This was achieved by placing the cameras in highly suitable habitat of the target species and in the right locations (forest roads, trails, ridges, saddles etc.).

Camera traps were left to work for a period of 3-4 weeks depending on the survey site, before they were collected.

Transects for recording large carnivore signs

The primary objective was to detect and map bear, wolf and ungulate (wolf prey) activity signs in the preselected study areas. Owing to landscape heterogeneity and the rugged terrain in some parts, non-linear type transects (Anderson et al., 1979) were chosen for field sampling, covering all of the major ecological components of the surveyed zones including the TAP ROW. The length and density of transects was adjusted to the ecological diversity of the investigated sectors.

The transects were concentrated where access was feasible and the probability of locating large carnivore signs was higher. In particular, forest roads and paths that cross the TAP alignment and connect areas with highest habitat suitability were walked, based on statistical modelling undertaken for the ESIA and/or expert opinion-based judgement. Moreover, transects were conducted inside probable homesite areas close to the TAP route as far as possible, to assess current occupancy by large carnivore s and utilisation intensity of large carnivores in these areas.

A total of 117.1km of transects were walked, or covered from a slow moving vehicle, in order to increase the detection of large carnivore signs. The use of transects was limited during the autumn 2015 surveys due to high numbers of hunters and livestock affecting the likelihood of finding large carnivore signs.

In study areas where wolf was the only large carnivore species of interest, and where time was a limiting factor, sampling effort was reduced to a radius of approximately 200m around areas where possible travel routes crossed. This is because wolves, unlike bears, have a strong tendency to mark their territories (with scats and scratches) closest to crossroads.

Sampling was undertaken along forest roads of varying degrees of vehicle accessibility; trails and paths; and along DESFA pipeline when the latter runs parallel to the TAP route.

The main wolf signs that were identified and record were wolf tracks in mud and dust; territorial scratches in road crossroads; and fresh scats.

The main bear signs that were identified during the surveys were tracks/footprints, scats, feeding signs, dens and resting places, territorial and reproductive marking.

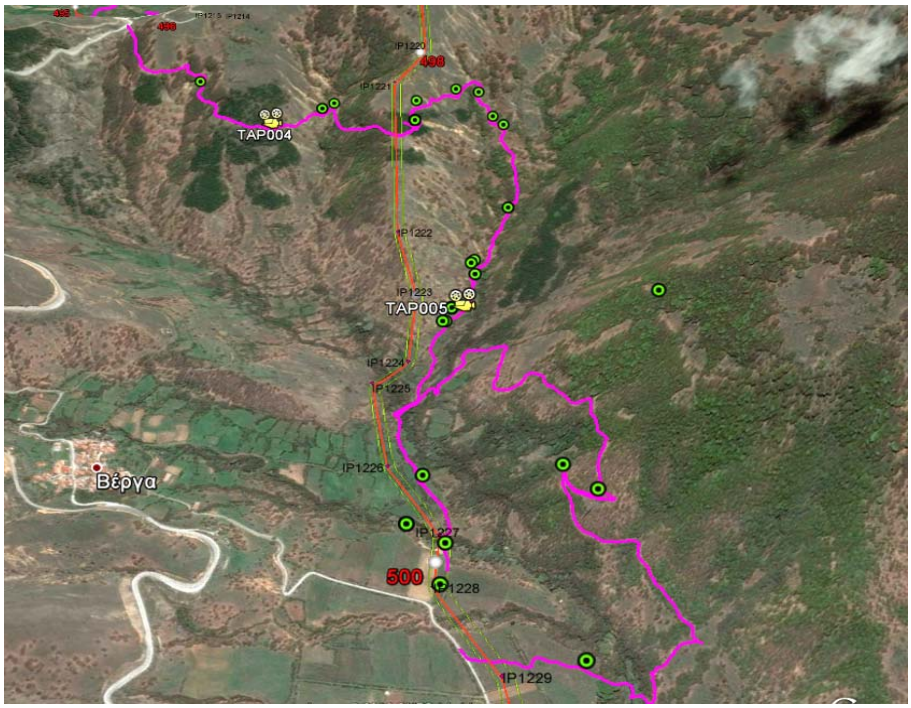

Plate 11 Transects at KP499-501 with bear and wolf signs

Howling Sessions (wolf)

Simulated howling in a saturated census is the most common method to survey and confirm rendezvous sites of wolves (sites in which the breeding pair and other pack members move the pups to and from continuously once the pups are old enough to leave the den).

Wolf response is elicited via human imitation or real wolf howl recordings. At every howling point, howling at 2–3-minute intervals from three to five series of howls were simulated; each series was 10–15-seconds long. Sessions took place after sunset during the early night-time hours and with good weather conditions (windless nights).

Howling points were chosen at sites close to the TAP alignment that offered good conditions for simulated howling and for receiving responses over the entire area. Generally, high vantage points with good visibility and acoustics were selected away from habitation (to reduce disturbance to people during the survey). No attempts at simulated howling were made on rainy or windy nights, as wolf response and howl audibility would have been reduced.

Simulated howling surveys took place during two periods:

- from 16/10/2015 to 12/12/2015 in the western part of the TAP alignment (Oinoi, Klisoura, Vermio). The time of the survey was considered suitable, as wolves still use the rendezvous sites and offspring voices can still be distinguished from the adults.
- from 17/12/2015 to 17/01/2016 in the central-eastern part of the TAP alignment (Kefalochori, Kavala, Kirki, Loutros). The survey timing suitability was considered sub-optimal, as the pack does not use the rendezvous sites as intensively during this period and it is more difficult to locate the pack within its territory due to increased mobility at this time of year.

Habitat/homesite modelling for wolf: resource selection (RSF) models

Published and unpublished wolf homesite data was used to model homesite suitability at a buffer of 2-5km from the ROW. A set of ecogeographical variables were selected (as probably independent variables) to explain the selection of homesites, of which there were 36 confirmed sites. These sites were then compared with control sites within a 5km radius using statistical modelling techniques with variables that could be easily obtained during the surveys. Three variables incorporated into the final matched paired logistic model successfully predicted 77% of home sites.

Total Core Area Index (TCAI) is an index of forest fragmentation; the larger the TCAI index, the less fragmented the forest patch. Analysis was performed in ArcGiS 9.3, with W as the Wald statistic and R the effect size. Instead of using the logistic regression coefficients to estimate probability of home site use at each grid cell of the study areas, relative probability of use at each grid cell was calculated based on a weighted sum suitability raster map by using raster map weights directly derived from R values. All raster maps describing the three variables entering the model were reclassified at the same 0–255 scale (default reclassification method) before applying the weighted sum overlay. As raster maps relative to the variables used were not directly available, the following were created accordingly:

- distance from forest roads: Forest roads were digitised in a 4-km buffer zone around the TAP alignment from Google Earth maps. A ‘distance from road’ raster map was created with 70 × 70 m grid cell size and then reclassified within a range cell value from 0 to 255.

- distance from perennial stream bottom based on GIS: A “distance from water” raster map was created with 70 × 70 m grid cell size and then reclassified within a range from 0 to 255 cell value.

- TCAI: As TCAI was not possible to be calculated during this study, a similar procedure was followed to create a thematic map that describes forest fragmentation.

Satellite images of the study areas with a resolution of 14 m were used to derive a forest cover map after suitable advancement of the red-green-blue (RGB) channel bands. The forest map was then smoothed with the boundary clean method. The whole process was cross-validated several times with the use of field reference data at study area survey points and Google Earth maps to avoid misinterpretation of the satellite image.

For each grid cell, the sum of forested cells (total forest cover) was calculated in a 500-m radius (flow statistics) with a moving window procedure. A second raster map was created showing the least and the most fragmented areas (after reclassifying at the 0–255 scale). The final raster map gives, in each cell, a value that is an index of fragmentation. Cells with higher values correspond to a less fragmented habitat.

Habitat Modelling for bear: Ecological Niche Factor Analysis (ENFA)

The suitability of landscapes as part of bear habitat included in the TAP buffer zone was evaluated by using ENFA spatial statistical modelling and GIS statistical and mapping tools. The habitat suitability results were estimated using ordination techniques (principal component analysis (PCA)), marginality and specialisation indices. ENFA starts at the same point as the single variable analysis, comparing the distribution of values where the animal is present with the distribution of values in the background (environmental factors influencing the distribution).

For this study, additional telemetry data were used from five radiotagged bears (two adult females, two adult males under the LIFE-Nature project (09NAT/GR/000333) and one sub-adult male). Data was correlated to the TAP alignment using kernel density distributors in order to detect habitat corridors along the TAP route.

Of these, four bears were radiotagged in May–June 2011 with Tellus GSM collars equipped with remote drop-offs and a fifth bear later in summer 2011. GPS collars were fitted with devices such as a VHF transmitter and mortality-activity sensors and were programmed to record a bear location for intervals ranging from 30 to 120 minutes. Bear home ranges were calculated using the minimum convex polygon (100% MCP), and the fixed kernel method and 50% contours of activity for core areas (areas of high intensity of use). Fixed kernel method home-range analysis was performed because, in addition to estimating home range size, it reveals range use patterns, using a smoothing factor determined by least squares cross validation (LSCV) (Seaman and Powell, 1996).

ENFA relies on identifying differences in the two distributions with respect to the mean (marginality) and with respect to the standard deviation (specialisation). This idea is applied to all variables in the study area and the environmental variables are related to topography, vegetation and land use, and to the composition of the spatial neighbourhood around each cell. The final habitat suitability scoring is estimated using ordination techniques such as PCA. The analysis estimates an overall marginality index, which expresses the difference between the mean animal preference and the mean condition of the study site. In addition, the overall specialisation index is estimated, which measures the range of environmental conditions the animal tolerates, compared to the range of values recorded in the study site. For both indices, values close to 0 indicate a species that can utilise the entire area well, and values close to 1 indicate a highly specialised species that can only use a small part of the available landscape (Hirzel et al., 2002; Mertzanis et al., 2008). The analysis was performed using the Biomapper 3.0 (Hirzel et al., 2002, 2004) and ARC GIS 9.10 software packages.

Given the available time frame and digital layers, seven key environmental (eco-geographical) factors were selected for the ENFA analysis and used to run the model (Mertzanis et al., 2008). These factors include elevation, slope, aspect and vegetation, which affect selection of brown bear (Ursus arctos) habitat. The human disturbance factors include main roads, forest roads and villages. Elevation, slope and aspect were derived from the digital elevation map. The vegetation types were from the CORINE Land Cover 2000 in a 5-km buffer.

Model validation was achieved through a jack-knife cross-validation process. The presence points were partitioned into ten subsets of equal size. Nine of them were used to calibrate the habitat suitability map and the last one was used to evaluate the result. Absolute validation index (AVI) was introduced to the model validation and defined as the percentage of predicted suitability exceeding 0.5 of the validation cells. By replicating this process 10 times, each subset was used in turn for the validation purpose. The mean and the standard deviation of the accuracy assessment were calculated for model validation.

Golden Jackal

All previous literature/studies regarding the species localities/activities along the pipeline route were sourced from local authorities. The localities were defined following the results of the ESIA and in accordance with the Evros Delta Management Authority and the National Park of Eastern

Macedonia – Thrace Management Authority. Sites from the ESIA were maintained and supplemented by those resulting from the literature study.

Plate 12 Camera trap photo of golden jackal

Acoustic Method

This is the main methodology used to track golden jackals in Europe over the last ten years (Salek et al 2013 and references therein). Based on vegetation and landscape morphology 24 calling stations were set along the road network. Each station was located in a site with good visibility and acoustics, and usually – but depending on the terrain – at a high vantage point. The linear distance between successive trial-calling stations was between 2 km and 4 km depending on the topography of the sampling area. Each station's coordinates were recorded by GPS.

As the species is quite vocal and relatively easy to detect when the animals defend territories, playback howls were used to stimulate responses. A broadcasted group-yip howl by two jackals was used at each calling station. Each 'simulated' howl was played from the roof of the vehicle at night, starting one hour after sunset and preferably on calm and dry nights – each howl was broadcast for 30 seconds followed by a 5 minute pause, and this cycle was repeated 5 times over approximately 30 minutes. Direction of the caller was changed every two or three howls, depending on the physical environment and the wind direction. After each broadcast, the field team recorded the direction and possible number of responding jackals. A broadcasted group-yip howl by two jackals was used at each calling station.

The maximum human-hearing distance on windless nights from a vantage point in open terrain with no background noise is at 1.8-2 km, whereas the maximum distance for attracting jackals is shown to be around 1.5 km: at each calling station the effective area for an audible response from the jackals is estimated to be between 7 and 12.5 km2, depending on the different landscape topography of the surveyed area (Giannatos et al. 2005). At each site the following parameters were also recorded to assess major features of the habitat and jackal-human interactions:

- altitude

- the most dominant plant species
- food resources
- type of cultivations
- water presence
- proximate human settlement.

Otter

Field surveys for the detection of otters and habitat function for the species were conducted along water bodies with permanent or intermittent flow, crossed by the TAP route from the Greek–Turkish border to the Greek–Albanian border as determined by the 2015 otter scope of works for Greece. Surveys were undertaken during October, as otter sprainting acticity is higher in the autumn compared to other seasons.

The methodology used for the detection of otters in this study involved directly examining the selected survey sites crossed by the pipeline route (crossing points) on the water bodes (rivers, streams, channels) determined by the scope of work for the detection of otter signs. Surveys were undertaken for a minimum of 100 m upstream and 100 m downstream from all the pipeline crossing points. Otter habitat functions (resting sites, breeding areas and corridors) were investigated in the field by searching banks and shorelines for otter signs (tracks, spraints, food remains) and assessing the riparian habitat structure (for potential breeding sites and/or resting areas). For the evaluation of otter habitat for holt suitability ranking of three grades was made: high habitat suitability, rank 1; medium habitat suitability, rank 2; and low habitat suitability for otters, rank 3. 26 sites were selected for surveying, with an additional 36 sites chosen in the vicinity of some crossing points to provide context to otter distribution throughout the study area and increase the robustness of evaluation of otter presence and habitat suitability. These sites were chosen on the basis of potential otter presence, and/or the site was in the river catchment and offered suitable holt habitat and/or sprainting sites.

Ground Squirrels

Field surveys took place in April 2016. Camera traps were deployed for periods of 24 or 48 hours, depending on the survey site.

The survey (based on the approved scoping report) focused on three core areas along the TAP corridor that coincided with strong evidence or known colonies of European ground squirrel, as reported in past TAP surveys, or sites with uncorroborated evidence. Areas in which the species is known to be extinct where excluded from the surveys, as were areas where previous TAP surveys or literature studies had failed to indicate the presence of active colonies within the pipeline corridor.

Surveys

Walking and driving surveys along the ROW involved visual assessment for holes that displayed the morphological characteristics of a European ground squirrel colony. The survey was robustly designed, but due to the nature of the habitats used by the species (short grasslands), patches

may have been missed amongst larger areas of other land uses, particularly when surveying such large stretches of land.

Camera Traps

All sites believed or known to be European ground squirrel colonies from past TAP surveys were visited and assessed. Potential evidence of a colony was defined as the presence of several freshly dug holes on the ground with > 6cm diameter, along with at least two larger holes (>10cm) in the same location. To fully comply with ESIA commitments and to reduce uncertainty as to the species presence, camera traps were used for (>30 hrs) in locations potentially inhabited.

Ornithology

Ornithological baseline surveys were carried out between 2nd - 20th June 2015 to record bird species of conservation interest along different sections of the ROW, particularly areas marked as potential or confirmed breeding sites. Survey techniques varied at each study site based on the specific survey objectives. The survey reports presented bird occurrence data, assessed potential impacts on bird populations and proposed mitigation measures for SCIs.

Point Count Method

From a sample point (randomly selected or from specific sites), all birds, detected by sight or sound, are recorded within a 10-minute time frame and within a 100m radius around each point. Sample points were visited between 1-3 times depending on the respective study question for that particular site, the same two observers visited the same site each visit. Sampling occurred during the day time (0900-1400) or in the evening (1630-2030) under suitable weather conditions.

If replicate sampling was performed, bird observation points were visited in reverse order each time in order to reduce possible time-of-day effects on species activity and their detection probability. Moreover, additional observations between sampling points and close to the pipeline route were attempted to identify other bird species with large territories and/or of conservation interest.

Plate 13 Calandra lark

Road Transects

Constant speed road transects (approx. 30 km/h) were also performed. The purpose of the road transects was to identify possible suitable habitats for species of conservation interest, as it was expected to locate potential breeding territories that could not be traced by random sampling. By using this method, it was possible to cover large areas along the pipeline route in a short time.

Estimation of Territories (territory mapping)

Territory mapping can be used to illustrate spatial abundance, calculate population indices or estimate breeding densities. Mapping is deemed an effective method for birds that show territorial behaviour, such as raptors. Estimation of territories was attempted in areas where territorial species were known to be present, i.e. raptors, shrikes, rollers etc. (ESIA, 2013 and subsequent Amendment reports). It has been proved a very effective method, especially in areas with a large number of species of conservation interest, as in the case of Thrace ("Kirki" Wildlife Refuge, Loutros forest).

Where possible, mapping was combined with nest finding to achieve a more precise estimate of potential construction-work impacts on breeding protected species. In other words, in those cases where the precise location of the nests could not be determined, territories were outlined approximately on the map, indicating the broader area of each nest.

Occupancy Modelling

This was chosen as the method by which to provide baseline data on bird species' presence in certain protected areas where;

- no data are currently available on the presence of bird species of conservation interest for which a complete census would be of interest
- the long length of the pipeline in these areas means that a census is not practicable
- the landscape (hilly and locally forested) and species are generally thought of as being imperfectly detected.

The modelling provides a baseline on which to compare post-construction monitoring results where impacts associated with construction are identified

Aquatic ecology

Surveying for fish took place between 14 - 17th October 2015.

Sampling was conducted using electric fishing equipment, a direct current generator was used (type EFKO FEG 7000) as direct current increases the so-called 'attraction zone' (increased catching ability) and reduces fish damage (Cowx and Lamarque, 1990).

Several physicochemical and physical parameters were measured and evaluated at every sampling site. A portable multi-parameter field instrument (AquaReed 3000) was used to measure water temperature, conductivity, salinity and pH. River width and depth were measured with a portable meter strip. All other environmental parameters (water velocity, substrate, bottom vegetation, riparian vegetation and fish habitats) were assessed visually. All these parameters reflect the conditions of the watercourse. All these parameters reflect the conditions of the watercourse. Correlation analysis between environmental parameters and fish species/populations can give evidence that certain environmental features relate to fish wellbeing, but they are difficult to assess. Data series for a long period of time are a prerequisite to determine these relationships. This notwithstanding, extreme values can indicate whether a specific parameter constitutes a restrictive factor for a fish community or not. It should be noted that physicochemical values measured during surveys provide only a snapshot of the respective environmental parameters. These values may vary strongly between seasons and years, according to different environmental conditions (e.g. high rainfall events). As a result, only extreme values should be recognised as restricting or limiting fish fauna. In addition, photographs of the survey site were taken so that a record of the habitat would be available for future assessment and comparison.

Lamprey Sampling Methodology

The methodology originally proposed for lamprey sampling was based on the Natural England methodology (Harvey and Cowx, 2003) developed for the three lamprey species found in the UK: brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*). The ammocoetes of these species are found in silt and sand substrate in slow-moving areas of river systems. The survey method specifically targets ammocoetes and involves;

- a walkover survey to identify optimal and/or sub-optimal sub-sites (within site reach), up to six if possible
- placing a quadrat with a 1 m^2 base area on each predefined sub-site, constructed of fine mesh, to enclose the sample area of soft sediment to enable a fixed area to be surveyed while acting as a barrier to prevent ammocoetes from evading capture
- electric fishing within the quadrat with the anode placed approximately 10 cm above the sediment and energised for 20 seconds then turned off for 5 seconds. This process is repeated for two minutes to form a single sample. To obtain depletion in numbers, a minimum of three samples should be taken within the same quadrat.

- measuring individuals captured (total length in mm) and releasing them back into the river.
- returning all captured lamprey specimens to the water unharmed close to their site of capture. No retention of specimens.

During the field surveys, it became apparent that the quadrat method would be unsuitable for use in some locations due to unsuitable habitat characteristics, such as deep water or the lack of $1m^2$ of silt or sand substrate. In these instances, areas of suitable habitat were surveyed following the Natural England survey methodology, within a specific area of available habitat. Furthermore, a roving approach was utilised to cover a large area of habitat throughout the site.

Loach sampling methodology

The method involved undertaking timed electric fishing runs, at each sub-site (within site reach). As with lamprey sampling, identification of optimal sub-sites preceded sampling. The sub-sites for the timed runs were chosen with respect to the habitat preferences of the Aggitis spined loach, namely silt/sand substrate and densely vegetated patches in still or slow-flowing reaches of the river. All loach individuals captured were transferred to holding tanks, measured (total length in mm) and subsequently released unharmed into the river close to their site of capture. No fish specimens were retained.

Sampling at additional sites

The sampling methodology for sites other than the three ESIA commitment sites comprised a single careful application of direct current while moving upstream (Godinho and Ferreira, 1998; Brown, 2000). The sampling team tried to cover all habitats present in a site to catch all possible species present. In cases where optimal or sub-optimal habitat for lamprey or loach was identified, specific sampling following the methods described above was conducted to determine if either species were present. All fish were identified into species level and categorised into fish classes in situ. No fish specimens were retained.

APPENDIX 7
ALBANIA ONSHORE BIODIVERSITY SURVEY METHODOLOGIES

Large Carnivores: Bear and wolves

Large carnivores are amongst the most difficult species to monitor via direct observation due to their elusive nature, large home ranges and natural rarity. A methodology combining track transects, camera trapping, assessment of habitat suitability and *ad-hoc* information through local ecological knowledge (Breitenmoser et al., 2006; Linnell et al., 1998) was used to determine the presence, potential distribution and identification of probable core reproductive areas of large carnivores.

The broad areas of known large carnivore occurance were identified from ESIA surveys and assessment of impacts from access roads. The focus was on habitats within these areas with the highest potential for serving as reproduction areas, in order to identify denning sites of both species along the route. As denning sites may be a limiting factor for population increases in both species and both species are most sensitive to disturbance (especially anthropogenic disturbance) when they are using dens for breeding or hibernation. Some foraging areas may also be seasonally important for both species, so ESIA data and habitat maps were reassessed to identify any potentially significant foraging areas to include in the survey. The importance of foraging resources in general was considered during all surveys.

Surveys were timed to coincide with peak activities of large carnivores, with the presupposition that this would generate more signs and evidence of their presence in the field. Peak bear activities are documented to occur in the post-hibernation/denning period in June and before hibernation in November (Mertzanis, 1994; Mertzanis et al., 2005). Tracking surveys were carried out in the areas described below between 24 -30th June for the spring survey, and repeated between 2 - 9th November for the autumn survey. Camera traps were deployed during the tracking surveys for the spring surveys, and prior to the tracking surveys in the autumn. The camera traps were left for a period of 3 weeks. Number of trap nights ranged from 29 to 45 nights.

No quantitative estimates of wolf and bear populations could be inferred from the surveys, as they were designed to primarily confirm the presence and abundance of the species, particularly around locations where construction activities are planned. Additionally, information on the reproduction of these species was gathered, including identification of the most important habitats for reproduction at a macro and micro scale.

Camera trapping

This is a non-invasive method of monitoring wildlife in their natural habitat and data collection can be maximised by putting the cameras in places where the chances of wildlife passage will be highest. Such locations include wildlife trails, feeding grounds, scent marking spots, etc. Identified based on prior basic knowledge of the target species' ecology and movement patterns.

Camera traps were spread across the core areas of bear and wolf distribution and proposed TAP alignment to understand and record use of key habitats.

Figure xx: Bear photographed at C06 – Large Carnivore Report Figure A1.1 (page 42)

Eight camera-traps were deployed in the core survey areas for large carnivores between KP61 and KP85 for a period of three weeks in each survey season (June–July and October–November). The principles of an opportunistic camera-trap session were used to maximise information collection from the field (Breitenmoser et al., 2006). This approach is limited in respect to its statistical usability and estimating the populations of target species (and only very limited assumptions can be made from variables such as latency to detection or frequency of detection). However, it is successful in proving the presence of species in an area and collecting sporadic information on their dispersal, reproduction and feeding behaviour. Cameras were set as close to the planned pipeline route as possible. However, where no good alternatives were found close to the pipeline, the most suitable adjacent trails were selected for camera placement.

Plate 14 Camera trap photo of a wolf

Transects and Local knowledge

Track transects are widely used as a relatively low-cost monitoring method for determining the presence and relative abundance of large carnivore species. For this survey, tracking was conducted through systematic transects going along the pipeline. When the route of the pipeline was too difficult to follow due to steep terrain or dense vegetation, surveyors proceeded on the next most suitable adjacent trail, by taking note of the sections missed and evaluating them from a distance.

All information collected on the transect route, such as tracks, scats or any other sign found in the field was recorded on GPS. For the recognition of signs and tracks of large carnivores and other mammal species, adequate field guides were used which focussed on tracks and signs of

European and Balkan wildlife. All the signs found were documented through photographs. Additionally, information related to other wildlife species was recorded, focusing mainly on prey species for large carnivores (wild ungulates such as roe deer and lagomorphs such as brown hare) and occasionally other faunal elements.

Local ecological knowledge is a relatively reliable measure to get an overview of the presence/absence of medium/large animals from the information provided by local inhabitants that share the landscape with these species (Huntington, 2000; Sagarin and Pauchard, 2012). Interviews were conducted with local inhabitants encountered during the surveys.

Habitat Assessment

Habitat characteristics within the survey areas, specifically in the vicinity of any large carnivore field signs, were recorded. Habitats were assessed visually by recording forest and natural vegetation cover, their productivity, their degradation status, the use by humans and regeneration status. These observations were synthesised by the field crew into generalised habitat suitability observations, which combined seasonal values and life requisites into one rating.

Otter

Surveys were undertaken during the first two weeks in August (4 -12th), a time considered optimal as this coincides with periods of low flow of watercourses meaning signs of activity were easier to find, and less likely to be washed away, as a greater proportion of the riverbanks were visible and potential spraint locations were exposed. Surveys at this time of year also confirmed which watercourses still held water and, therefore, could support otters year-round.

Surveys of rivers and streams involved direct inspection of areas crossed by the pipeline route and extended at least 100m up and downstream (covering both banks). This survey area also covers the predicted area of influence for disturbance to resting otters; at distances greater than 100 m from construction activities, resting otters are unlikely to be significantly disturbed and there will be no direct impacts on structures used for resting. Surveyors assessed habitats within the 200 m area for their potential to support resting otters (e.g. holt locations and day-nesting locations) and looked for evidence of otter activity (e.g. footprints and spraints (droppings).

Plate 15 Otter evidence recorded during surveys: tracks and spraints

Surveys of reservoirs near Markeze forest and the Osumi River, involved surveyors walking the entire circumference of the water bodies. Due to the size of the Gjanci reservoir, and the fact that it is not being directly affected by pipeline construction, surveyors focused efforts on the southern and western half of the reservoir (the side closest to the pipeline route). Surveyors assessed the habitats present and searched for evidence of otter activity, using the same methods/approach applied to rivers and streams.

Bats

Internal inspections

Underground features, such as caves, were inspected internally in June, July, September and December 2015. Not all sites were visited on each occasion depending on the result of the first survey and only sites deemed suitable for hibernation were visited in December.

Surveyors used head torches to inspect structures and identified bats through visual observation, aided by bat detection software where necessary. A Pettersson D1000X bat detector was used. This detector has heterodyne, frequency division, time expansion systems and built-in 16-bit recording system with internal storage.

Bat detectors were not used during the winter surveys (December) and no bats were handled at this time in order to reduce disturbance to hibernating bats.

Other survey techniques, emergence and mist netting, were used at sites considered to be of high ecological value where numbers of bats were hard to establish or where species needed to be verified through identification in the hand.

Emergence Surveys

A single emergence survey was undertaken at military tunnel 8 near KP166 in June 2015 to gather more data on the types of bat species present and their abundance using the cave system beyond the tunnel. The survey started about 15 minutes before sunset and continued for about 90 minutes after sunset or until it was too dark to count bats. Surveyors stood at the entrance to the tunnel where bats could be observed and counted leaving the tunnel. Calls were recorded and analysed using a Pettersson D1000X detector to aid species identification.

Mist Netting

Undertaken at military tunnel 8 near KP166 in July and September 2015 to gather more data and establish whether the site was used as a maternity and swarming site. The mist netting surveys involved erecting a 3m or wider net across the width of the tunnel approximately 10m in from the entrance. The net was erected just before sunset. Bats flying in or out of the cave were caught in the net and data on the species and sex was gathered for all caught bats. Some bats were processed in more detail to gather information on weight, forearm length and breeding condition.

Birds

A walkover survey was undertaken in spring 2015 of sites previously identified in the ESIA as being suitable for migrating and breeding birds to identify where further targeted surveys should be undertaken. Two sites were chosen for further surveys, Petova Resevoir, and Topoja-Seman.

Migrating Bird Survey

The survey at Topoja-Seman was undertaken on 26th March 2015 and the survey at Petova Reservoir on 29th March 2015 in conjunction with the ecological walkover survey.

The migrating bird surveys comprised a walked transect and point counts at selected locations to provide a qualitative assessment for migrating species. A route was walked incorporating all features that may support migrating birds within and immediately adjacent to the site. Locations at which all birds were seen or heard were recorded on base maps. Notes were made of behaviour that may indicate use of the site for stop-over or foraging, or as fly-over records.

Breeding Bird Survey

Two breeding bird surveys were undertaken at Petova Reservoir. The first survey was undertaken at dusk on 5th June 2015 to highlight any potential breeding raptors returning to a nest and a second survey following standard breeding bird survey methods was undertaken on 7th June 2015. A single breeding bird survey at Topoja-Seman was undertaken on 6th June 2015.

The survey methodology was based on the Common Bird Census (CBC) methodology devised jointly by the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert et al., 1998). All surveys were undertaken early in the morning, at or just after sunrise, to coincide with peak bird activity. A route incorporating all features that may be nesting bird habitat within and immediately adjacent to the site was walked, locations of all birds seen or heard were noted on base maps along with notes of behaviour that may indicate breeding.

Pygmy cormorant and little egret surveys

Autumn surveys for pygmy cormorant and little egret were undertaken at thirteen river crossings between 22nd September 2015 and 29th September 2015.

The breeding status of each species is classified into three categories: confirmed, probable and possible. The behaviour, sex, age and location of individual birds allow conclusions to be drawn about breeding status, based on categories devised by the European Ornithology Atlas Committee (EOAC, 1979). It is also possible that species are merely present in a habitat and not actually breeding. Breeding evidence used in this report follows the EOAC (1979) guidelines

given in Appendix 3. Birds not thought to be breeding (e.g. would not breed in the habitats present) and birds flying-over are classed as non-breeding.

Aquatic Ecology

In total, the TAP pipeline through Albania will cross 372 watercourses, with a further 152 watercourses to be affected by upgraded or new roads to access the pipeline route. In order to assess potential impacts, watercourses were categorised according to size and ecological importance. The 2015 investigations concentrated on RV1 watercourses (main river channels with ecological importance) and RV2 watercourses (tributaries of the main rivers with ecological importance), as these were defined as highly sensitive to potential impacts from TAP.

Surveys were carried out between 24-27th September 2015.

Habitat Survey methods

Surveyors walked the riverbank for approximately 250m upstream and 750m downstream of the road crossing/pipeline crossing location and recording the key habitat features observed including their precise location and extent. The survey methodology is adapted from that outlined in Hendry and Cragg-Hine (1997) and incorporates habitat types for all species of fish. The field mapping technique used entails drawing sketch maps (or preferably hand drawing onto a high-resolution (e.g. 1:10,000 scale) map where available) illustrating the river outline and other main geographical locaters (bridges over the river, buildings etc.). The surveyor adds further detail to the maps as he progresses along the river channel/survey route, ultimately building up a map mosaic of the dominant or most important habitat features observed. Habitat features recorded during the walkover survey included:

- flow type, for example, glide, run, riffle, cascade, pool and rapid
- substrate type, for example, boulder, cobble, pebble, gravel, sand and silt as defined using the Wentworth scale
- macrophyte presence/type, for example, emergent linear, emergent broad-leaf, submerged linear, submerged broad-leaf, floating linear, floating broad-leaf
- other key features, for example, side bar, mid-stream bar, man-made dams, weirs, large woody debris, coarse woody debris, spawning area, fry/juvenile fish refuge area, otter spraint, otter holt, nesting birds (e.g. in cliffs and mud banks)
- otter field signs such as spraint or footprints
- pygmy cormorant roosts
- evidence of birds nesting in mud banks adjacent to the river.

RSK subsequently transcribed field maps into GIS for each pipeline crossing or pygmy comorant roost site. Digital photographs of important habitat features were also obtained during surveys. These photographs, with the maps, will provide a permanent digital record of the habitat at the time of the surveys and against which future changes can be compared (e.g. post-construction reinstatement).

Plate 16 River habitat close to PC5

Fish Survey Methods: Electric Fishing

Fish were sampled using backpack devices working with unidirectional impulse current SEN. Sampling was performed in accordance with British Standard EN 14011:2003 (Water quality. Sampling of fish with electricity).

The total watercourse area sampled at each location was approximately 100 m^2. Upon capture, all fish were transferred to a water-filled bucket before being identified to species level and measured (total length in mm). Experienced fisheries experts identified the species and confirmed identification using descriptions provided in Kottelat and Freyhof (2007). Certain sites were not surveyed due to health and safety reasons – the channel was too deep and too wide at these locations.

APPENDIX 8
ITALY ONSHORE BIODIVERSITY SURVEY METHODOLOGIES

Threatened and endemic flora

Baseline field surveys for the ESIA were undertaken within a 2km corridor along the pipeline route to describe the main vegetation types, species of interest and habitats present. Surveys were undertaken in October 2011, with updates in April 2013. These surveys fell outside the optimal timing for floral surveys, so should not be considered definitive. Habitat was classified according to it type based on the EU's habitat types and condition; consisting of species composition and vegetation structure.The ESIA surveys found 47 flora species to be of high conservation value in the region. The greatest floral biodiversity was found in the Palude di Cassano wetland and the coastal vegetation extending to the east.

Additional land cover surveys were undertaken in 2014 in a corridor 25m either side of the centreline refining some of the boundaries of plant communities.

Olive Trees

A census to map all individuals of the European olive (*Olea europea*) in the micro-tunnel area (lot 1 and 1b) was undertaken April – September 2015 as part of the Olive Tree Management plan which aims to ensure the safeguarding of olive specimens during the construction phase.

The methodology adopted for mapping and census of the olive trees in Lot 1included the acquisition of vector data of the site area (coordinates UTM WGS84 – zone 34). Furthermore, the vector data has been adjusted to the cadastral plan using suitable reference points. A GPS system was used to describe the perimeter of the survey area and to register the position of the olive trees within the study area. Subsequently, each plant was labelled with a unique identification code containing the lot number.

The following data was also collecting during the census operations: plant dimensional characteristics, phenological and morphological features and phytopathologies, of every specimen.

The mapping methodology for Lot 2 and 3 involved the use of vectorial illustrations of the construction area adjusted to the cadastral plan and to a series of aerial photographs of the region of Puglia (2006, 2010, 2011, and 2013) and newly acquired aerial images. Geographic information (GIS) software was used to carry out a preparatory investigation of the area in order to remotely identify and georeference the plants present in the study area. Subsequently, during the on sit mapping each plant was labelled with a unique identification code containing the lot number.

Natural Vegetation

Surveys and mapping for spontaneous and wild flora have been conducted using the same methodology as for the census and mapping of olive trees in lot 1. The botanical field surveys allowed the identification and consistency of the vegetation within lot 1B.

The census for spontaneous flora on lot 2 and lot 3 was carried out on all linear or aerial plant formations interfering with lots 2 and 3 and with the access roads to the pipeline receiving terminal (PRT). For each vegetation cluster the number of native plants was recorded (such as *Quercus ilex*, *Phillyrea latifolia,* Cistus, *Myrtus communis*, *Pistacia lentiscus*, Terebinth, olive, Arbutus, Laurel, *Quercus spinosa*, Ginestrella, Buckthorn, Salvione yellow). The study included mapping and photographic documentation of vegetation, as well as specific survey cards for trees with trunk diameter greater than 30 cm (considered for removal/replanting).

Threatened fauna

ESIA surveys were conducted during October 2011 and April 2013 in a 2km corridor (1km either side of centreline); however surveys were not undertaken in optimal survey season. In 2015 another desk top review followed by site visits was undertaken for protected species associated with designated sites in the wider area.

Mammals

No mammals potentially present in the study area are species included in the Annex II and/or IV of the Habitats Directive (92/43/EEC).

As required by the Environmental Monitoring Project (Prescription A.31 of Ministerial Decree 223/2014) during the site activity the environmental monitoring activities will continue, including fauna monitoring. If further species of conservation interest should be found, the appropriate mitigation measures will be adopted to minimize the potential interference of the project.

Birds

During the 2013 surveys, the Montagu's harrier (*Circus pygargus*) was observed in the study area..

Further surveys were undertaken in 2015 for the ante-operam phase following the Environmental Monitoring Plan along the 1km buffer zone on both sides of the microtunnel construction, Palude di Cassano and the phytopurification plant:

- Nesting and Residential Birdlife (April, May, June and October).
- Migratory Birdlife (March, April, May, September and October).

Surveys for the monitoring of nesting, residential and migratory birdlife have also been planned during the construction phase and commissioning/operation.

Surveying and GPS mapping of species in the micro-tunnel area was undertaken using a sampling point technique based on a regular grid. At each listening point all birds visually and acoustically observed within a specific time period, 10 minutes for the sedentary and 20 minutes for migratory species, were recorded.

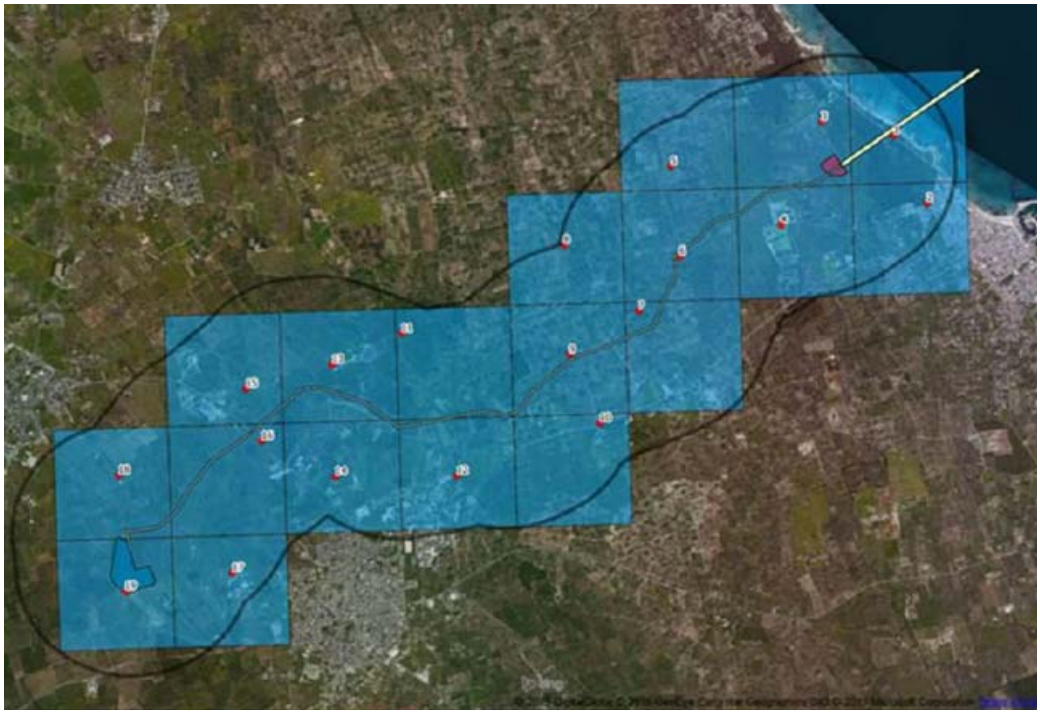

Plate 17 Listening points for nesting birds in sampling cells

Desk based studies indicated that the phytodepuration plant of Melendugno and Palude di Cassano may support some Annex I species. Nesting surveys were undertaken to establish the presence of any breeding or potentially breeding pairs of these species.

Plate 18 Monitoring wetlands (Palude di Cassano and phytopurification plant)

Surveys to assess the presence of protected bird species that are nesting, or potentially nesting, in the vicinity of the Cassano swamp and of the phytopurification plant, specific monitoring, managed by an ornithologist (possibly proposed by ARPA) once a week from 1 - 30 April and twice a week from 1 May to 15 June.

Nesting bird survey season runs from mid April until the first week of June, during which time data from four listening points will be recorded for ten minutes, at four times between sunrise and 11pm. Migratory birds survey seasons are March-May and mid August until October, during which time data from four listening points will be recorded for 20 minutes for four and times between 08.00-17.00). The swamp of Cassano and the phytopurification plant of Melendugno will be surveyed in spring (once a week between 1 -30 April and twice a week 1st May- 15th June) and during the wintering period (November-mid February) seven times, once per year.

During the construction phase and for the first three years of commissioning bird surveys will be undertaken in the vicinity of the micro-tunnel, PRT area the swamp of Cassano and phytotreatment plant of Melendugno using the methodologies employed during the pre-construction phase.

Additionally during construction, and for the first three years of the commissioning phase, monitoring of bird death/injury due to traffic around the building site will be undertaken. This will be done weekly from the mid April to the first week of June, mid August to October and from December until the first week of February.

As part of the environmental monitoring project, a number of water level surveys for the swamp of Cassano will be implemented from the pre-construction phase until the decommissioning phase, in order to monitor the water quality of the humid area during all project phases.

Herpetofauna

The species and abundance of amphibians was recorded in a 1km buffer either side of the TAP onshore route in Italy using GPS in March/April and September 2015. Within wet habitats effort was spread across five 1km2 areas. Sites included the microtunnel exit point and the marsh of Cassano and the phytoremediation plant. Direct observation and counting of individuals was supplemented by recording of larval forms and egg masses.

Abudance and species of reptiles were recorded using GPS within a 1km buffer of the route within >500m linear georeferenced transects containing or in proximity to dry stone walls or similar features. Surveys were undertaken on sunny warm days in March, April and May using direct observation and counting of individuals. For species with fossorial, nocturnal or strictly aquatic habits an active "hand-search" of individuals in all potentially suitable microhabitats e.g. clusters of ferrous waste, rock masses, dry stone walls and hygrophilous vegetation in proximity of wetlands

APPENDIX 9
OFFSHORE BIODIVERSITY SURVEY METHODOLOGIES

The survey methodologies deployed to assess the marine baseline are as follows:

Table A9.1: TAP marine/intertidal surveys overview 2006-2014

Source: [1] Statoil presentation by Oriana Parisi: *TAP Offshore Survey Campaigns from 2006-2014*

Date	Survey ref.	Title/scope (contractor)	Ref	Notes
2006	[1]ST06243	Orthophotos & Topographic map collection (ILF/MSS)	Offshore Survey Reconnessaince MBES/SSS/SB	
	[1]ST06570	Pipeline Route Investigation (ILF/MSS)	Geotechnical Investigation (Gravity samples)	
2009	[1]ST09501	Offshore campaign (DeepOcean/Fugro)	Reconnessaince (MBES hull mounted, Mini Airgun	
			Detailed surveys (ROV - MBES, SSS, SBP, video	
			Fault Mapping (MBES hul mounted, Mini Airgun	
			Geotechnical Investigation (CPTs)	
2011/12	[1]ST11541	Nearshore Surveys, Old Italian & Albanian Landfall (D'Appolonia/Fugro)	UXO, Topographic, Geophysical and Environmental, Italian and Albanian landfall	Albania landfall survey is Albania ESIA Annex 6.5
	[1]ST11461		Geotechnical survey (BH and CPTs), Italian and Albanian landfall	
2012	[1]ST12219	Collection of satellite and lidar data of the Italian and Albanian Coasts (e-Geos)	Albanian coast (satellite)	
	[1]ST12220		Albanian coast (satellite)	
	[1]ST12222		Italian coast (satellite & LIDAR)	

2012/13	[1]ST12589	Comprehensive offshore campaign to finalise pipeline **route**/for EIA (DOF Subsea/ (D'Appolonia/Gardline)	Reconnessaince Survey Hull mounted MBES and SBP	
	[1]ST12590		Detailed survey offshore (ROV-MBES,SSS,SBP and Magnetometer) and nearshore (hull mounted MBES, SBP and towed SSS and Mag	
	[1]ST12904		Environmental survey (water and sediment samplings, chlorophilla analysis, CTD measurements	Environmental survey (inc ROV of habitats) is Appendix 6 of Annex 7 to Italy ESIA
	[1]ST12833 [1]ST13454		Deep and shallow geotechnical survey	
	[1]n/a	One year Metocean Campaign, 10 Stations continuously recording environmental data (RPS)	Installation of 10 stations including wavebuoys, currentometers, marine fauna growth plates, CTD sensors	
2013/14	[1]ST13573	Nearshore survey on the new Italian Landfall of San Foca (D'Appolonia/Fugro)	Detailed Geophysical Survey (Hull mounted MBES and SBP, towed SSS and Boomer	
			Cavity survey - Seismic Refraction Static Method	
	[1]ST13917		Environmental survey (water and sediment samplings, CTD measurements	
			Underwater Camera and ROV Video survey at each environmental station and along the route with focus to the microtunnel exit area, to identify the presence of *Posidonia oceanica, Cymodocea nodosa and coralligenous*	July 2013 *Posidonia* survey is Italy ESIA Annex 12
	[1]ST14452		Shallow Geotechnical survey	

Table 9.2: TAP marine/intertidal surveys detail 2011-2017

Albania

Survey type	Company	Survey area & equipment	Dates	Survey methodology	Key outputs	Reports
Ecology (Turtles)	Herpetofauna of Albania Society (HAS)	Two 'core' areas (1km either side of the proposal TAP landfall), but will and 'buffer' areas (2 km north and south of the core areas).	Summer 2017	Core areas will be surveyed visually at both night (for nesting females) and daylight (for tracks). Survey frequency be staggered so the start and end of the season (approx. June and Sept) will have lower frequency, with the greatest frequency in peak season (July and August).	The objective of the survey is to record presence or absence of activity associated with nesting along the beach in the area of the TAP Albania landfall.	Turtle nesting survey report to be produced.
Benthic ecology	OGS/ RSK	Albania nearshore	Autumn 2017	Data on the benthic environment in the nearshore Albanian landfall location within the dredging, piling and spoil disposal area, information is needed; current sediment chemistry, macrobenthic fauna and physical characteristics as well as general water quality are to be assessed.	Detailed baseline data for the Albanian landfall area.	Survey reports
Geophysical	DOF Subsea	High fly ROV along predefined sections of the main and	Dec 2012-Feb 2013	The basis for the work conducted by *MV Geosund* was the Statoil Work Package Trans Adriatic Pipeline – Scope	Geophysical analysis identified morphological and geological features	DOF Subsea ST12590 Detailed

		alternative routes while MBES, SBP & SSS logged. Low fly ROV logging video and magnetometer (To detect magnetic anomalies and cable crossings) data also conducted along the centreline of the entirety of the main and alternative routes. 53 sites also sampled with digital still photos. Box cores and day grabs taken as well as water sampling and profiling at 50 locations		of Work for Offshore Survey – 2012 rev04. Work began using the SP06 Surveyed route route, but this was superseded with a new route, SP07 Surveyed route on 4th January 2013.	including shipwrecks, UXO and submerged military bunkers.	Route Survey report August 2013.
Geophysical	Fugro Oceansismica S.p.A. (on behalf of D'Appolonia and	RTK GPS (Real time kinematic global positioning system): 500m	September – November 2011	Survey area of 500 x 80m centered on the proposed landfall route extending from -1 to about +1	GPS campaign to survey landfall topography	Geophysical report- shallow and deep water surveys – Albanian

	Statoil)	width topographic intertidal survey corridor		contour line.		Landfall Fier (Report Number: 513/11-J151)
		Shallow hydrographic and geophysical survey: from -8.5 m bMSL to the shoreline 500m wide survey corridor: RTK GPS, multi-beam echo sounder (MBES), single-beam echo sounder (SBES), side scan sonar (SSS), side bottom profiler (SBP) and magnetometer data acquisition		101 main lines along the route, 2.58 km long, and with line-spacing of 5 m run with the magnetometer and MBES; 11 main lines along the route, 2.58 km long, and with a line-spacing of 50 m, run with the SBP and SSS; 10 tie lines N-S oriented 0.5 long km, from KP 250 to KP 2.250 run with all instrumentations. Other: 3 extra SSS lines and 46 MBES-SBES lines (shoreline parallel infilling lines) were run in order to assure full coverage of the area.	Bathymetry interpreted from combined MBES and SBES data. Seabed features and obstructions interpreted from SSS. Shallow geology interpreted from SBP data. Magnetometers identified any ferrous objects, but not UXO.	
		Deep hydrographic and geophysical survey: from -8 m		90 main lines along the route, 4.10 km long, and with line-spacing of 5 m run with the SBES,	Bathymetry interpreted from MBES data.	

		to -30 m bMSL 500m wide survey corridor: RTK GPS, MBES, SBES, SSS, Uniboom (SBP), underwater video camera and magnetometer data acquisition		MBES and MAG; 11 main lines along the route, 4.1 km long, and with a line-spacing of 50 m, run with all instrumentations; 17 tie lines N-S oriented 0.5 km long, from KP 2.250 to KP 6.250 run with all instrumentations. Other: 11 SSS lines (shifted by 25 m from the previous ones and with the SSS fish towed with the magnetometer) were run in order to assure full coverage of the area.	Seabed features and obstructions interpreted from SSS. Shallow geology interpreted from SBP data. Magnetometers identified any ferrous objects, but not UXO.	

Italy

Survey type	Company	Survey area & equipment	Dates	Survey methodology	Key outputs	Reports
Benthic ecology (seagrass)	Prof. Ardizzone	N/A	June 2017	Diver survey to verify 2016 seagrass survey findings and conclusions at micro-tunnel exit point.	Previous data verified.	Techical Note produced.
Marine water and sediment quality	OGS	Survey area: a 2 km wide corridor around the subsea pipeline <3 km from the coast	2016	Physio-chemical sampling: Five transects: one along the pipeline route, and two either side of it, located at increasing distance (500 m and 1000 m). Four sampling stations pre transect at increasing distance from the shore (about 500 m, 700 m, 1000 m e 3000 m). A profile of the entire water column was taken, except at stations >30m surface, intermediate and bottom samples were	To collect baseline data against which subsequent monitoring can be compared. Monitoring of the water column (physical and chemical characterization, organic matter and nutrients, solvents, hydrocarbons, microbiology and heavy metals). Phytoplankton (structure and	Ante-operam offshore monitoring survey: seawater quality and surface sediment results 2017 (OPL00-C5577-150-Y-TRS-0001)

				taken. Sediment samples were collected in 12 locations by a Van Veen grab with a 0.1 m^2 sampling area.	composition of the phytoplankton community, chlorophyll *a* and TRIX). Surface sediments (grain size, organic matter and nutrients, pesticides, hydrocarbons, microbiology, heavy metals, other chemical compounds, macrozoobenthic community).	
Marine physical processes	Fugro	Monitoring Station is equipped with a Multi-parameter probe (including sensors for conductance, temperature, density, pressure, and turbidity) and an Acoustic Doppler Current Profiler (ADCP).	2016-ongoing	A continuous seabed turbidity and current monitoring system installed in proximity of micro-tunnel exit will record pre, during and post construction.	Record natural variation peaks in turbidity and currents to provide a baseline to monitor against.	Final Geophysical Report: TAP Pre-construction Survey- installation of monitoring station, Environmental and Geophysical Survey 2016 (Fugro Document 750/16-J387)

Geophysical	Fugro	MBES, SSS, SBP used to assess possible presence of bioconstructions along pipeline and FOC route	November – December 2016	Approx 47 km length survey: data collection extended to 200m on either side of pipeline and FOC routes, MBES, SSS and SBP were used, within the survey area line spacing was <50m with >20% overlap in data collection. Data was acquired for an area of 633.46km. The grid consists of 11 Main lines along the route, 50 m spacing and 46 Cross lines about 600 to 900 m long, 1 km spacing.	Improving existing data coverage and quality to inform habitat classifications. Morpho-bathymetry and stratigraphic data. MBES, SBES, SSS and SBP data was integrated to produce bathymetry and seabed feature data. Shallow geology interpreted from SBP data.	Final Geophysical Report: TAP Pre-construction Survey- installation of monitoring station, Environmental and Geophysical Survey 2016 (Fugro Document 750/16-J387)
Benthic sediment and ecology	Fugro	Vibrocore and grab samples	November 2016	26 grab samples were taken at water depths of between 10.4- 21.7m and 4 vibrocore samples were taken in water depths ranging from 17.8- 22.4m	Assessment of physical-chemical and biological characteristics (including any contaminants) of the surface sediments and waters	Final Geophysical Report: TAP Pre-construction Survey- installation of monitoring station, Environmental and Geophysical Survey 2016 (Fugro Document 750/16-J387)

Benthic ecology	Furgo EMU Ltd	Seagrass survey and mapping within the 700 m wide corridor centred on the pipeline route, and extending seaward from the exit of the micro-tunnel out to the 30 m contour (approximately 200 m) and landwards to approximately 100 m from the exit point.	June- July 2016	**Seagrass Survey** - Remotely Operated Vehicle (ROV) video mapping of the 700 x 300m seagrass survey area: 1 Main line 300 m long, centred on the pipeline route; 61 Cross lines 700 m long, 5 m spacing; 2 Wing lines 300 m long, 50 m spacing from centre line (on each side). Complete coverage as ROV flew at 2.5 m above the seabed allowing for video coverage swath of 5m. **Geophysical Survey -** in the of the 700 x 300m seagrass survey area. 7 Main lines about 700 m long , 50 m spacing, NNW-SSE oriented; 3 Cross lines about 300 m long, 175 m spacing, ENE-WSW oriented. Survey grid ensured 100 % coverage of the MBES data with <20 % overlap on adjacent run lines. **Bioconstruction Survey** - ROV video mapping of	To determine the pre-construction presence of any sensitive marine biocenosis (*Posidonia oceanica* and/or *Cymodocea nodosa*) within the survey area and to delineate the related extents of distribution. Acquisition of SBES, MBES, SSS and SBP data sets. Identification and mapping of bioconstructions.	TAP Pre-construction and Environmental Survey seagrass video survey Habitat Report (Fugro Document No.: 160887)

				potential bioconstructions, including possible collection of samples for eventual taxonomic characterisation.		
Benthic ecology	OGS	ROV, equipped with both a Standard Definition (SD) and High definition (HD) fixed camera and HD video recorder collected both still and video images for visual analysis and verification. Five pre-identified areas, based on previous geophysical survey data, were surveyed using transects.	2016	The survey covered a distance of 55m on either side of the TAP pipeline alignment, whilst also considering that the accuracy of pipe lay will be approximately +/- 5m from the centre line, as reported by TAP.	To identify, verify and classify potential bioconstructions within 50 m of the TAP marine pipeline alignment.	Results of the bioconstructions survey along the TAP route 2016 (OPL00-C5577-160-Y-TRS-0003)

APPENDIX 10
SCREENING OF PRIORITY BIODIVERSITY FEATURES

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Mammals				
Brown bear (*Ursus arctos*)	Y	Habitat of significant importance to globally-listed 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.	n/a	n/a
Golden jackal (*Canis aureus*)	Y	It is not possible to estimate the number of jackals within the DMUs in Albania without adequate surveys, but it is possible that the DMUs represent >10% of the national population.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Wildcat (*Felis silvestris*)	Y	Habitat of significant importance to globally-listed 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.	n/a	n/a
Otter (*Lutra lutra*)	Y	Otters do not trigger critical habitat in Albania as the DMUs do not support > 10% of the national population of a VU species. However, otter is listed as EN in Greece hence the DMUs conservatively qualify as Tier 2 critical habitat under subsection (b).	n/a	n/a
Wolf *(Canis lupus*)	N	DMUs do not support > 10% of the national population of this VU (Greece) species, see detailed assessment below.	Y	Yes as VU nationally, an Annex II listed species and a keystone species that contributes to healthy ecosystem structure and functioning
Balkan mole (Talpa stancovici)	N	No population data available. Due to extensive endemic range (Balkans) any suitable habitat within the AOI considered unlikely to support ≥ 1% of the global population.	N	Mitigation measures for small mammals include provisions for moles

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Mediterranean mole (Talpa caeca)	N	No population data available. Due to extensive endemic range (Europe) any suitable habitat within the AOI considered unlikely to support ≥ 1% of the global population.	N	Mitigation measures for small mammals include provisions for moles
Balkan pine vole (*Microtus feltini*)	N	No population data available. Species prefers montane forests, which are avoided by project. DMUs unlikely to support > 1% of the global population of this EN (Greece) and Balkan endemic species	N	Species is EN nationally but no DMU identified and preferred habitat avoided by ROW.
Bats				
Mediterranean horseshoe bat (*Rhinolophus euryale*)	Y	DMUs conservatively qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a
Blasius's horseshoe bat (*Rhinolophus blasii*)	Y	DMUs conservatively qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a
Greater horseshoe bat (*Rhinolophus ferrumequinum*)	Y	DMUs conservatively qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a
Schreiber's bat (*Miniopterus schreibersii*)	Y	DMUs conservatively qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Long-fingered bat (*Myotis capaccinii*)	Y	DMUs conservatively qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a
Lesser horseshoe bat (*Rhinolophus hipposideros*)	Y	No known roosts within the project AOI. Although listed as a qualifying feature for a number of protected/designated areas within 5km of the project within Albania, any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement. Similarly, in Italy, any DMUs are unlikely to support > 10% of the national population of this nationally-listed EN species.	n/a	n/a
Greater mouse-eared bat (*Myotis myotis*)	Y	No known roosts within the project AOI. Although listed as a qualifying feature for a number of protected/designated areas within 5km of the project, any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, nor > 10% of the national population in Italy, based on in-country expert judgement	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Bechstein's bat (*Myotis bechsteinii*)	Y	In the absence of definitive date regarding the location of roosts within these areas, all have been assumed to potentially support > 1% of the global population of the relevant species and therefore qualify as Tier 2 Critical Habitat under subsection	n/a	n/a
Mehely's Horseshoe Bat (*Rhinolophus mehelyi*)	Y	In the absence of definitive date regarding the location of roosts within these areas, all have been assumed to potentially support > 1% of the global population of the relevant species and therefore qualify as Tier 2 Critical Habitat under subsection	n/a	n/a
Lesser mouse-eared bat (*Myotis blythii*)	Y	In the absence of definitive date regarding the location of roosts within these areas, all have been assumed to potentially support > 1% of the global population of the relevant species and therefore qualify as Tier 2 Critical Habitat under subsection	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Geoffroy's bat (*Myotis emarginatus*)	Y	In the absence of definitive date regarding the location of roosts within these areas, all have been assumed to potentially support > 1% of the global population of the relevant species and therefore qualify as Tier 2 Critical Habitat under subsection	n/a	n/a
Serotine (*Eptesicus serotinus*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Free-tailed bat (*Tadarida teniotis*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Whiskered bat (*Myotis mystacinus*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, nor > 10% of the national population in Italy, based on in-country expert judgement	Y	Yes as nationally VU and Annex II listed species

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Natterers bat (*Myotis nattereri*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, nor > 10% of the national population in Italy, based on in-country expert judgement	Y	Yes as nationally VU and Annex II listed species
Leisler's bat, lesser noctule (*Nyctalus leisleri*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Noctule (*Nyctalus noctula*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, nor > 10% of the national population in Italy, based on in-country expert judgement	Y	Yes as nationally VU and Annex II listed species

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Kuhl's pipistrelle (*Pipistrellus kuhlii*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Nathusius's pipistrelle (*Pipistrellus nathusii*)	N	No known roosts within the project AOI. Although listed as a qualifying feature for a number of protected/designated areas within 5km of the project, any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Common pipistrelle (*Pipistrellus pipistrellus*)	N	No known roosts within the project AOI. Although listed as a qualifying feature for a number of protected/designated areas within 5km of the project, any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Savi's pipistrelle (*Pipistrellus savii*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Parti-coloured bat (*Vespertilio murinus*)	N	No known roosts within the project AOI. Any DMUs are considered unlikely to support > 1% of the global population of this congregatory species, based on in-country expert judgement	Y	Yes as Annex II listed species
Amphibians and Reptiles				
Fire bellied toad (*Bombina bombina*)	Y	Given its widespread global distribution and very restricted in Greece, it is not considered likely that the DMU contains 10% of the global EOO of this species. The DMU therefore qualifies as Tier 2 critical habitat under subsection (a).	n/a	n/a
Four-lined snake (*Elaphe quatuorlineata*)	Y	The lack of understanding and patchy nature of their populations means that the Albanian DMUs and surrounding area across the whole pipeline could support 10% of the regional population. The Greek DMUs collectively qualify as Tier 2 critical habitat under subsection (c).	n/a	n/a
Albanian pool frog (*Pelophylax shqipericus*)	Y	A loss of habitat in or around the DMU has the potential to affect the long-term survivability of the species which therefore triggers Tier 2 critical habitat under subsection (b).	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Macedonian crested newt (*Triturus macedonicus*)	Y	It is not considered likely that the DMU contains 10% of the global EOO of this species, due to its distribution elsewhere in the Balkans (Weilstra & Arntzen 2012), but it could conservatively be estimated to support 10% of the national population. The DMU therefore qualifies as Tier 2 critical habitat under subsection (a).	n/a	n/a
Yellow-bellied toad (*Bombina variegata)*	N	Species distributed throughout forests, forest steppe, scrubland, grassland and alpine habitats in Greece and Albania. DMUs unlikely to support > 1% of the global population of this congregatory species	Y	Yes as Annex II listed species.
Greek marsh frog (*Pelophylax kurtmuelleri*, syn. *Rana balcanica*)	N	Widespread, predominantly aquatic species that is generally found in proximity of suitable open water wetland habitats, it breeds within slow moving and stangant waterbodies. DMUs unlikely to support > 10% of the national population of this VU (Albania) species	Y	Yes as VU nationally and presence within project AOI possible.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Spur-thighed Tortoise (*Testudo graeca*)	N	No detailed information available for global or national distributions. Species prefers semi-arid scrub and forested habitats, which are not common across the AOI. DMUs not likely to support > 10% of the national population of this VU species	Y	Yes as VU globally and Annex II listed species that may be present within AOI.
Aesculapian snake (*Elaphe longissima*)	N	Species distributed throughout dry, open woodlands (deciduous, mixed and coniferous), woodland edges, forested ravines, scrubland and thickets, rocky outcrops, road embankments, moist meadows, field edges, traditionally cultivated land, tea plantations, stone walls and old buildings, parks and gardens in Albania. DMUs unlikely to support > 10% of the national population of this species	Y	Yes as EN nationally and AOI encompasses preferred habitat types.
Freshwater fish				
European eel (*Anguilla anguilla*)	Y	Precautionarily triggers as Tier 2 critical habitat under subsection (a).	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Aggitis spined loach (*Cobitis punctilineata*)	Y	Population estimates of the species within the Strymon basin are unknown, however in the absence of further evidence to the contrary the DMU must be considered to be of significant importance for the species.	n/a	n/a
Greek brook lamprey (*Eudontomyzon hellenicus*)	Y	The DMU qualifies as Tier 1 critical habitat under both subsection (a) and subsection (b).	n/a	n/a
Pelasgus prespensis	Y	Given the extremely restricted range of the species it is considered highly likely that the DMU is one of 10 or fewer DMUs globally for the species. As such the DMU qualifies as Tier 1 critical habitat under subsection (b).	n/a	n/a
Pelagos trout (Salmo pelagonicus)	Y	Based on current knowledge it is assumed that the above DMUs collectively support more than 10% of the global population of Pelagos trout and therefore qualify as Tier 2 critical habitat under subsection (a). DMUs also qualify as Tier 2 critical habitat under Criterion 2.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Alburnus vistonicus	Y	The regular occurrence of this CR species the DMUs qualifies as Tier 1 Critical Habitat under subsection (a). It also triggers Tier 2 critical habitat under Criterion 2.	n/a	n/a
Alburnoides sp. Volvi	Y	DMU's are thus likely to sustain ≥1% but <95% of the global population of this species which thus qualify under CHA Criterion 2 – Tier 2.	n/a	n/a
Devoll riffle minnow *(Alburnoides devolli)*	Y	The DMU is therefore likely to contain ≥95% of the global population of this species, and qualifies as Tier 1 critical habitat.	n/a	n/a
Osum riffle minnow *(Alburnoides fangfangae)*	Y	The Osum River system DMU is therefore likely to contain ≥95% of the global population of this species and therefore qualifies as Tier 1 critical habitat. It is considered likely that in the future this species would at least be considered VU on account of its restricted range, in which case the DMU could also qualify as critical habitat under Criterion 1.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Pindus stone loach *(Oxynoemacheilus pindus)*	Y	It is considered likely therefore that each of these tributaries could support ≥10% of the national / regional population and ≥1% but <95% of the global population of this species. However sufficient data is not available to confirm or dispute this.	n/a	n/a
Pelasgus minutus	Y	Adopting a precautionary approach and assuming that the species EOO is <20,000km2 with all individuals occurring only in the Lake Ohrid basin.	n/a	n/a
Barbus macedonicus	Y	If each location is taken as a DMU then each potentially sustains ≥1% but <95% of the global population	n/a	n/a
Brown spined loach (Cobitis puncticulata)	Y	Present in canals/wetlands near the villages of Lyra and Tychero (the Evros Population) and these types of waterbodies are not crossed by the route in this area DMU unlikely to support > 10% of the national population	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Twaite shad (*Alosa fallax*)	N	DMUs not likely to support > 1% of the global population of this migratory species, based on in-country expert judgement, nor > 10% of the national population in Italy	Y	Yes as nationally VU and Annex II listed species.
Ukrainian stickleback (*Pungitius platygaster*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Vimba melanops	N	DMU unlikely to support > 10% of the national population	Y	Yes as VU nationally.
Cyprinus carpio	N	Native populations most likely to be in North Eastern Greece (Thraki and Makedonia-Thessaly Ecoregions. DMU unlikely to support > 10% of the global population	N	Globally VU species but named locations of wild stocks not in AOI.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Alosa vistonica	N	Not known within the project AOI	N	Globally and nationally CR and Annex II listed species but not known in project AOI.
Freshwater invertebrate				
Thick-shelled river mussel *(Unio crassus)*	Y	Based on the species' range, it is considered highly unlikely that the DMUs support > 10% of the global population however they could conservatively support 10% of the national population. In combination, the DMUs therefore qualify as Tier 2 critical habitat under subsection (a).	n/a	n/a
Turcorientalia hohenackeri	Y	In the absence of detailed survey data it is assumed that the DMUs collectively support more than 10% of the national / regional population of this species which is listed as vulnerable by the IUCN. The DMUs therefore qualify as Tier 2 Critical Habitat under subsection (b). The DMUs therefore also qualify as Tier 2 critical habitat under Criterion 2.	n/a	n/a
Flora				

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Mountain tea (*Sideritis raeseri*)	Y	With the information available, it is not considered likely that the DMU contains 10% of the global EOO of this species, however it is not possible to be confident the DMU supports less than 1% of the global population. The DMU therefore qualifies as Tier 2 critical habitat under subsection (a).	n/a	n/a
Yellow monk's-hood (*Aconitum lamarkii*)	Y	This triggers Tier 2 critical habitat under subsection (a).	n/a	n/a
Deadly nightshade (*Atropa belladonna*)	Y	In the absence of reliable population data, the DMU in Albania is assumed to support between 1% and 95% of the global population. This triggers Tier 2 critical habitat under subsection (a).	n/a	n/a
Albanian lily (*Lilium albanicum*)	Y	In the absence of population size data, this would make the DMU habitat between 1% and 95% of the global population. This triggers Tier 2 critical habitat under subsection (a).	n/a	n/a
Dianthus formanekii	Y	DMU likley to support 10% of the global population. This triggers Tier 2 critical habitat.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Dianthus tenuiflorous	Y	The total number of populations of this species is unknown, but data searches show that it is likely that there are 50 to 100 locations recorded for this species. Details of these populations are unknown. On the assumption that these populations are of similar size to the DMU, and still exist, then the DMU would support 1 to 2% of the global population. This triggers Tier 2 critical habitat.	n/a	n/a
Verbascum dingleri	Y	Details of the distribution of this species are not readily available, but references in literature are interpreted to suggest the species is known from between 10 and 50 locations in Northern Greece. Details of these populations are unknown. On the assumption that these populations are of similar size to the DMU, and still exist, then the DMU would support between 2% and 10% of the global population. This triggers Tier 2 critical habitat.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Serpentine false-brome (*Festucopsis serpentini*)	Y	On the assumption that these populations are of similar size to the DMU, and still exist, then the DMU would support 5.6% of the national, and hence global, population. This triggers Tier 2 critical habitat.	n/a	n/a
Adiantum capillus-veneris	N	Throughout the most of its range, this species is abundant and there is no evidence of a decline. DMU unlikely to support > 1% of the global population	Y	Yes as nationally VU species.
Marram grass (*Ammophila arenaria*)	N	Invasive species, that occurs in dune systems along the Albanian coastal zone. DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species
Cephalanthera epipactoides	N	No information is available on this species, but the DMU unlikely to support > 10% of the global population	Y	Yes as globally VU species
Meadow saffron (*Colchicum autumnale*)	N	Species occurs in central Albania, in damp meadows, open woods and river banks. DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species
Burning dittany (*Dictamnus albus*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Joint pine (*Ephedra distachya*)	N	DMU of coastal dunes unlikely to support > 10% of the national population	N	Nationally EN species but not found in recent surveys
Great yellow gentian (*Gentiana lutea*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species
Perforate St John's wort (*Hypericum perforatum*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species
Black walnut (*Juglans regia*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species
Common juniper (*Juniperus communis*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species
Prickly juniper (*Juniperus oxycedrus*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species
Prickly juniper (*Juniperus oxycedrus ssp. Macrocarpa)*	N	Species occurs in dune systems along the Albanian coastal zone. DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Wild marjoram (*Origanum vulgare*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species.
Pancratium maritimum	N	Species occurs in dune systems along the Albanian coastal zone. DMU unlikely to support > 10% of the national population	N	Nationally EN species but absent from recent surveys.
Hart's tongue fern (*Phyllitis scolopendrium*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Holly oak (*Quercus ilex*)	N	Species component of EU Habitat 9340, which occurs throughout Albania. DMU unlikely to support > 10% of the national population	Y	Yes as nationally EN species.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Crack willow (*Salix fragilis*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Common sage (*Salvia officinalis*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Common elder (*Sambucus nigra*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Winter savoury (*Satureja montana*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Laurustinus (*Viburnum tinus*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Mistletoe (*Viscum album*)	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Erica forskalii	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Serapias orientalis subsp. apulica	N	DMU unlikely to support > 10% of the national population	Y	Yes as nationally VU species.
Highly threatened and unique ecosystems				
6220* Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	Y	The habitat is identified as a priority habitat by the EU, so is likely to be CR/EN under the IUCN RLE assessments and would trigger critical habitat under Criterion 4.	n/a	n/a
7210* Calcareous fens with Cladium mariscus and species of the Caricion davallianae	Y	The DMU is approximately 26 ha. In the absence of a national AOO with which to compare this, this is conservatively considered to trigger critical habitat.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
2270 * Wooded dunes with Pinus pinea and/or Pinus pinaster	Y	The habitat is identified as a priority habitat by the EU, so is likely to be CR/EN under the IUCN RLE assessments and would trigger critical habitat under Criterion 4.	n/a	n/a
3170* Mediterranean temporary ponds	Y	The DMUs are collectively estimated at 571 ha, representing just over 10% of the combined AOO for this habitat type in Italy and Greece. Based on professional judgement, this qualifies as critical habitat.	n/a	n/a
91E0*Alluvial Forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion Incanae, Salicion Albae)	Y	In the absence of a national AOO with which to compare this, and given the comparatively large area of the DMU, this is conservatively considered to trigger critical habitat.	n/a	n/a
9530 * (Sub-)Mediterranean pine forests with endemic black pine	Y	Critical habitat is not triggered for this ecosystem based on areas and extent of occurence. The habitat is identified as a priority habitat by the EU, so is likely to be CR/EN under the IUCN RLE assessments and would trigger critical habitat under Criterion 4.	n/a	n/a
2250 *Coastal dunes with *Juniperus* spp.	Y	The habitat is identified as a priority habitat by the EU, so is likely to be CR/EN under the IUCN RLE assessments and would trigger critical habitat under Criterion 4.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
9110 Luzulo-Fagetum beech forests	Y	The DMU of 9110 in Albania is estimated to be approximately 1773 ha. In the absence of a national AOO with which to compare this, and given the comparatively large area of the DMU, this is conservatively considered to trigger critical habitat.	n/a	n/a
9540 Mediterranean pine forests with endemic Mesogean pines	Y	The DMUs of 9540 are estimated to be approximately 423 ha in Greece and 328 ha in Albania. In the absence of national AOOs with which to compare these figures, and given the comparatively large collective area of the DMUs, this ecosystem is conservatively considered to trigger critical habitat.	n/a	n/a
9130 Asperulo-Fagetum beech forests	N	n/a	Y	EU Annex 1 habitats (non-priority) identified as priorities by stakeholders and assessed for critical habitat in this document Not assessed as potential critical habitat triggers – included as PBFs

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
1310 Salicornia and other annuals colonising mud and sand	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBFs
1410 Mediterranean salt meadows (Juncetalia maritimi)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
1420 Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
2110 Embryonic shifting dunes (Cakiletea maritimae & Ammophiletea)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
3280 Constantly Flowing Mediterranean Rivers with Paspalo-Agrostidion Species and Hanging Curtains of Salix and Populus Alba	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
5110 Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
5130 Juniperus communis formations on heaths or calcareous grasslands	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
5210 Mediterranean arborescent matorral, arborescent matorral with Juniperus spp.	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
6170 Alpine and subalpine calcareous grassland	N	n/a	N	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
6420 Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	N	n/a	N	n/a
6520 Mountain hay meadows	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
72A0 Reed beds (Phragmito-Magnocaricetea)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
8120 Calcareous and calcshist screes of the montane to alpine levels	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
8210 Calcareous rocky slopes with chasmophytic vegetation	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
8220 Siliceous rocky slopes with chasmophytic vegetation	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
9160 Sub-Atlantic and medio-European oak	N	n/a	N	n/a
9170 Galio-Carpinetum oak-hornbeam forests	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
91F0 Riparian mixed forests along the great rivers	N	n/a	N	n/a
91M0 Pannonian-Balkanic turkey oak- sessile oak forests	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
924A Thermophilous oak woods of E Mediterranean and Balkans	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBFs
9250 Quercus Trojana Woods	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
925A Ostrya, Carpinus and mixed thermophilous forests	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
92A0 Salix alba and Populus alba galleries	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
92B0 Riparian formations on intermittent Mediterranean watercourses with Salix and others	N	n/a	N	n/a
92C0 Platanus orientalis and Liquidambar orientalis woods (Plantanion orientalis)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
92D0 Southern Riparian Galleries and Thickets (Nerio-tamaricetea and Securinegion tinctoriae)	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
9340 Quercus ilex forests	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
9350 Quercus macrolepis forests	N	n/a	Y	EU Annex 1 habitats (non-priority) habitats identified in project documents but not assessed as critical habitat Not assessed as potential critical habitat triggers – included as PBF
2120 Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")	N	n/a	N	n/a
2260 Cisto-Lavenduletalia dune sclerophyllous scrubs	N	n/a	N	n/a
32B0 Annual river communities	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
5340 Garrigues of Eastern Mediterranean	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
5350 Pseudomaquis	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
6290 Mediterranean subnitrophilous grasslands	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
62A0 Eastern sub-mediterranean dry grasslands (Scorzonetalia villosae)	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
6450 Greek hyper-Mediterranean humid grasslands	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
5160 South-eastern sub-mediterranean deciduous thickets	N	n/a	Y	Greek protected habitats identified in project documents but not assessed as critical habitat listed as PBF
Key evolutionary processes				
Macedonian and Western crested newt interaction zone	Y	The DMU which includes this interface of two species is considered to trigger critical habitat under Criterion 5.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Vithkuq-Ostrovice Serpentine Outcrops	Y	The DMU is delimited based on the boundary of the designated area that includes the majority of the Vithkuq-Ostrovice area. This is considered to trigger critical habitat under Criterion 5.	n/a	n/a
Prespa Lakes	Y	Prespa Lakes is considered to trigger critical habitat under Criterion 5.	n/a	n/a
Birds				
Greater spotted eagle (*Aquila clanga*)	Y	Given the broad range of the species it does not qualify as Tier 1 habitat as the size of the DMUs is well under 1% of the global range. However, the DMUs do collectively qualifiy as Tier 2 critical habitat under subsection (a).	n/a	n/a
Lesser spotted eagle (*Clanga pomarina*)	Y	The DMUs collectively qualify as Tier 2 critical habitat under subsection (c).	n/a	n/a
Booted eagle (*Hieraaetus pennatus*)	Y	Collectively, the DMUs are considered to qualify as Tier 2 critical habitat under subsection (c).	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Black kite (*Milvus migrans*)	Y	Given the lack of definitive population data or survey results, a conservative approach has been applied and the DMUs are assumed to collectively support > 10% of the regional population, thereby qualifying as Tier 2 critical habitat under subsection (c).	n/a	n/a
Montagu's harrier (*Circus pygargus*)	Y	The DMU supports over 10% of the national breeding population and qualifies as Tier 2 critical habitat under subsection (c).	n/a	n/a
Eagle owl (*Bubo bubo*)	Y	Applying a highly conservative approach, the DMU could potentially support 10% of the national population and hence qualifies as Tier 2 critical habitat under subsection (c).	n/a	n/a
Dalmatian pelican (*Pelecanus crispus*)	Y	It is likely that the DMUs could collectively support 10% of the national/regional population of this nationally-listed CR species which qualifies them as Tier 2 Critical Habitat under subsection (a)	n/a	n/a
Little egret (*Egretta garzetta*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	Y	Yes as nationally VU species.
Night heron (*Nycticorax nycticorax*)	N	In Greece: DMU supports < 0.1% of the global AOO of this migratory species. In Italy: no DMUs identified for this species	Y	Yes as nationally VU species.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
White stork (*Ciconia ciconia*)	N	DMU does not support > 10% of either the global or national population of this species, nor is it one of ten or fewer DMUs globally for the species. DMU is not of significant importance to this species which is wide-ranging whereby the loss of the habitat could potentially affect the long-term survivability of the population. DMU does not appear to support the regular occurrence of this species.	Y	Yes as nationally CR and VU species.
Black stork (*Ciconia nigra*)	N	In Greece: DMU supports < 0.1% of the global AOO of this migratory and nationally-EN species In Italy: no DMUs identified for this species	Y	Yes as nationally EN and VU species.
Shelduck (*Tadorna tadorna*)	N	DMU supports < 0.2% of the global AOO of this migratory and VU (Greece) species	Y	Yes as nationally VU species.
Griffon vulture (*Gyps fulvus*)	N	In Greece: DMU supports < 0.1% of the global AOO of this migratory and nationally-VU species In Italy: no DMUs identified for this species	N	No despite being nationally CR and VU species species/habitat not known in project AOI.
Black vulture (*Coragyps atratus*)	N	DMU supports < 1% of the global AOO of this migratory and EN (Greece) species	N	No despite being nationally EN species, not known in AOI.
Short-toed eagle (*Circaetus gallicus*)	N	In Albania: DMU supports < 0.1% of the global AOO of this migratory and nationally-VU species	Y	Yes as nationally VU species, could be present in Albania or Greece but not AOI in Italy

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
		In Italy: no DMUs identified for this species		
Pygmy cormorant (*Microcarbo pygmeus*)	N	In Albania the species' range extends across the western coastal areas and the south east of the country where it is considered resident. DMUs have been identified within the project AOI, associated with the Prespa Lakes and Karavasta Lagoon. Both sites are National Parks, designated Ramsar sites and proposed Emerald sites. Given the broad range of the species these DMUs do not qualify as Tier 1 habitat as the area in question is well under 1% of the EOO. Similarly, the supported population is likely to be < 10% of the regional population, with surveys conducted by Wetlands International in 2016 recording 1,019 individuals at Karavasta and < 200 at Prepspa Lakes (Bino and Carugati, 2016).	Y	Yes as nationally CR species.
Marsh harrier (*Circus aeruginosus*)	N	In Greece and Albania: DMU supports < 0.1% of the global AOO of this migratory and nationally-VU species In Italy: no DMUs identified for this species	Y	Yes as nationally VU species could be present in Albania and Greece but not Italy.
Long-legged buzzard (*Buteo rufinus*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Greece) species	Y	Yes as nationally VU species.
European honey buzzard (*Pernis apivorus*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	Y	Yes as nationally EN species.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Lesser kestrel (*Falco naumanni*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Greece) species	Y	Yes as nationally VU species.
Red-footed falcon (*Falco vespertinus*)	N	DMU supports <1% of the global AOO of this migratory species	Y	Yes as nationally VU species.
Eleonora's falcon (*Falco eleonorae*)	N	DMU supports <1% of the global AOO of this migratory species	N	Nationally VU species (IT) but preferred habitat not found within AOI.
Grey partridge (*Perdix perdix*)	N	DMU unlikely to support > 1% of the national population of this migratory and EN (Greece) species	Y	Yes as nationally EN species.
Turtle dove (*Streptopelia turtur*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU species	Y	Yes as globally VU species.
Kingfisher (*Alcedo atthis*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU species	Y	Yes as nationally VU species.
European roller (*Coracius garrulus*)	N	DMUs support < 10% of this nationally-CR species	Y	Yes as nationally CR and VU species.
Skylark (*Alauda arvensis*)	N	DMU supports <1% of the global AOO of this migratory species	Y	Yes as nationally VU species.
Short-toed lark (*Calandrella brachydactyla*)	N	DMU supports <1% of the global AOO of this migratory species	Y	Yes as nationally EN species.
Calandra lark (*Melanocorypha calandra*)	N	In Greece: DMU supports <1% of the global AOO of this migratory and nationally-VU species In Italy: no DMUs identified for this species	Y	Yes as nationally VU species.
Red-backed shrike (*Lanius collurio*)	N	DMU supports <1% of the global AOO of this migratory species	Y	Yes as nationally VU species.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Lesser grey shrike (*Lanius minor*)	N	DMU supports <1% of the global AOO of this migratory species	Y	Yes as nationally VU species.
Golden eagle (*Aquila chrysaetos*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	Y	Yes as nationally EN species.
Purple heron (*Ardea purpurea*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	Y	Yes as nationally EN species.
Squacco heron (*Ardeola ralloides*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	Y	Yes as nationally VU species.
Short eared owl (*Asio flammeus*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	N	Nationally VU species but not found in AOI.
Moustached warbler (*Acrocephalus melanopogon*)	N	In Albania: DMU supports < 0.2% of the global AOO of this migratory and nationally-EN species In Italy: no DMUs identified for this species	N	Nationally EN and VU species but species / habitat not known in AOI.
Ferruginous duck (*Aythya nyroca*)	N	In Albania: DMU supports < 1% of the global AOO of this nationally-EN species In Italy: no DMUs identified for this species	N	Nationally CR and EN species but not found in AOI.
Stone curlew (*Burhinus oedicnemus*)	N	No DMUs identified within the project AOI	N	Nationally CR species but not known in AOI.
Black tern (*Chlidonias niger*)	N	DMU supports <1% of the global AOO of this migratory species	N	Nationally EN species but not known in AOI.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Hen harrier (*Circus cyaneus*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	Y	Nationally EN species but passage only
Corncrake (*Crex crex*)	N	In Albania: DMU supports < 1% of the global AOO of this migratory and nationally-VU species In Italy: no DMUs identified for this species	Y	Yes as globally and nationally VU species.
Merlin (*Falco columbarius*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU species	Y	Globally and nationally VU species but passage only.
Lesser kestrel (*Falco naumanni*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	Y	Yes as nationally VU species.
Peregrine falcon (*Falco peregrinus*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	Y	Yes as nationally VU species.
Collared pratincole (*Glareola pratincola*)	N	In Albania: DMU unlikely to support >1% of the global AOO of this migratory and nationally-VU species In Italy: no DMUs identified for this species	N	Nationally EN and VU species but not known in AOI.
Bonelli's eagle (*Aquila fasciata*)	N	DMU unlikely to support >1% of the global AOO of this migratory species	Y	Nationally CR and EN species, could be present in AOI in Albania but not found in AOI in Italy.
Black-winged stilt (*Himantopus himantopus*)	N	DMU unlikely to support >1% of the global AOO of this migratory species	N	Nationally EN species but not found in AOI.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Red kite (*Milvus milvus*)	N	In Albania: DMU supports < 0.3% of the global AOO of this migratory and nationally-EN species In Italy: no DMUs identified for this species	Y	Yes as nationally EN and VU species, not found within AOI in Italy.
Egyptian vulture (*Neophron perconopterus*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN species	N	EN globally and nationally VU species but not found in AOI.
Osprey (*Pandion haliaetus*)	N	DMU supports < 0.1% of the global AOO of this migratory and VU (Albania) species	N	Nationally VU species but not found in AOI.
Grey headed woodpecker (*Picus canus*)	N	DMU unlikely to support >1% of the global AOO of this migratory and VU (Albania) species	Y	Yes as nationally VU species.
Eurasian spoonbill (*Platalea leucorodia*)	N	In Albania: DMU supports < 0.1% of the global AOO of this migratory and nationally-EN species In Italy: no DMUs identified for this species	N	Nationally EN and VU species, but species / habitat not in AOI.
Avocet (*Recurvirostra avosetta*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	N	No as nationally EN species but not found in project AOI.
Little tern (*Sternula albifrons*)	N	In Albania: DMU supports <1% of the global AOO of this migratory species In Italy: no DMUs identified for this species	N	Nationally EN species but not in AOI.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Little Bittern (Ixobrychus minutus)	N	Suitable habitat (e.g. freshwater marshes, riparian vegetation) within project AOI unlikely to support >1% of the global AOO of this wide ranging, migratory species	N	Potentially found in AOI but not VU, EN, CR or endemic species
Common tern (*Sterna hirundo*)	N	DMU supports < 0.1% of the global AOO of this migratory and EN (Albania) species	N	Nationally EN species but not found in AOI.
Flowering plants (Marine)				
Posidonia oceanica	N	LC species globally and regionally. (Note Posidonia beds are critical habitat)	Y	Yes, as this species is providing ecological structure and functions particularly at the Italian landfall
Slender seagrass (*Cymodocea nodosa)*	N	Not present in sufficient density to be a bed/meadow, LC species globally and regionally.	Y	Yes, as this species is providing ecological structure and functions particularly at the Italian landfall. Furthermore *Cymodocea* meadows are provided for under Annex I of the Bern Convention and Annex I of Habitat's Directive, the latter via inclusion in the following habitat types: 1110 and 1140.
Cnidaria				

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Bamboo coral (*Isidella elongata*), Tall sea pen (*Funiculina quadrangularis*), Deepwater coral (*Lophelia pertusa*), Zigzag coral (*Madrepora oculata*), *Pennatula rubra,*various sp (*Eunicella singularis; Virgularia mirabilis; Dendrophyllia cornigera; Desmophyllum dianthus; Leiopathes glaberrima*).	Y	Qualify precautionarily as Tier 2 critical habitat triggers under Criterion 1 subsections (a) and possibly (b).	n/a	n/a
Sponges				
Honeycomb sponge (*Hippospongia communis*), *Calix nicaeensis, various sp.*	N	No as AOI unlikely to support >10% of nationally / regionally significant popn	N	No as unlikely to be present in AOI
Axinella cannabina, Axinella polypoides	Y	Qualify precautionarily as Tier 2 critical habitat triggers under Criterion 1 subsections (a) and (b).	n/a	n/a
Bony fish				
European eel (*Anguilla anguilla*)	Y	Given the dramatic stock declines of these species in recent years it is reasonable to assume that the collective area of the offshore DMUs (11,071 km2) may sustain ≥ 1% (but < 95%) of the global population, this therefore does qualify as a Tier 2 critical habitat.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Bluefin tuna (*Thunnus thynnus*)	N	Not CH as eastern Atlantic stock migrate to and congregate in the Mediterranean in the Balearic Sea.	Y	Yes as EN globally and known to occur in the wider Mediterranean region despite known breeding hotspot not being close to the Adriatic.
Twaite shad (*Alosa fallax*)	N	Screened out as known to aggregate in northern Adriatic near the mouths of large river systems.	Y	Yes as VU nationally and known to occur in Adriatic waters.
Marine turtles				
Loggerhead turtle (Caretta caretta)	Y	Triggers under Criterion 1 Tier 2 subsection (a) and Criterion 3 Tier 2 subsection (a).	n/a	n/a
Green turtle (*Chelonia mydas*)	N	Screened out as extremely rare visitor / vagrant	Y	Yes as species is listed globally as EN and nationally as CR and the possibility of occurrence within AOI cannot be ruled out.
Leatherback turtle (*Dermochelys coriacea*)	N	Screened out as extremely rare visitor / vagrant	Y	Yes as species is listed globally as VU and nationally as CR and the possibility of occurrence within AOI cannot be ruled out.
Hawksbill (*Eretmochelys imbricate)*	N	Screened out as extremely rare visitor / vagrant	Y	Yes as species is listed globally as CR and the possibility of occurrence within AOI cannot be ruled out.

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Kemp's Ridley turtle (*Lepidochelys kempii*)	N	Screened out as extremely rare visitor / vagrant	Y	Yes as species is listed globally as CR and the possibility of occurrence within AOI cannot be ruled out.
Marine mammals				
Fin whale *(Balaenoptera physalus)*	Y	Triggers CH under Criterion 1 Tier 2 subsection (a) and/or (b)	n/a	n/a
Bottlenose dolphin *(Tursiops truncatus)*	Y	Triggers CH under Criterion 1 Tier 2 subsection (a) and/or (b) and Criterion 3 Tier 2 subsection (a)	n/a	n/a
Striped dolphin *(Stenella coeruleoalba)*	Y	Triggers CH under Criterion 1 Tier 2 subsection (a) and/or (b) and Criterion 3 Tier 2 subsection (a)	n/a	n/a
Cuvier's beaked whale *(Ziphius cavirostris)*	Y	Triggers CH under Criterion 3 Tier 2 subsection (a)	n/a	n/a
Risso's dolphin *(Grampus griseus)*	Y	Triggers CH under Criterion 3 Tier 2 subsection (a)	n/a	n/a
Mediterranean monk seal	N	Regional extinction of species within Adriatic,	Y	Yes as species is listed

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
(*Monachus monachus*)		occasional vagrant individuals recorded but species does not regularly occur in AOI		globally EN and nationally as CR and the possibility of occurrence within AOI cannot be ruled out.
Short-beaked common dolphin (*Delphinus delphis*)	N	Screened out as extremely rare visitor / vagrant	Y	Yes as EN regionally and nationally and also VU nationally and the possibility of occurrence within AOI cannot be ruled out.
Habitats				
Reef	Y	It is possible that deepwater coral may exist in the vicinity of the offshore pipeline route within the offshore DMU. Deepwater coral and deepwater sponge communities are cited within the designation of the South Adriatic Ionian Strait EBSA that is transected by much of the offshore TAP route, a site proposed following publication of the TAP ESIAs. Overall, it is therefore considered that all DMUs do qualify as critical habitat for reefs. As reefs exist in nearshore areas, and have the potential to exist in deep water offshore (see Criterion 5) a conservative precautionary assessment concludes reefs qualify as critical habitat under this criterion.	n/a	n/a
Submarine structures made by leaking gases	Y	As a conservative assessment in the absence of more detailed information, it is therefore considered that submarine structures made by leaking gases qualify as potential critical habitats under Criterion 6.	n/a	n/a

Species / Habitat	CH Y?	CH Rationale	PBF Y/N	PBF Rationale
Posidonia oceanica beds	Y	Posidonia is not present in the 'meadow' form (greater shoot density and a larger spatial extent) required to constitute Annex I habitat in the nearshore area and evidence indicates that the area of the microtunnel exit is not of high importance to this species. However, based on the presence of nearby SCIs within the project AOI at the Italian landfall this does qualify as Tier 2 critical habitat.	n/a	n/a
South Adriatic and Ionian Strait EBSA	Y	Each of the qualifying features of the ESBA have been individually assessment in detail as part of this CHA but the site as a whole also triggers critical habitat under Criterion 4 as a site containing unique assemblages of species including assemblages or concentrations of biome-restricted species.	n/a	n/a