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ENVIRONMENTAL IMPACT STUDY
of the project

" Wind farm with an installed capacity of 44 MW in the "Polemistis" position of the Municipalities of Komotini & Arrianon, the Municipalities of Komotini & Organi, P.E. Rodopi,

Compilation of Study

Δ. ΑΡΓΥΡΟΠΟΥΛΟΣ
σύμβουλοι περιβάλλοντος Α.Ε.

April 2024

CHAPTER 1: INTRODUCTION

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Abbreviations - Definitions

A/C	Wind turbine
AEO	Decision on the approval of environmental conditions
AP	Wind farm
AP	Renewable Energy Sources
ASPHE	Wind Power Plant Power Generation
OPHSAA RES	Special Spatial Planning and Sustainable Development Framework f o r Renewable Energy Sources
GIS	General Urban Plan
ZOE	Residential Control Zone
SPSP	Open City Spatial and Housing Organisation Plan
IC	Municipal Unit
TK	Local Community
OJ	Waste water treatment plants
NATIONAL WEATHER SERVICE	National Weather Service
BME	Environmental Impact Assessment
MS	Weather Station
MSTH	Average Sea Level
MT	Average voltage
GM	Transmission line
PESDA	Regional Waste Management Plans
IP	Regional Section
RAE	Energy Regulatory Authority
GCC	Flood Risk Management Plans
SWAP	River Basin Management Plan
H/S	Substation
HYT	High Voltage

1 INTRODUCTION

This Environmental Impact Assessment (EIA) has been prepared in accordance with the provisions of Chapter A of Law 4014/2011, as amended by Law 4685/2020 and in force. In particular, this EIA was prepared in accordance with the specifications of Annex 2 "*Basic Specifications of Environmental Impact Studies for projects and activities*" and Annex 4.10 "*Group 10η "Renewable Energy Sources*" of Ministerial Decision 170225/2014 (Government Gazette 135/B/27.01.01.2014) concerning Environmental Impact Studies for projects and activities of category A, while the Special Ecological Assessment Study included in this EIA was prepared in accordance with the specifications of Annex 3.2 "*Specifications of the Special Ecological Assessment Study (SEA)*" of the aforementioned Ministerial Decision.

1.1 TITLE OF PROJECT

The title of the project is:

44 MW ASPEE at the location 'Polemmistis', in the Municipal Units of Komotini and Organi, Municipalities of Komotini and Arrianon, Regional Unit of Rodopi, Region of Eastern Macedonia and Thrace

1.2 TYPE AND SIZE OF THE PROJECT

It is a wind farm in the location "Polemistis", which is developed in 1 polygon and includes a total of 11 wind turbines, each with a capacity of 4.0 MW, which are developed along ridges. The total installed capacity of the ASPHE is 44 MW. The wind farm's accompanying projects include the construction of new access roads to the wind farm, with a length of 11,182.63m, the improvement of existing roads, as well as the installation of the MT grid for the interconnection of the wind farm with the existing MT/150kV "Flamburo" Voltage Booster (for connection of wind turbines).

1.3 GEOGRAPHICAL LOCATION AND ADMINISTRATIVE AFFILIATION OF THE PROJECT

1.3.1 Location

The location of the project is shown on **Figure 1.3-1** below, as well as on the Orientation Map (Chapter 15) of this study. The wind farm site station is located in the Local Community of Kalhantos, of the Municipal Unit of Komotini, of the Municipality of Komotini and a small part of the installation polygon of the ASPIE falls within the Municipal Community of Organi, of the Municipal Unit of Organi, of the Municipality of Arrianon, of the Region of Eastern Macedonia and Thrace.

Figure 1.3-1: Location of the project

1.3.2 Geographical coordinates of the project

The geographical coordinates of the tops of the land within which the proposed A/C are located are given in the following tables according to the Greek Geodetic Reference System 1987 (ΕΓΣΑ 87) and the World Geodetic System 1984 (WGS 84).

Table 1.3-1: Geographical coordinates of the positions of the A/Cs (ΕΓΣΑ 87 - WGS 84)

A/A	ΕΓSA '87		WGS '84	
	X	Y	λ	φ
A/C 1	630595,345	4572505,875	25,56156865	41,29598652
A/C 2	631145,480	4572498,203	25,56813529	41,29582813
A/C 3	631611,673	4572399,368	25,57367994	41,29486222
A/C 4	632086,755	4572507,258	25,57937545	41,29575600
A/C 5	631401,593	4573456,765	25,57140032	41,30441762

A/C 6	631803,477	4573236,410	25,57615139	41,30236786
A/C 7	632092,086	4572914,405	25,57952756	41,29942119
A/C 8	632351,354	4573615,171	25,5827758	41,30568854
A/C 9	631782,911	4574235,508	25,57612249	41,31136737
A/C 10	632147,963	4574494,530	25,58053834	41,31363988
A/C 11	632648,666	4573973,357	25,58640421	41,30886485

Table 1.3-2: Geographical coordinates of the ASPHE polygon (ΕΓΣΑ 87 - WGS 84)

Coordinates of Polygon vertices (A/C 1 - A/C 11)		
A/A	**X**	**Y**
A1	630340,39	4572569,003
A2	630474,242	4572892,15
A3	630800,301	4572950,714
A4	631120,538	4572892,15
A5	631150,436	4572819,97
A6	631435,524	4572938,057
A7	631600,897	4572869,557
A8	631533,783	4573031,583
A9	631454,494	4572998,741
A10	631131,346	4573132,593
A11	630997,494	4573455,741
A12	631131,346	4573778,888
A13	631454,494	4573912,741
A14	631777,641	4573778,888
A15	631897,236	4573490,161
A16	631924,723	4573501,547
A17	631909,262	4573538,872
A18	632007,618	4573776,326
A19	631697,178	4573904,914
A20	631563,326	4574228,062
A21	631697,178	4574551,21
A22	631963,948	4574661,71
A23	631995,53	4574635,541
A24	632095,357	4574592,211
A25	632278,661	4574553,648
A26	632323,445	4574559,506
A27	632343,474	4574551,21
A28	632403,43	4574406,464
A29	632579,587	4574479,266
A30	632573,746	4574317,073
A31	632561,039	4574245,57
A32	632494,721	4574175,972
A33	632532,548	4574129,074
A34	632632,824	4574099,366

A35	632675,722	4574045,398
A36	632832,335	4574008,214
A37	633041,031	4573890,63
A38	632971,879	4573727,924
A39	632778,187	4573647,694
A40	632823,262	4573538,872
A41	632675,457	4573225,351
A42	632418,065	4573103,33
A43	632433,526	4573066,004
A44	632323,157	4572799,551
A45	632403,339	4572766,338
A46	632537,192	4572443,19
A47	632403,339	4572120,042
A48	632080,293	4571994,779
A49	631757,044	4572120,042
A50	631743,894	4572151,788
A51	631435,524	4572024,057
A52	631112,376	4572157,909
A53	631082,478	4572230,09
A54	630797,39	4572112,003
A55	630474,242	4572245,855
A1	630340,39	4572569,003

Table 1.3-3: Geographical coordinates of characteristic points of the MT network route

A/N	x	y	φ	λ
1	631846	4572132	41.29241939	25.57642858
2	631954	4572001	41.29122631	25.57769559
3	632078	4571790	41.28930399	25.57912728
4	632007	4571636	41.28792353	25.57824651
5	631894	4571192	41.28394942	25.5768029
6	631662	4571029	41.28252179	25.57399848
7	631715	4570903	41.28137636	25.574602
8	631841	4570603	41.27865034	25.5760368
9	631695	4570041	41.27361895	25.57417295
10	631272	4569624	41.26993343	25.56904041
11	631362	4568971	41.26403924	25.56996399
12	631048	4568349	41.25848358	25.56608892
13	630909	4567916	41.25460716	25.56433606
14	630839	4567174	41.24794355	25.56333738
15	630910	4566934	41.24576978	25.56413488
16	631001	4566415	41.24107628	25.56511209
17	631297	4565873	41.23614715	25.56852912
18	631276	4565546	41.2332108	25.56820114
19	631680	4564465	41.22340746	25.57278538

20	631757	4563485	41.21457373	25.57349569
21	632207	4562971	41.20987205	25.57874898
22	631592	4562269	41.20365368	25.57126091
23	630828	4560806	41.1906026	25.56185039
24	631524	4559410	41.17791708	25.56983984
25	631886	4558577	41.17035976	25.57397204
26	632037	4557108	41.15710561	25.57545999
27	632131	4557161	41.15757042	25.57658849
28	632438	4555964	41.14674202	25.57998724
29	632351	4554984	41.13792633	25.57873637
30	633416	4554921	41.13718847	25.59141467
31	633710	4554263	41.13121189	25.59477442
32	633923	4554441	41.13277785	25.59734285
33	634159	4554248	41.13100575	25.60010899
34	634240	4554136	41.12998473	25.60105518

* The points of the common path of the interconnection network and the road network are marked in grey outline

Table 1.3-4: Geographical coordinates of access road feature points

A/N	x	y	φ	λ
1	631715	4570903	41.28137636	25.574602
2	631662	4571029	41.28252179	25.57399848
3	631894	4571192	41.28394942	25.5768029
4	632007	4571636	41.28792353	25.57824651
5	632078	4571790	41.28930399	25.57912728
6	631954	4572001	41.29122631	25.57769559
7	631846	4572132	41.29241939	25.57642858
8	631725	4572196	41.29301419	25.57499283
9	631512	4572011	41.29138824	25.57241004
10	631449	4572251	41.2935537	25.57171228
11	631109	4572322	41.29424949	25.56766928
12	630886	4572443	41.29537615	25.56503431
13	630793	4572577	41.29659782	25.56395278
14	631118	4572666	41.29734965	25.56785158
15	631307	4572741	41.29798955	25.57012643
16	631395	4573131	41.30148989	25.57125869
17	631452	4573428	41.30415059	25.57200849
18	631677	4572267	41.29366177	25.574442
19	631462	4572389	41.29479949	25.57189651
20	631308	4572429	41.29518545	25.5700755
21	631675	4572502	41.29577892	25.57446718
22	632021	4572696	41.29746917	25.57864031
23	632154	4572739	41.29783456	25.58023762
24	631980	4572821	41.29860142	25.57817792
25	631832	4573059	41.30076865	25.57646244
26	632176	4573001	41.30018977	25.58055632

27	632267	4573285	41.30273235	25.58170561
28	632290	4573427	41.30400718	25.58201115
29	632435	4573725	41.30666663	25.5838075
30	632511	4574066	41.30972459	25.5847894
31	632502	4574371	41.31246877	25.5847466
32	632377	4574532	41.31393973	25.58328918
33	632026	4574247	41.3114332	25.57903963

* The points of the common route of the interconnection network and the new road are marked in grey outline

1.4 CLASSIFICATION OF THE WORK

The project, based on the YA 1958/2012, as amended, codified and in force and in particular based on the YA YPEN/DIPA/17185/1069/2022, (Government Gazette B΄841), belongs to the 10η Group "*Renewable Energy Sources and Individual Energy Storage Plants*", with serial number 1.a "*Onshore Wind Power Generation*". The project concerns RES-E with a capacity of 6.5 < P ≤ 45 MW and a High Voltage interconnection length L < 20 km (only the construction of an underground medium voltage transmission line is foreseen) and is therefore classified in **Subcategory A2.**

Accompanying projects (e.g. roads, interconnection network, etc.) follow the category of the main project, as indicated in the 'Remarks' column of the relevant Table of Categorisation of Projects in Group 10ης , as none of them are classified independently in a higher category of projects.

In view of the above, the project is classified in Category A and specifically in A2 Subcategory for all interventions.

The classification of the project/activity according to the Greek and European statistical classification of economic activities (STAKOD and NACE respectively), belongs to sector D with codes 35.11 "Production of electricity", 35.12 "Transmission of electricity" and 35.14 "Trade in electricity".

1.5 PROJECT PROMOTER

Implementing body **"WPD ΑΙΟΛΙΚΗΙΚΗ ENERGY 1 M.I.K.E."**

Ave. 3 Pentelis Avenue, TK 15235, Athens, Greece

Tel: 210 1993553

Lt. Comm: M. Diamantopoulos

1.6 ENVIRONMENTAL CONSULTANT FOR THE PROJECT

The preparation of this EIS was carried out by the design office:

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The coordination of the study was carried out by D. Argyropoulos who holds a category 27 (environmental studies) class C degree with a study team of scientists presented below.

STUDY TEAM

1	Dimitrios Argyropoulos	Civil Engineer - Hygienist
2	Konstantinos Katsoulis	Environmental Engineer
3	Rebecca Batmanoglou	Chemist (consultant)
4	Daphne Christofidou	Agronomist, MSc Environment and Development
5	Georgia Varvitsioti	Spatial Engineer, MSc Environment and Development
6	Lazaros Doanidis	Environmental Engineer, MSc Hydrologist
7	Socrates Tsigardas	Environmental Engineer, MSc Water Resources Management
8	Ismeni Gurchoulis - Antoniadou	Biologist, MSc Ecology, Evolution and Conservation Biology
9	Konstantinos Mantzios	Environmental Engineering MSc
10	Myrto Argyropoulou	Chemical Engineer NTUA MSc DIC Environmental Engineering and Business Management
11	Marcella Katsanevaki	Environmental Engineer

CHAPTER 2: NON-TECHNICAL SUMMARY

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2 NON-TECHNICAL SUMMARY

2.1. INTRODUCTION

The title of the project is:

44 MW ASPEE at the location 'Polemmistis', in the Municipal Units of Komotini and Organi, Municipalities of Komotini and Arrianon, Regional Unit of Rodopi, Region of Eastern Macedonia and Thrace

It is a wind farm in the location "Polemistis", which is developed in 1 polygon and includes a total of 11 wind turbines, each with a capacity of 4.0 MW, which are developed along ridges. The total installed capacity of the ASPHE is 44 MW. The wind farm's accompanying projects include the opening of new access roads to the ASPHE, 7.22km and 3.96km long, the improvement of existing roads, and the installation of the MT grid for the interconnection of the wind farm with the existing MT/150kV "Flamburo" MT/150kV step-up substation (for connection of gensets).

Image from 2-1: Project location

The location of the project is shown in above image above, as well as on the Orientation Map (SEA2 - Orientation Map | Annex) of this study. The site of the wind farm is located in the Local Community of Kalhantos, of the Municipal Unit of Komotini, of the Municipality of Komotini and a small part of the installation polygon of the wind farm falls within the Municipal Community of Organi, of the Municipal Unit of Organi, of the Municipality of Arrianon, of the PE Rodopi of the Region of Eastern Macedonia and Thrace.

The project, based on the YA 1958/2012, as amended, codified and in force and in particular based on the YA YPEN/DIPA/17185/1069/2022, (Government Gazette B΄841), belongs to the 10η Group "*Renewable Energy Sources and Individual Energy Storage Stations*", with serial number 1.a "*Electricity generation from onshore wind energy*". The project concerns RES-E with a capacity of 6,5 < P ≤ 45 MW and with a High Voltage interconnection length L < 20 km (only the construction of an underground medium voltage transmission line is foreseen) and is therefore classified in **Subcategory A2.**

Accompanying projects (e.g. roads, interconnection network, etc.) follow the category of the main project, as indicated in the "Remarks" column of the relevant Table of Categorisation of Projects of Group 10ης , as none of them are classified independently in a higher category of projects.

The implementing and managing body of the project is "**WPD ΑΙΟΛΙΚΗ ENERGY 1 M.I.K.E.**" .

2.2. COMPATIBILITY OF THE WORKS WITH ESTABLISHED SPATIAL AND PLANNING OBLIGATIONS OF THE REGION

Looking at the study area, the following can be seen:

- The project is located outside of settlement boundaries and outside of city plans.
- At a distance of more than 8.1 km and south of the ASPEO, the defined settlement of Drymi is located, with a permanent population of 302 inhabitants according to the 2011 census.
- At a distance of >9.1 km southwest of the nearest A/E of the examined ASPHE, the settlement Ardeia is located, with a permanent population of 27 inhabitants, according to the 2011 census.

It is noted that the distances from the A/Cs under consideration are measured from the centre of the pillars of the nearest A/C, since it is a fixed and dimensionless point.

The development polygon of the project under study is located outside the national system of protected areas. Access to the project area will be provided mainly by the existing rural and rural-forestry network in the area, where interventions and improvements are proposed in order to meet the manufacturer's specifications for the movement of the A/C equipment, as well as the opening of new small road sections. All of these projects are located outside the national system of protected Natura sites. The planned underground medium-voltage transmission line is located outside protected areas of the Natura network.

The licensed ESDP is located outside Special Protection Areas (SPAs) or Special Areas of Conservation (SACs). In particular, the Special Protection Area for avifauna called 'Filiouri Valley', code GR1130011 and area of 37.565,9 ha GR1130011 is located at a distance of >10,5 km.

In the wider area and at a distance of more than 1.8km from the nearest A/E of the considered EWS up to 22km, the following Wildlife Refuges are located:

- K805 - "Petarmon-Adas of the Municipality of Komotini",
- K799 - "Nymphaea of the Municipality of Komotini" and
- K798 - "Arrianon-Nea Sanda Municipalities of Arrianon-Sapes".

Both the A/C under study, the accompanying works and the site of the existing water supply system are located outside the above areas and at a distance of at least 1.5 km. Regarding the medium voltage transmission line, a part of it passes within the boundaries and within the Wildlife Refuge K805 "Patermon - Ada"; however, the entire interconnection cable is designed to run underground up to the existing substation.

In the study area there are no small island wetlands, as defined by Government Gazette 229/AAPTH/19-06-2012.At a distance of more than 34.5km southwest of the wind turbine site, the Ramsar Wetland 'Lake Vistonis, Porto Lagos, Lake Ismaris and adjacent lagoons' is located, with an area of 24.396ha.

Important Bird Areas (IBAs) are defined as areas of highest priority for the conservation of biodiversity in general and for the protection of birds in particular, which are often irreplaceable or vulnerable, as they regularly host significant populations of one or more threatened, endemic or synanthropic species. The A/Cs of the considered ESDP project are located within the boundaries of the Important Bird Area (BSA) 'Filiouris Valley and Eastern Rhodopes', code GR008.

For the Municipal and Local Communities of the Municipalities of Komotini, Iasmos, Maroneia-Sapes and Arrianon of the Municipality of Rodopi, a Forest Map has been posted with the Decision of the Forestry Directorate of Rodopi (IDA: O2ONOR1Y-KN7).Specifically, according to the posted maps[1] , the project passes through areas that fall under par. 1,2,3,4 and 5 of article 3 of Law 998/79 as in force, but also from non-forested areas. The area of the polygon of the installation of the ASPIE under licensing has been classified as forest land (with forest designation DD, AD and DA), while in much smaller parts there are areas of non-forest land (with AA designation). With regard to the access road, it passes mainly through forested areas (with forest designation AD, DA AD and PD), while only 62 m of the 11.1 km are in non-forested areas, the MT interconnector passes through forested (in most of its >85% of its alignment) and non-forested areas. The location of the Voltage Raising Substation is located in non-forested land with a Final Act.

The proposed ESDP is located outside of heritage sites and monuments and the area is not part of an archaeological zone. No archaeological sites with Absolute Protection Zones are identified in the wider area.

According to the Permanent List of the Declared Archaeological Sites and Monuments of Greece[2] , the following areas of archaeological interest are listed, which are located at a significant distance from the project site:

- Monument of the Fortified enclosure of Asar-Tepé Sarakinis in Rodopi (Government Gazette

[1]https://gis.ktimanet.gr/gis/forestsuspension, April 2023.

[2] http://listedmonuments.culture.gr/search_declarations.php?v1=03&v18=1&v11=&v13=&v14=&v15=&v16=&v5=&v6=&v7=&v8=&v9=&v10=&v12=&v17=&v18=1&v2=0305&v3=030503&v19=111

468/B/1981), at a distance of >1.4km southwest of the project.

- Archaeological site Kale Tepe Nymfaias hill in Rodopi (Government Gazette 731/B/1979) at a distance of >9.8 km southwest of the project.
- Kale-Teppe Nymphaea perimeter (Government Gazette 731/B/1979) at a distance of >13.7 km southwest of the project.

The ESDP site under study is located at great distances from productive zones of the secondary and tertiary sector and at great distances from quarrying and mining areas.

From the analysis carried out regarding the compatibility of the proposed project with the regulations, restrictions, objectives and guidelines of the Strategic and Regulatory Spatial Planning at both National and Regional level, **the project is compatible** and in compliance with the established spatial and urban planning commitments. Furthermore, it does not contradict the measures and the guidelines and objectives of the Special Management Plans.

In addition, the examination of the compatibility of the project with the Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources by KYA 49828 (Government Gazette 2464B/03.12.2008), showed that the project is fully compatible.

2.3. BRIEF DESCRIPTION OF THE DESIGN OF THE PROJECTS

The proposed power generation facility will have a total installed and delivered power of 44 MW and will include eleven (11) gensets of indicative type VESTAS V-150, with a nominal power of 4.0 MW each, in forest areas mainly on the Greek-Bulgarian border 8.1 km north of the settlement of Drymi.

Each wind turbine consists of a 125 m high metal tower, on top of which the wind turbine's spindle rests. The main equipment of the wind turbine is mounted on the nacelle, consisting of the main shaft on which the hub and the rotor of the 150 m diameter wind turbine, the speed multiplier and the generator are mounted. The total height of the wind turbine (tower, nacelle, rotor) is 200 m.

The A/Cs are arranged at an appropriate distance from each other, which is greater than the minimum distance equal to 2.5 times the diameter of the A/C blade (2.5 x 150 = 375 m), in order to avoid aerodynamic shading and high wind turbulence and to optimise their energy efficiency, reducing their wear and tear and increasing the lifetime of the installation.

The following data were taken into account for the **placement of the A/Gs:**

- Terrain topography and possible presence of local obstacles/ anomalies,
- Prevailing wind directions,

- Soil morphology and foundation suitability A/C,
- Restrictions in the relevant legislation on keeping distances from roads, settlements and other restricted areas.

The project under study is developed within a polygon, for which a Producer's Certificate has been granted by RAE (attached to the Annex to the Documents).

The interventions for the construction and operation of the ASPEO concern:

- Access road deck improvement,
- Deck improvement and construction of short new sections of internal road network,
- Excavation of foundations of A/G,
- Excavation of Low/Medium Voltage and Low Voltage and Low Voltage cable ducts parallel to the internal roads,
- Landscaping of squares around the locations of the A/Gs,
- Backfilling/landscaping,
- Excavation of MT cabling channel up to the existing voltage boosting substation,

The existing road will be used to access the project, then new road sections will be constructed or existing road sections of the local network will be improved to access the A/C sites and their connection. The improvement mainly includes works in terms of deck thickness and strength, mainly at curve locations. The length of the road network required is 11,182.63m.

All the electricity produced will be exclusively supplied to the National Electricity Transmission System of ADMIE through a medium voltage (20kV) transmission line and a 20/150kV step-up substation. The total length of the interconnection line is 25 km, the entire route of which is designed to be installed underground.

The total permanent occupation of land by the project squares is approximately 50 acres of mostly forest land.

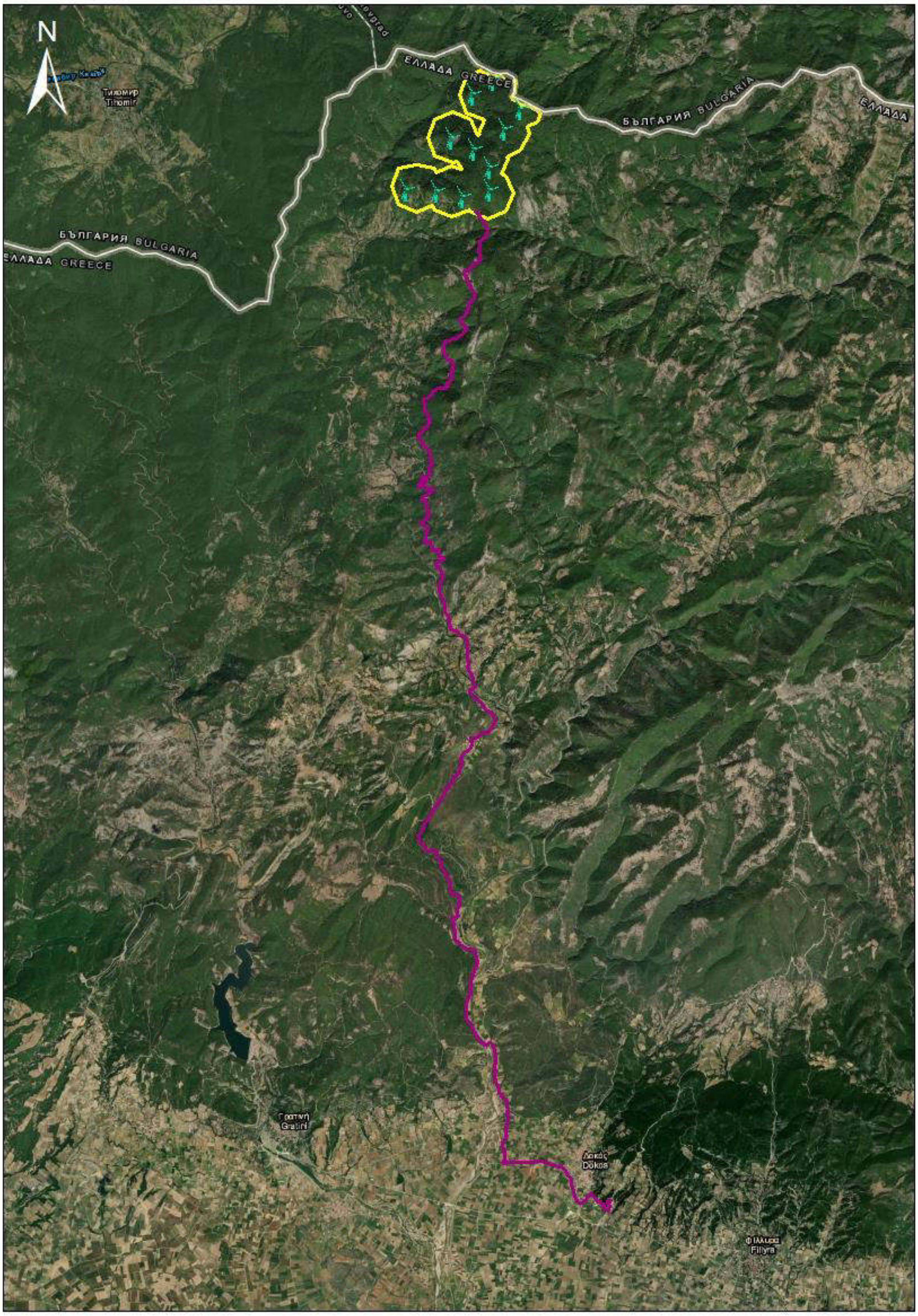

Image from 2-2: Project location

(the polygon is shown in yellow, the Medium Voltage line and the Voltage Booster Substation in purple)

2.4. ENVIRONMENTAL IMPACT ASSESSMENT

The assessment of the environmental impacts on all aspects of the natural and man-made environment, both during the construction and operation phases, shows that the project as a whole will have minor and localised impacts, while in some cases it will have neutral or even positive impacts. The examination of any cumulative impacts has shown that there is a potential for cumulative impacts only for the landscape parameter, but even these will be minor given the scale of the projects.

Table 2.4-2: Summary of the intensity and characteristics of impacts on individual environmental parameters during the construction phases

Environmental parameters	Impact						
	Probability of occurrence	Type and Tension	Extent- geographical area	Chronic display horizon	Duration/repeat possibility	Preventability/preventability avoidance	Synergistic / cumulative Action
Climatic and bioclimatic characteristics	Small	-	Local	Short-term		Yes	
Morphological and landscape characteristics	Small	-	Local	Short-term	Provisional	Yes	No
Geological, tectonic and soil characteristics	Small	-	Local		Permanent		No
Flora- ecosystems		O					No
Fauna (excluding avifauna)	Small	-	Local	Short-term	Provisional	Yes	No
Avifauna (SPA GR008)	Small	-	Local	Long-term	Permanent	Yes	No
Areas of the National. National System of Protected Areas		O					
Forests and woodlands	Medium	-	Local	Short-term	Permanent	Yes	No
Spatial planning - land use	Small	-	Local	Short-term	Permanent	No	No
Structure and functions of the man-made environment		+	Local	Short-term	Permanent		No
Cultural heritage		O					
Socio-economic impact	Medium	++	Greater	Short-term	Permanent		No
Technical infrastructure	Small	-	Local	Short-term	Provisional	Yes	No
Correlation with anthropogenic pressures		O					
Air quality	Small	-	Local	Short-term	Provisional	Yes	No
Noise/vibrations	Small	-	Local	Short-term	Provisional	Yes	No
Electromagnetic fields		O					
Inland waters		O					

Table 2.4-3: Summary of intensity and characteristic impacts on individual environmental parameters during the full operation phase

Environmental parameters	Impact						
	Probability of occurrence	Type and Tension	Extent- geographical area	Chronic display horizon	Duration/repeat possibility	Preventability/p reventability avoidance	Synergistic / cumulative Action
Climatic and bioclimatic characteristics	Small	++	Greater	Medium-term	Permanent		Yes
Morphological and landscape characteristics	Small	-	Local	Long-term	Permanent	Yes	No
Geological, tectonic and soil characteristics		O					
Flora- ecosystems		O					
Fauna (excluding avifauna)		O					No
Avifauna (SPA GR008)	Small	-	Local	Long-term	Permanent	Yes	No
Areas of the National. National System of Protected Areas		O					
Forests and woodlands	Medium	-	Local	Short-term	Permanent	Yes	No
Spatial planning - land use		O					
Structure and functions of the man-made environment	Medium	+	Local	Long-term	Permanent		No
Cultural heritage		O					
Socio-economic impact	Medium	++	Greater	Long-term	Permanent		No
Technical infrastructure	Small	+	Local	Short-term	Permanent		No
Correlation with anthropogenic pressures		O					
Air quality	Medium	++		Long-term	Permanent		Yes
Noise/vibrations	Small	-	Local	Long-term	Permanent	No	No
Electromagnetic fields		O					
Inland waters		O					

2.5. PROGRAMME OF IMPACT MITIGATION AND ENVIRONMENTAL MONITORING MEASURES

Although the project will result in minor and localised negative impacts during the construction phase, some mitigation measures are required. The application of good construction practices, adherence to a rational construction schedule and compliance with Greek and EU legislation on construction works and the specifications of the machinery and materials used will be sufficient to mitigate the impact.

In order to ensure the effective protection of the environment and the implementation of the proposed measures, as presented in chapter 10 of the EIA, it is proposed to prepare an Environmental Management Plan (EMP) for the project, in accordance with the specifications of Law 4014/2011.

In order to avoid disturbing the balance of the ecosystem, it is proposed to design and implement a monitoring programme for avifauna, which will start with the commencement of the construction of the A/P, and will continue for at least the first three years of its operation. In this way it can be confirmed that there are no impacts on birdlife, otherwise additional measures will have to be taken. The programme will focus on the following objectives:

- the monitoring of significant environmental parameters related to the impacts of the project (Chapter 9 of this EIA) and the monitoring of the effectiveness of the implementation of the proposed mitigation measures (Chapter 10 of this EIA),
- the recording and maintenance of data documenting the implementation of the proposed measures and allowing their effectiveness to be monitored,
- providing information to public authorities and the public on the basis of the applicable legislation.

2.6. BENEFITS FROM THE IMPLEMENTATION OF THE PROJECT

The importance of the project focuses on the following areas:

(a) the environmental contribution of the project,

b) the importance of exploiting a renewable natural resource (wind potential of the area),

(c) enhancing available power (contributing to energy sufficiency) by making the national energy system less dependent, which is particularly important after the recent developments with the war in Ukraine.

The use of Renewable Energy Sources (RES) technology, such as wind farms, for electricity generation, partly replacing the use of conventional sources, offers several environmental advantages, notably:

- no gaseous pollutants (e.g. CO_2 , NO_X) are emitted that contribute to global warming, as is the case with conventional fuels,
- natural resources, such as fossil fuels, are not consumed.

The necessity of the project is highlighted mainly at the political and economic level. The emerging binding treaties at the level of the European Union for a substantial increase in the participation of Renewable Energy Sources in the electricity production of the Member States in the coming years, make it an imperative obligation for Greece to partially substitute the domestically produced energy with conventional polluting fuels from renewable energy sources. In addition, the immediate implementation of the annual financial burden on countries that exceed the carbon dioxide (CO_2) emission limits set by international treaties is expected to have an impact on the country's development. The burden is expected to be shared proportionally among domestic polluting industries, with a significant impact on their competitiveness. The use of renewable energy sources helps both to reduce emissions and to minimise the fine imposed by the concentration of green certificates.

At the national level, the installation and operation of the project is of particular importance due to the following benefits that will result from its use:

- Quiet operation, zero emissions, minimal maintenance requirements, long service life and reliable operation.
- Production of 102 GWh per year, as derived from the calculations of the project's energy potential (deducting losses). Considering that for 2017 the country's total electricity consumption was 51.9 TWh (Source: Energy Institute of South East Europe, 2019) it implies that the project alone can provide 0.2% of the electricity consumed in the country.
- Exploiting a domestic and abundant renewable energy source, contributing to the security of energy supply.
- Reduction of grid losses, with decentralised power generation, lightening of lines and postponement of investments in networks.
- Gradual decoupling from conventional centralised power stations and all forms of imported energy and ensuring energy supply through decentralised generation.
- Contributing to sustainable development, quality of life and environmental protection in urban centres and the periphery.
- Developing economic activities with an impact on society as a whole.
- Creating new jobs.

All of the above shows the expected benefits at local, regional and national level.

2.7. ALTERNATIVE SOLUTIONS

The No Action Alternative A0 of no project implementation was considered, as well as the alternatives that include:

- Alternative A1: Installation of 11 gensets, which will produce the same annual energy as the considered RES-E, in an area west of the proposed solution, outside protected areas and areas of importance for birds. More specifically, the RES-EU of Alternative A1 is located more than 2.5 km from the boundary of the SPA GR008 "Valley of Filliouris and Eastern Rhodopes", on peaks close to the Hellenic-Bulgarian border.
- Alternative A2: Installation of a Photovoltaic Power Plant of equivalent installed capacity to the proposed PPA, i.e. 44 MW, which would require a polygon of a total area of approximately 260 acres. Its location would be further southwest of the settlement of Ano Drosini, on rural land where the slopes allow for the installation of a PV station.
- Alternative A3 (proposed solution): 11 gensets of indicative type VESTAS V-150, of nominal power of 4.0 MW each, in forest areas mainly on the Greek-Bulgarian border, 8.1km north of the settlement of Drymi. The rotor of the wind turbine has a diameter of 150 m, while the total height of the wind turbine (tower, fuselage, rotor) is 200 m.

The comparative consideration of all alternatives resulted in the proposed solution A3, as designed and presented in Chapter 6, to be the optimal solution for the implementation of the 44 MW RES-EPP at the location "Polemmistis" in the Municipalities of Komotini and Organi, of the Municipalities of Komotini and Arrianon, of the P.E. Rodopi and the achievement of significant benefits for the natural and man-made environment (at local and national level) and the local community, with the least possible impacts, compared to alternatives A1 to A3 and the no solution.

The choice of the site was made after a thorough examination of the area, in order to make the best use of the high wind potential and to meet the restrictions provided for in the relevant legislation for the protection of the environment, the existing settlements and the general activities of the wider area.

The placement of the wind turbines was carried out taking into account the following criteria:

- The maximum efficiency of the RES-E system, which is ensured by the appropriate placement of wind turbines at points with high wind potential. The identification of the points of high wind potential has been carried out after collecting multi-year wind data from metrological masts installed in the area and using specialized flow field analysis software.

- The minimization of the environmental impact of the construction and operation of the wind farm.

CHAPTER 3: SUMMARY DESCRIPTION OF THE PROJECT

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Schemes

3. BRIEF DESCRIPTION OF THE PROJECT DESIGN

3.1 MAIN ELEMENTS OF THE PROJECT

This chapter contains a brief description of the project:

44 MW ASPEE at the location 'Polemmistis', in the Municipal Units of Komotini and Organi, Municipalities of Komotini and Arrianon, Regional Unit of Rodopi, Region of Eastern Macedonia and Thrace.

The project promoter is "**WPD Aeoliki Energia 1 MIKE**"

The project under study has been designed according to the following principles:

(a) the energy efficiency shall be at a satisfactory level,

(b) its construction requires the least possible interventions and has the least possible impact on the environment; and

(c) its operation has the least possible impact on the environment

The proposed power generation facility will have a total installed and delivered power of 44 MW and will include eleven (11) gensets of indicative type VESTAS - V150, with a nominal power of 4.00 MW each, in forested areas mostly on the Greek-Bulgarian border, 8km north of the settlement *"Drymi"* of the Municipality of Komotini.

Each wind turbine consists of a 125 m high metal tower, on top of which the wind turbine's spindle rests. The main equipment of the wind turbine is mounted on the nacelle, consisting of the main shaft on which the hub and the rotor of the 150 m diameter wind turbine, the speed multiplier and the generator are mounted. The total height of the wind turbine (tower, nacelle, rotor) is 200 m.

The A/Cs are arranged at an appropriate distance from each other, which is greater than the minimum distance equal to 2.5 times the diameter of the A/C blade (2.5 x 150 = 375 m), in order to avoid aerodynamic shading and high wind turbulence and to optimise their energy efficiency, reducing their wear and tear and increasing the lifetime of the installation.

The following data were taken into account for the **placement of the A/Gs:**

- Terrain topography and possible presence of local obstacles/ anomalies,
- Prevailing wind directions,

- Soil morphology and foundation suitability A/C,
- Restrictions in the relevant legislation on keeping distances from roads, settlements and other restricted areas.

The project under study is developed within a 3,760.964-acre polygon. The

interventions will involve:

- Access road deck improvement.
- Deck improvement and construction of new sections of internal road network.
- Excavation of foundations of A/G.
- Excavation of Low/Medium Voltage and Low Voltage and Low Voltage cable ducts parallel to the internal roads.
- Landscaping of squares around the locations of the A/Gs.
- Backfilling/landscaping.
- Excavation of MT cabling channel up to the existing voltage boosting substation.

The existing road will be used to access the project, then new road sections will be built or existing road sections of the local network will be improved to connect the A/C. The length of the road network that will be required is 11,182.63m.

All of the electricity produced will be made available exclusively to the National Electricity Transmission System of ADMIE.

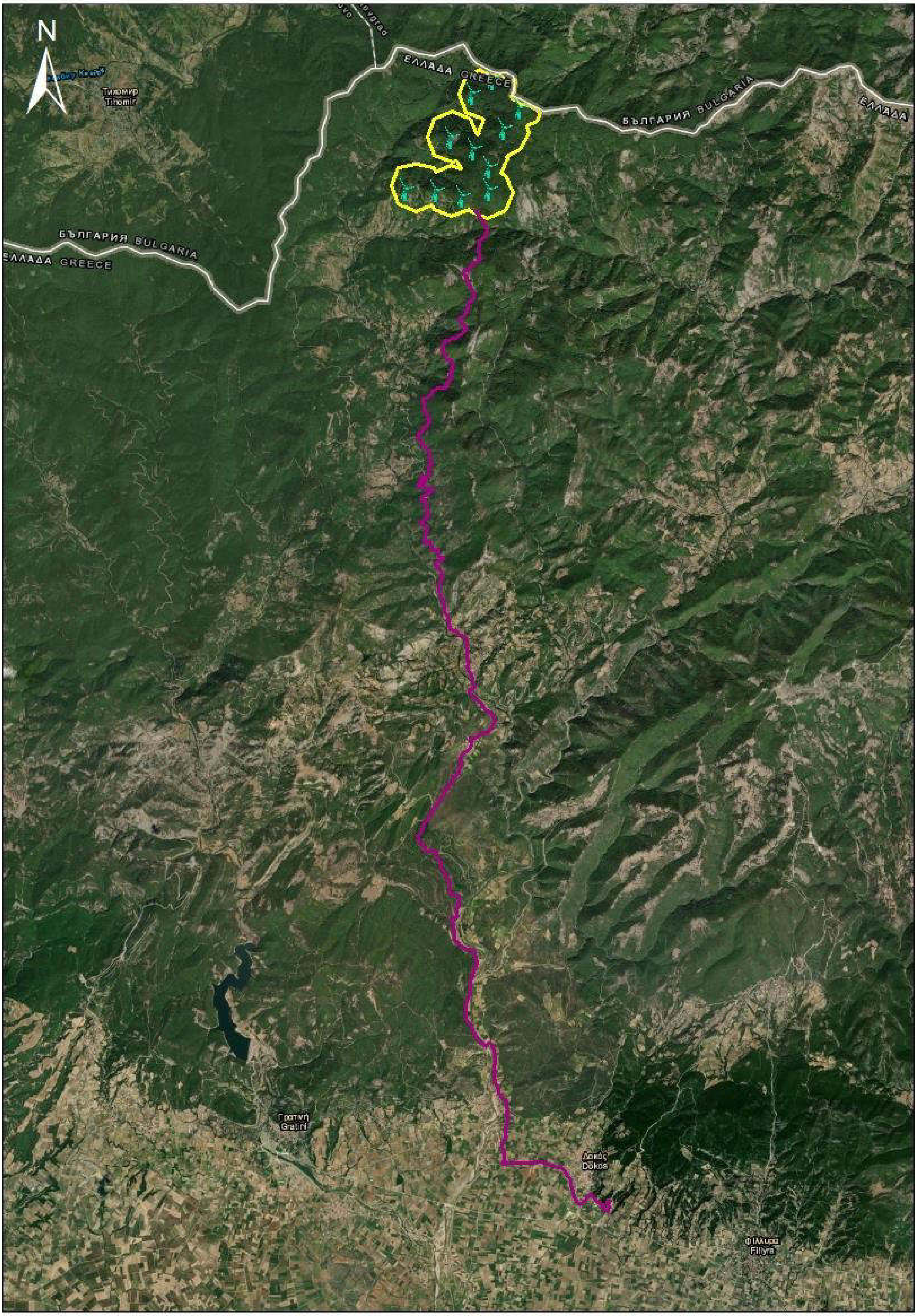

Figure 3.1-1 : Project location

(the polygon is shown in yellow, the Medium Voltage line and the Voltage Booster Substation in purple)

3.1.1 Wind turbines

The project under study consists of 11 gensets of indicative type VESTAS V-150, with a power of 4.0 MW each. Each wind turbine consists of a 125 m high metal tower on top of which the turbine's spindle is mounted. The main equipment of the wind turbine is mounted on the nacelle, consisting of the main shaft on which the hub and the rotor of the wind turbine, the speed multiplier and the generator are mounted. The rotor has a diameter of 150m and consists of three blades.

The wind turbine pylon is steel, cylindrical with a slight taper. The pylon is closed to the external environment. Access to the interior is through a metal door located at the base of the tower. The pylon has a metal staircase inside which allows access to the wind turbine shaft. It is internally divided in height by metallic platforms, which serve to ensure the safety of maintenance personnel.

The wind turbine fuselage consists of a steel frame and the housing which is made of polyester material. The fuselage is closed to the outside environment and is mounted on the wind turbine tower by means of a crown-coil system so as to allow the fuselage to rotate 360 degrees relative to the wind turbine tower.

Access to the shell is achieved from inside the tower through a metal staircase. In addition, at the base of the fuselage and outside the wind turbine tower there is a hatch and lifting and lowering equipment for the transport of tools and spare parts. This hatch can also be used as an escape hatch in case of emergency.

At the base of the wind turbine and inside the tower is the central electrical panel and the wind turbine controller through which the connection of the wind turbine to the power grid and the control of all the functions of the wind turbine are made respectively.

All the connections of the electrical panel, both the main and the secondary ones, are properly protected in accordance with the regulations in force, in particular by the use of fuses and automatic circuit breakers, which protect the installation both in case of overload and in case of short-circuit.

The kinetic energy of the wind is converted through the rotor of the wind turbine into mechanical work, which in turn is converted into electricity through the wind turbine's electrical generator.

The wind turbine control system controls a set of parameters and ensures the safe and uninterrupted operation of the system.

Each genset is equipped with a two-phase asynchronous generator. The generator is connected to the grid via a Grid Streamer which allows it to operate at variable speeds. The converter also controls the frequency as well as the quality of the power generated. The wind turbine has a lightning protection system (with protection level LPL1) to protect the entire wind turbine and all its subsystems. The Genset shall have a grounding system that connects all its metallic parts to the grounding system of the Genset. The grounding system shall consist of a grounding conductor installed in the ground and vertical electrodes (grounding rods) placed at selected points.

3.2 DESCRIPTION ASSISTANTS AND SUPPORTING /ASSEMBLIES OF INSTALLATIONS AND WORKS

The gensets of the PDO under study will be interconnected to the underground medium voltage line through autonomous voltage step-up transformers (step-up transformers). The transformers are to be installed inside the gensets at the base of the pylons for their uninterrupted and safer maintenance and operation. From the main switchboard of the gensets, the M.T. cables will run underground, following the layout of the internal roadway to the point where it connects to the layout of the external interconnection.

3.2.1 Electrical interconnection projects

3.2.1.1 MT Underground Interconnection Line

The internal grid of the wind farm consists of 3 medium voltage circuits. In each circuit the gensets are connected in series to each other, following the layout of the internal road and then to the proposed substation. The 3 underground medium voltage cables, run in parallel from a point near the entrance of the wind farm. The route follows the access road of the wind farm to a point 1km north of the village of Neo Kalintiri. From this point the access road and the interconnection are differentiated. The route of the underground cables follows existing roads up to the final proposed interconnection point at the existing 20/150 kV Flamburo substation.

The substation will be connected to the existing 20/150kV Flampouro voltage step-up substation in the 150kV heavy-duty (B) single circuit substation (GB) Orestiada - Kehros - Kerveros - Iasmos

3.2.1.2 Voltage boosting substation

The substation will be connected to the existing 20/150kV Flampouro voltage step-up substation, where the Medium Voltage interconnection line will end and will be connected to the 150kV single circuit heavy duty (B) GM "Orestiada - Kehros - Kerveros - Iasmos".

3.2.2 Connections to the Road Network - Transport of equipment to the installation sites of the Gensets

Access to the A/P will generally be via the existing road network in the area. However, new sections of the road network will be opened and improvements will be made to those sections that are deteriorated, with the ultimate aim of ensuring the successful transport of the A/C and safe access to the project.

The geometric elements of the roads must ensure the passage of the vehicles that will transport the wind turbine components, but at the same time the required strength to withstand the weight of the wind turbine components.

Both the installation of the A/C and the access roads are located in agricultural and forest areas. The slopes of the ground do not exceed the 14% gradient provided for by the legislation, so there are no problems for the movement of transport vehicles. In designing the roads, an effort was made to use existing roads as far as possible to minimise interference with forest land.

3.2.3 Geometric elements of the streets

The geometric elements of the roads should be such as to allow the passage of vehicles carrying the components of the wind turbines selected for installation. The choice of the transport vehicle depends on the dimensions of the wind turbine components and the way in which they are to be transported. The critical dimension is the length of the blades. If the blade is transported in a horizontal position , without the blade lifter device, then the length of the tractor is of the order of 65.0m.

The geometric requirements of the access roads for the transport of the elements of the specific A/C are as follows:

- The minimum width of the roads within the installation polygons of the A/C is 4.0m., with a minimum free width from any kind of obstacles on either side of 0.50m. In this study the width of the roads within the polygons is 5.0m.
- For transport routes outside the installation polygons, i.e. access routes, the minimum required width of the routes is 5.0 m with a clearance of 0.80 m on either side of the access routes.
- *Maximum longitudinal slope 14%.* As mentioned, the terrain is mountainous-mountainous, but the slopes do not exceed the maximum permissible number.
- *Minimum radius of curvature.* The radii depend on the length of the vehicle. As it was mentioned that since no blade lifter is used for this particular vessel the length of the tractor will be in the order of 65.0m. The present study contains a variety of horizontal radii of curvature (large and small), so as not to require major interventions on the road surface, protecting the environment as much as possible. The minimum the horizontal curve used has a radius of 35.0 m.
- The strength of the road surface shall be such that it can withstand a minimum axle load of 12 tonnes.
- Where the roads meet half canyons, culverts will be constructed so that stormwater runoff is unobstructed.

As regards the condition of the pavements, access roads are divided into three categories;

1. Existing roads with full pavement.

   These are the roads of the National - Provincial or Municipal road network, which also serve the traffic of heavy vehicles. The pavement of these roads does not require any additional reinforcement in order to accommodate the loads of the transport vehicle.

2. Existing roads without complete pavement.

   These are agricultural or forest roads which are usually paved with one or more layers of aggregate (torrent or quarry material). These roads are also used by heavy agricultural vehicles, but it is not certain that their strength will be such that they will be able to withstand the specific load. After inspection of some sections, upgrading work will be required. It is estimated that by laying another 10cm thick layer of 10cm thick crushed material of PTP O150 well compacted, these sections will be able to meet the loads of the transport vehicle.

3. Opening of new roads.

The length of new openings is generally short. The construction of the new roads is proposed to be made with: one layer of 10 cm thick average crushed material of PTP O150 and one layer of 10 cm thick of PTP O155 (Technical Specification 05-03-03-00). In order to determine the thickness of the pavement more accurately, soil bearing capacity tests will be carried out at the specified locations.

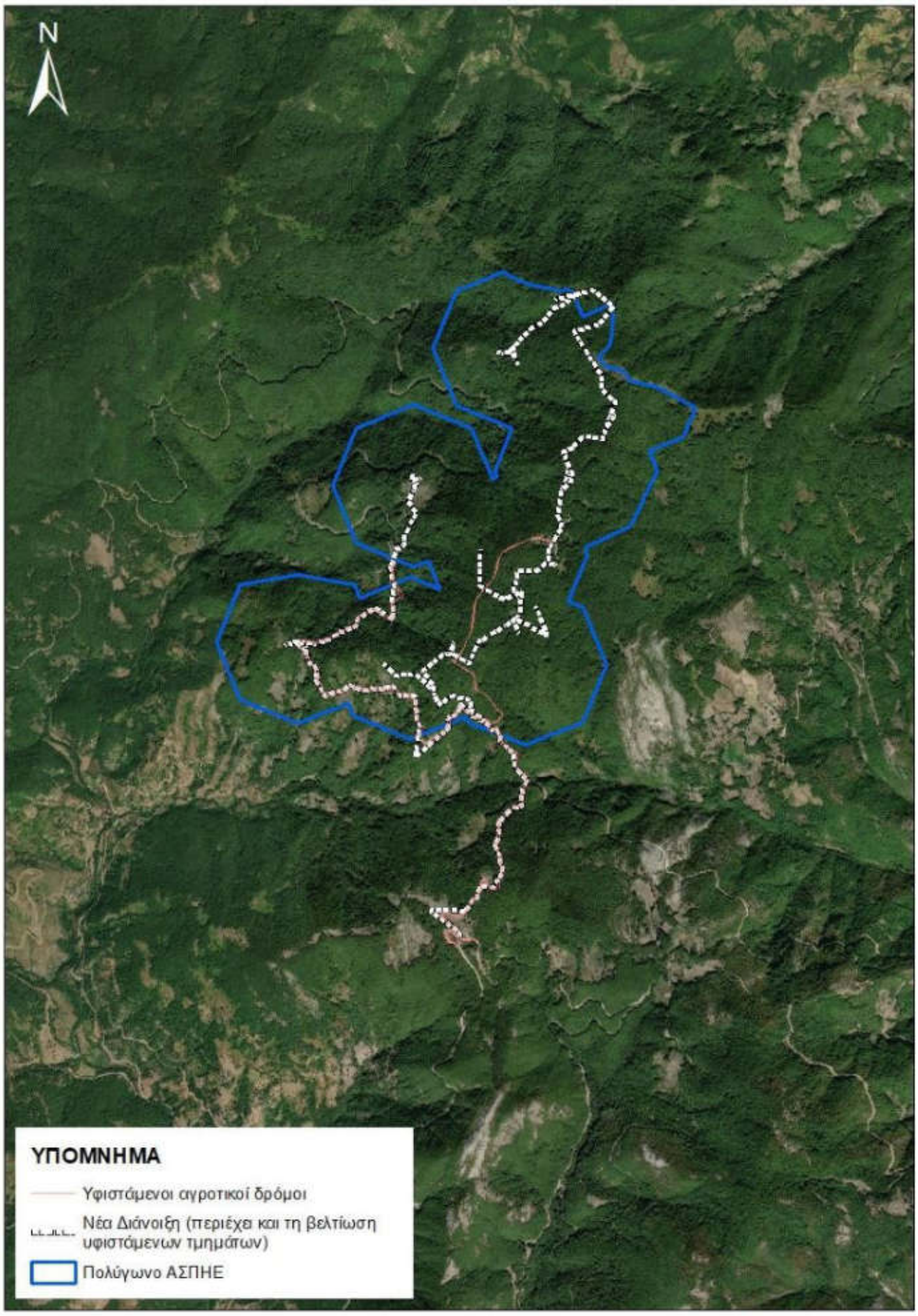

Figure 3.2-1: Access road network to the ESDP under study

3.3 CONSTRUCTION PHASE

3.3.1 Work schedule

According to the project design at this stage, the construction of the project will have a total duration of 16 months. The construction phase of the project includes the following stages:

- Opening new roads and improving existing access roads,
- Installation of A/C (landscaping, foundation, erection),
- Interconnection with ESME,
- Test period of operation.

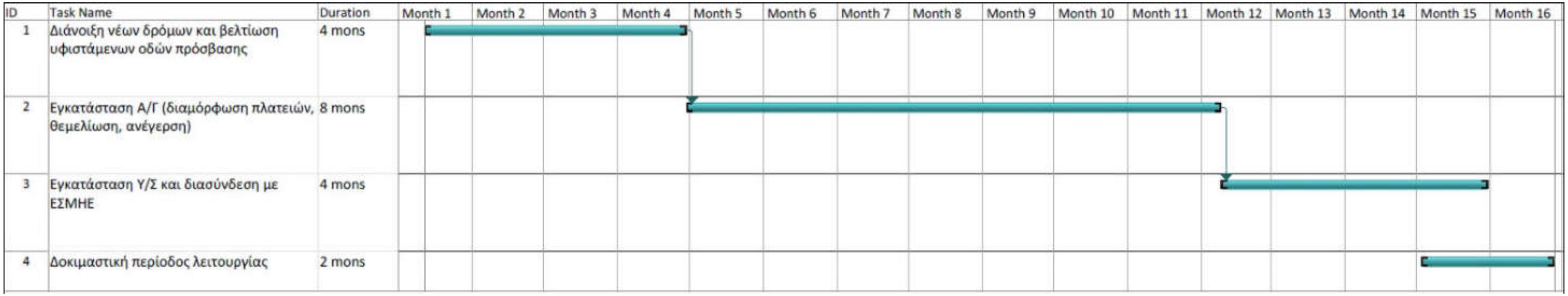

Figure 3.3- 1: Estimated duration of project construction

3.3.2 Supporting facilities (borrowing rooms - storage rooms - construction sites)

Construction sites will be established at each A/C site being constructed. The construction sites will be temporary and within the A/C installation areas, where the machinery and the necessary personnel will be located.

A construction crew will be present during the shaping of each platform, as well as during the assembly and erection of each A/C, as required by law and the manufacturer. The main works envisaged include cleaning of the intervention surface, earthworks for the foundation of the A/C. The earthworks will be carried out in such a way as to achieve immediate reuse of the excavated material in the configuration areas.

Within the installation squares, there will be temporary storage bins for the management of sediment. As regards road surfacing, it is planned to use the materials produced by the excavation work, provided that they are deemed suitable for the needs of the project and after the removal of unsuitable products from the excavation mix.

A mobile crusher will be used to reuse a quantity of excavated material to create aggregate for road paving.

3.3.3 Necessary construction materials

For the construction of the A/C under study and the accompanying works, the main materials to be used are presented in the following paragraphs. The above mentioned materials will be procured commercially and transported to the project.

3.3.3.1 Quantities of concrete

The concrete for the foundations of the A/Cs will come from licensed concrete manufacturing plants. The quantities of concrete for the foundations of the wind turbines are estimated in principle at 66 000 m3 .

3.3.3.2 Quantities of aggregates (paving, squares and cable channel)

In the new road openings, with a total length of 11.182 m, a 0.10 m thick sub-base layer and a 0.10 m thick base layer are constructed:

(5,40*0,10+5,0*0,10)*11.182,63 =11 .630,0 k.m.

We estimate that along 50 % of the existing rural-forest roads in use, which have a total length of 3,690 m, the construction of another 0.10 m thick pavement layer will be required:

50%*3.960*3.960*5,0*0,10 =990 ,0 k.m.

The total volume of broken paving material is therefore in the order of 12,620 m^3.

Furthermore, the trench where the cables for the interconnection of the ASPHE with the Voltage Raising Substation will be partially filled with quarry sand. The quantity of sand is estimated at 4.024 m^3 (trench width: 25.150 m x trench width: 0.40cm or 0.70cm as appropriate x sand layer thickness: 40cm).

3.3.3.3 Water needs

Living arrangements for workers. The water requirements for the living quarters of workers on the construction sites during the construction phases of the project are estimated at 15 persons x 20 Lt/worker/day = 0.3m^3 /day for the peak day. This quantity will be met with quota quality water from licensed water carriers and bottled water suppliers.

Material leakage. During the construction phases, quantities of water will be required for the wetting of materials at construction sites and in the occupation zones of the works in order to control the release of dust from earthen surfaces and materials. Considering the humid climate in the project area and the small size of the earthworks, these quantities are estimated to be very small and will certainly not result in significant impacts to the water resources of the area and will be covered by licensed water carriers.

3.3.4 Energy needs

Electricity requirements during construction will be met by either site power or a generator.

3.3.5 Waste water discharges

Urban wastewater. During the construction phase of the project, urban wastewater is expected to be generated from the living quarters of workers at the construction sites. It is estimated that the maximum urban wastewater flow will be equal to the drinking water consumption of the workers as calculated earlier i.e. 0.3 m^3 /day peak. To serve the staff, it is proposed to install chemical toilets within the construction sites with tanks of appropriate capacity to be emptied regularly under the responsibility of the project operator.

Waste from the maintenance of machinery, vehicles and E/M equipment: Although the maintenance of machinery will be carried out off-site in licensed workshops, nevertheless, during the construction phase of the works, waste may be generated from the site machinery and vehicles, mainly from any spills from them and from the site's E/M equipment (transformers, inverters, capacitors, filters, etc.). This waste mainly concerns hazardous waste oils and liquid fuels, which are classified under ECA codes (**Table 3.3-1**).

Waste will be collected in special watertight containers kept in a rain-protected area with a watertight floor within the site and then collected by licensed collectors-transporters, who will ultimately dispose of it through approved alternative management systems at appropriate facilities for further management. To deal with accidental pollution or spillage, the site will be equipped with appropriate cleaners, which will be readily available in the event of a spill as detailed in Chapter 10 herein.

Table 3.3-1: ECW codes for waste that may be generated from the maintenance of construction machinery and E/M equipment during the construction phase of the project

ECA code	Category of waste
13 02	**Waste gearbox and lubrication engine oils**
13 02 05*	non-chlorinated engine, gearbox and mineral-based lubricating oils
13 02 06*	synthetic engine, gearbox and lubricating oils; and
13 02 08*	Other engine, gearbox and lubricating oils
13 03	**Waste insulation and heat transfer oils**
13 03 06*	Chlorinated mineral-based insulating or heat transmission oils
13 03 07*	non-chlorinated mineral-based insulating and heat transmission oils
13 03 08*	synthetic insulating and heat transmission oils
13 03 09*	directly biodegradable insulation and heat transfer oils
13 03 10*	Other insulating and heat transmission oils
13 07	**Liquid fuel waste**
13 07 01*	diesel fuel and diesel fuel
13 07 02*	petrol
13 07 03*	other fuels (including blends)
16 01	**Waste from vehicle maintenance**
16 01 13*	brake fluids

Source: European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Commission Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC.

3.3.6 Surplus or waste materials or solid waste

3.3.6.1 Municipal Solid Waste (MSW)

During the construction phase of the projects, municipal solid waste (MSW) is expected to be generated from workers living on the construction sites. This waste is classified under the ESW codes in **Table 3.3-2**. The maximum daily MSW generation during project construction (100% site occupancy) is estimated at a maximum of 15 persons x 0.4 kg/person/day = 6 kg/peak day. This quantity will be collected in bins to be placed inside the construction site. The bins will be transported under the responsibility of the project operator to suitable locations indicated by the municipality, in order to be collected by the municipality's collection network or by the collection agencies for the collection of recyclable materials.

Table 3.3-2: CSW codes of the MSW expected to be generated during the construction phase of the project

ECA code	Category of waste
20 01	**Separately collected parts of household waste**
20 01 01	papers and cardboard
20 01 02	glasses
20 01 08	biodegradable kitchen and leisure waste
20 01 38	wood
20 01 39	plastics
20 01 40	metals
15 01	**Waste from packaging**
15 01 01	Paper and paperboard packaging
15 01 02	Plastic packaging
15 01 06	Mixed packing
15 01 07	Glass packaging

Source: Annex I of the HAC 36259/1757/E103/2010 & European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC of the European Commission.

3.3.6.2 Excavation, construction and demolition waste (AECW)

From the total of the project's road opening works and the landscaping of the A/G squares, **187,050 m³** of earth and semi-buried excavation products will result, of which **154,700 m³** will be used as backfill materials. The remaining quantity amounts to

32,350 m³ and will be managed as LCW by a lender if not reused in the project.

It is noted that the plant land will be reused in the project for planting needs and slope lining. The paving will require 20,350 m³ of crushed material, which will be taken from the excess spoil after using the mobile crusher.

3.3.7 Noise and vibration emissions

The noise level in the nearest houses of the nearest settlement (Sarakini) is less than 60 dBA even for the most conservative scenario of simultaneous operation of several machines. 65 dBA is exceeded only at the machinery operating locations. Noise levels are even lower in the other settlements (Drymi, Ardeia, Ano Drosini). Similarly, the vibration levels are negligible in the nearest settlement.

3.4 PHASE OF OPERATION

3.4.1 Description of the operation and management of the project

Once all the aforementioned works have been carried out and before the final connection of the station to the network, the trial period of operation of the station (1.5 - 2 months) will follow, in order to improve any failures related to the electrical and mechanical equipment used, in order to ensure the smooth and uninterrupted operation of the station.

After this stage, the wind farm will operate as an inexhaustible electricity producer and will be interconnected with the National Electricity Transmission System of ADMIE.

All maintenance work on the park will be carried out in accordance with the technical manuals provided by the contractor. In addition, the availability of a complete range of spare parts has been taken into account in order to avoid any delays in the repair of breakdowns. Trained personnel will work at the AP and each year the installation will be inspected by the manufacturer's personnel to confirm that the equipment is well maintained and for technical support issues.

3.4.2 Material inputs

3.4.2.1 Water needs

No water consumption activity is included during the operational phase of the project. In addition, the design of the project under consideration does not provide for the installation of a Control House, therefore the amount of water to meet the needs of the staff is considered to be zero.

3.4.2.2 Energy needs

The use of electricity is required for the starting needs of the A/Cs. In the case of Gensets, the power is supplied via the fields and the M.T. cables, which in normal operation carry the energy produced.

3.5 SOLID WASTE OUTPUTS

The only source of municipal waste generation is the facility's maintenance staff. This waste will be collected in small bins or containers in selected points of the facilities and will be transported under the responsibility of the project operator to the nearest municipal bins, from where they will be collected by the municipality's refuse collection vehicles. Solid waste will also be generated from the packaging of spare parts, which will be collected in the same way as staff waste and disposed of in the municipal recycling bins (**Table 3.5-1**). This waste will be removed from the A/P premises at regular intervals.

Other solid waste resulting from the maintenance of electrical and mechanical equipment will be removed immediately under the responsibility of the maintenance technicians.

Table 3.5-1: CSW codes of the MSW expected to be generated during the operational phase of the project

ECA code	Category of waste
20 01	**Separately collected parts of household waste**
20 01 01	papers and cardboard
20 01 02	glasses
20 01 08	biodegradable kitchen and leisure waste
20 01 39	plastics
20 01 40	metals
15 01	**Waste from packaging**
15 01 01	Paper and paperboard packaging
15 01 02	Plastic packaging
15 01 06	Mixed packing
15 01 07	Glass packaging

Source: European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Commission Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC.

For the safe management of any hazardous waste, the project operator must deliver it to a licensed collector-transporter for disposal in an appropriate facility for further treatment, recovery or disposal, or to approved alternative management systems for such waste under the conditions laid down in the relevant provisions. The delivery and legal possession of the hazardous waste shall be evidenced by the Identification Form which shall accompany the hazardous waste. Upon transfer of the identification form, the responsibility of the previous holder (of the hazardous waste) ceases and the new holder becomes responsible. The final holder (management entity or alternative management system) takes care of the various procedures for the proper management of the waste, including regeneration, re-refining, recycling, decontamination, burial, etc.

For the temporary storage of hazardous waste on the project site until collection, either UN-compliant packaging (for solid waste) or tanks enclosed by a leakage collection system (for liquid waste) should be used. The collection containers must be in a place with appropriate signage and adequate ventilation and lighting. They must also be located in such a place and in such a way that they do not interfere with other activities of the installation.

3.6 EFFLUENT OF LIQUID WASTE

During the operation of the project, urban wastewater is generated by workers during maintenance, repairs and monitoring of the plant. The quantities of wastewater are very small and fully manageable by the installation of chemical toilets. Wastewater from the chemical toilets will be collected by a licensed company.

3.7 NOISE AND VIBRATION EMISSIONS

As shown by the simulation results of the operation of the G/Gs, the LP noise level index value at the nearest house to the project under licence is 42 dBA, i.e. below the 45 dBA limit. Obviously, in the other settlements further away (Ardea, etc.), the noise levels are much lower.

3.8 SUSPENSION OF OPERATION - RESTORATION

The production of wind energy is subject to all the provisions of the legislation in force concerning the obligations of undertakings concerning the restoration of the site where they are installed and the management of the materials remaining after their closure. In addition, the specific energy legislation and the spatial planning framework for RES contain additional provisions to ensure these obligations. The substance of these provisions is also incorporated in the decisions approving the environmental conditions for wind farms.

The imposition of such conditions is provided for in Article 26 of the Special Spatial Framework for RES (KYA 49828/2008) which stipulates that: "*The holders of permits for the operation of electricity generation installations from RES are obliged, before the installation ceases to operate in any way, to restore, at their own expense and in accordance with the approved environmental conditions, the relevant sites, ensuring in particular the dismantling and safe removal of the installations, the restoration of native vegetation and the general restoration of the site to its previous state, provided that this is technically feasible*".

Similarly, in the Law on SIAs (Article 8, para. 7 of Law 3468/2006, as amended by Article 3(2) of Law 3851/2010): '*After the end of the operation of a RES or CHP plant, the operator of the plant is obliged to dismantle the above-ground equipment and to restore, as far as possible, the interventions in accordance with the conditions laid down in the N.P.O. decision.* ......"."

According to the legislation in force, the wind farm operating licence is issued for a period of 20 years and can be renewed for an equal period of time. It should be noted that before the operating licence is granted, a temporary connection of the park for trial operation is required, upon application to the competent operator.

After the definitive cessation of the operation of the project under study, the electromechanical equipment will be removed and the site will be restored as far as possible to its original state. In particular, all measures will be taken to ensure the safe dismantling of the main and individual items of equipment (A/C, electrical and electromechanical equipment such as voltage inverters, transformers, power electronics, cables, etc.), as well as the final dismantling of the MV interconnection network. The above dismantling works shall be carried out in accordance with the legislation in force at the time of dismantling of the installations.

The materials of the old wind turbines will be recycled or managed by specialised companies accredited for this purpose in accordance with current legislation. This includes the foundation materials, the pylon, other wind turbine systems and blades. The foundations of old wind turbines shall be recovered and managed as WEEE and the soil shall be restored to its previous condition. The cables of the interconnection circuits shall also be removed from the trench and treated as WEEE by licensed companies. In fact, depending on their condition and technology, they can be used as such in other applications, saving resources for the production of new ones.

As with the materials of any activity, in the case of blades, prevention and reuse (including change of use) come first in order to reduce their environmental footprint. When these solutions are not feasible, recycling is pursued. At present, the management of dismantled WEEE blades is limited to transport and storage in an approved/licensed non-hazardous waste management facility.

It is noted that, due to the appropriate measures foreseen even at the planning stage to mitigate the impact on the natural environment and landscape, the specific measures to be taken after the project has ceased operations are such that the site will be restored to its original natural state within a short period of time.

CHAPTER 4: OBJECTIVE AND FEASIBILITY OF THE PROJECT - BROADER CONTEXT

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4 OBJECTIVE AND PURPOSE OF THE PROJECT - BROADER CONTEXT

4.1 OBJECTIVE AND FEASIBILITY OF THE PROJECT

4.1.1 Objective and feasibility of the proposed project

The main purpose of the project under study is the generation of electricity through the exploitation of wind potential, which is a renewable and sustainable form of energy, and its exclusive supply to the country's energy system. The objective is that the operation of the proposed RES-E will lead to the strengthening of the energy production and distribution system at local and supra-regional level, through the production of clean and renewable energy.

In this way, and using mature and economically competitive technology, the project contributes to the achievement of climate goals and in particular to the reduction of greenhouse gases (GHGs), as well as to the reduction of air, ground and water pollution, by substituting electricity production from conventional power plants, which are more polluting, and by saving fuel for the benefit of the national economy.

The importance of the project is mainly focused on the following

points-areas: a) the environmental contribution of the project

b) the importance of exploiting a renewable natural resource (wind potential of the area),

c) enhancing available power (contributing to energy sufficiency) by making the national energy system less dependent, which is particularly important following the developments of recent years concerning Russia's invasion of Ukraine.

4.1.2 Development, environmental, social and other criteria

The production of electricity from RES is a key component of the country's sustainable development and contributes, among other things, to the country's energy independence, the security of energy supply and the protection of the environment, mainly through the reduction of greenhouse gases that contribute to climate change, but also through the reduction of atmospheric pollutants.

The achievement of the climate targets set by the Paris Agreement and the emerging binding conditions for a substantial increase in the participation of Renewable Energy Sources in electricity production are the most important reasons that make the substitution of energy produced from polluting and imported conventional fuels with energy from renewable energy sources an imperative obligation.

This section summarises the European and national objectives for sustainable development and environmental protection that are relevant to the project.

4.1.2.1 European Objectives

In 2019 the Commission announced the "**European Green Deal"** ("GREEN DEAL") [COM (2019) 640 final] which is the EU's new growth strategy and aims to transform the EU into a just and prosperous society with a modern, competitive and resource-efficient economy, where net greenhouse gas emissions are zero by 2050 and where economic growth is decoupled from resource use. The Green Deal also aims to protect, conserve and enhance the EU's natural capital, and to protect the health and well-being of citizens from risks and impacts related to the environment. It sets out the EU's roadmap for all key policies and measures needed to implement at EU level the Sustainable Development Goals (SDGs) of the UN 2030 Agenda. **Figure 4-1** below summarises all elements of the Green Deal.

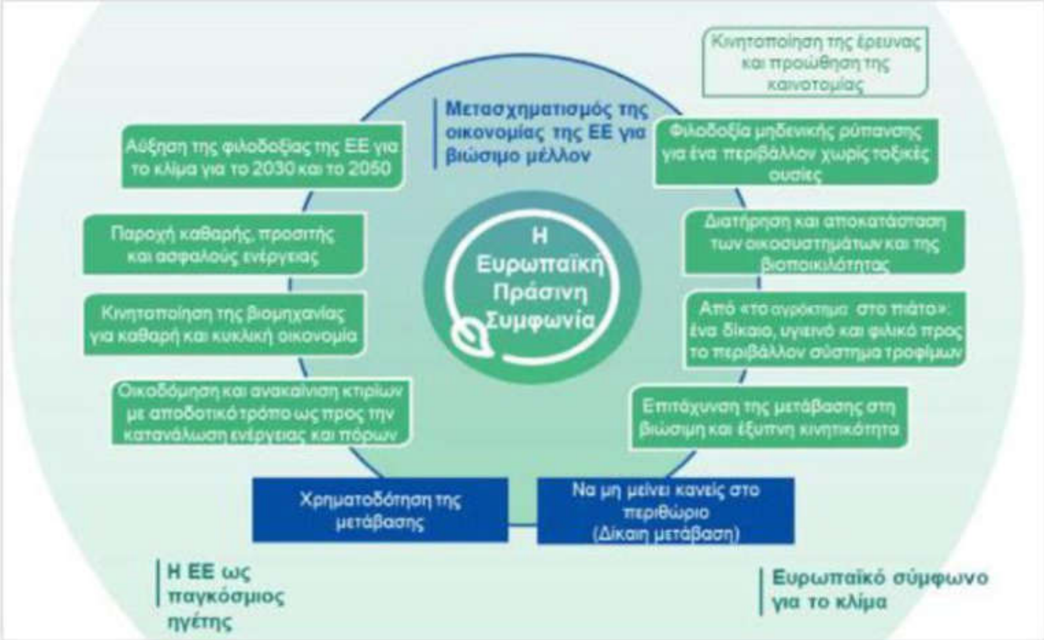

Figure 4.1-1: Objectives of the "Green Deal"

The supply of clean, affordable and secure energy is a key objective of the Green Deal. Further decarbonisation of the energy system is critical to achieving the 2030 and 2050 climate targets. The Green Deal recognises that the transition to clean energy should engage and benefit consumers and that renewable energy sources will play an essential role in this direction. It also recognises that the risk of energy poverty for households that cannot afford basic energy services that provide a basic standard of living must be addressed.

In the context of the Green Deal, the new EU Climate Law [COM (2020) 80 final] was adopted which increased the GHG emission reduction target from 40% to at least 55% by 2030 as an interim target to achieve the central climate neutrality objective in 2050. The new Climate Law also set an increased level of ambition and policy coherence for adaptation.

The EU is working on revising its climate, energy and transport legislation with the so-called "Fit for 55" package to align current law with the 2030 and 2050 ambitions. The package also includes a number of new initiatives. The 'Fit for 55' package is a series of proposals to review and update EU legislation and to set out new initiatives to ensure that EU policies are consistent with the climate targets agreed by the Council and the European Parliament.

The Green Deal states that the transition to clean energy should involve and benefit consumers. Renewable energy sources will play an essential role. Smart integration of renewable energy, energy efficiency and other sustainable solutions in all sectors will contribute to carbonisation at the lowest possible cost. The rapid reduction in the cost of renewable energy, combined with improved design of supporting policies, has already reduced the impact of renewable energy deployment on household energy bills.

Therefore, the rapid promotion of Renewable Energy Sources (RES) is one of the fundamental pillars of European Union (EU) policy, in the context of the effort to tackle climate change and its potentially catastrophic consequences.

In the **Energy Roadmap 2050** (COM/2011/0885), the European Commission has included strong measures to support renewables leading to a very high share of renewables in gross final energy consumption (75% in 2050) and a share of renewables in electricity consumption of up to 97%. Finally, the NAP text explicitly states that electricity should play a more important role than today (almost doubling its share of final energy demand to 36-39% in 2050) and should contribute to decarbonising the transport and heating/cooling sectors. To achieve this, the power generation system will need to undergo structural changes and achieve a significant level of decarbonisation already in 2030 (57-65% in 2030 and 96-99% in 2050).

4.1.2.2 National Energy Plan: the National Energy and Climate Plan

The report "**National Energy Planning (NEP): roadmap for 2050**" was prepared in 2012 and is a roadmap report that aims to present the data and assumptions that will determine the national strategy for the development of the country's energy system. The NAP first outlines the international and European context regarding energy policy and climate change. It then provides an overview of the national energy system, including an assessment and analysis of the state of the energy system at the stage of drafting the EAP, an examination of the technical and economic possibilities of developing measures to implement energy policy and the identification of the obstacles and specificities of the national energy system, as well as the main challenges of the national energy policy

The National Energy and Climate Plan (NECP) was ratified by Decision No. 4/23.12.2019 of the Governmental Council of Economic Policy (Government Gazette B4893).The NECP is a Strategic Plan for Climate and Energy issues and presents a detailed roadmap for the achievement of comparable Energy and Climate Targets by the year 2030. The NSRF presents and analyses Policy Priorities and Measures across a wide range of development and economic activities for the benefit of Greek society, making it the reference document for the next decade. In addition, the NSRF develops the Long Term Strategy for 2050, which constitutes a roadmap for Climate and Energy issues, in the context of the country's participation in the collective European objective of a successful and sustainable transition to a climate neutral economy by 2050, at the level of the European Union. The Long Term Strategy has 2030 as a reference point and assumes the achievement of the relevant ESDP targets.

The ESDP sets specific national targets, which are quantified, costed and with defined intermediate milestones. To achieve them, specific policy priorities with corresponding policy measures are defined across a wide range of development and economic activities for the period 2021-2030. These elements are categorised under seven different thematic headings:

- Climate Change, Greenhouse Gas Emissions and Sinks,
- Renewable Energy Sources,
- Improving energy efficiency,
- Security of energy supply,
- Energy purchase,
- Rural sector, Shipping, Tourism and
- Research, innovation and competitiveness.

Specifically on the issues of Climate Change and GHG emissions, the NSAP sets a significantly higher central GHG emission reduction target, with a reduction of more than 42% compared to 1990 emissions and more than 56% compared to 2005 emissions, aiming to exceed even the central European targets.

The following quantitative targets are set for the thematic area of RES, with the overall objective of increasing their penetration in gross final energy consumption by 2030:

- increase the share of renewable energy in gross final energy consumption to at least 35%.
- increasing the share of RES in gross final electricity consumption to at least 60%, making optimal use of the high domestic potential especially for wind and photovoltaic (PV) plants (the share of domestic electricity production is expected to exceed 65% by 2030),
- the share of renewables for heating and cooling needs to exceed 40%, and
- the share of renewables in the transport sector to exceed 14% (according to the EU calculation methodology).

The main objective of the National Energy Plan and the National Energy and Climate Plan is the design and planning of socially, environmentally and cost-effective policies and measures that will contribute to the achievement of medium and long-term national energy and climate objectives, contribute to the economic development of the country and at the same time meet the challenge of reducing energy costs and generally protect end consumers from high energy prices.

Recently, the **National Climate Law** "Transition to climate neutrality and adaptation to climate change,..." (Government Gazette 105/B/2022). Its purpose is "*to create a coherent framework to improve the country's adaptive capacity and climate resilience and to ensure the country's gradual transition to climate neutrality by the year 2050 in the most environmentally sustainable, socially equitable and cost-effective manner*".

In particular, it sets out measures and policies to reduce emissions and increase removals, to ensure a smooth transition of the economy and society to climate neutrality, and to secure the pathway to decarbonisation by 2050. In addition, this law also provides for "*the establishment of a mechanism for carbon budgeting for key sectors of the economy and a system of governance and participation for climate action*".

4.1.2.3 Energy poverty

Energy poverty is defined as the situation of a household in which it has to pay more than 10% of its income to have an acceptable temperature level in its home. This definition includes all energy services (heating, lighting, use of appliances). Energy poverty is caused by a combination of three factors: low income, high electricity, oil and gas prices, and inefficient energy efficiency of buildings.

This phenomenon is a particularly critical social issue, with many environmental implications, directly linked to the energy sector. In the current economic downturn, it is intensifying, particularly affecting low- and middle-income households. The issue of energy poverty and vulnerable consumers is highlighted in several European directives (e.g. Directive 2009/72/EC and Directive 2009/73/EC), while specific reference is made in Directive 2012/27/EU on energy efficiency.

According to the European Commission, reducing energy poverty is an objective of the European Union. A study by the European Parliament has shown that energy poverty affects around 36% of households in Greece. In the period 2010 - 2014, the prices paid by households for electricity increased at an average annual rate of 12.8% (European Parliament, 2015). At the same time, according to a European Commission survey on consumer trends, only 30% of respondents in Greece say that they have no difficulties in paying their electricity bills, while 68% have partial or total difficulties in paying their electricity bills. Despite the existence of the small heating allowance and the social electricity tariff, many tens of thousands of households are at risk or without electricity. In recent times, following the recent developments of Russia's invasion of Ukraine, there have been huge increases in electricity prices and the phenomenon of energy poverty is becoming more pronounced.

But energy poverty also has consequences for the environment:

- There is an increase in poaching in peri-urban forests, even in urban groves and especially in rural areas.
- There is a significant deterioration of air quality (increase in particulate matter concentrations) in urban areas due to the use of biomass and inappropriate and hazardous materials.

According to the International Energy Agency (IEA) report, "*Projected Costs of Generating Electricity 2015", the* cost of generating electricity from renewables has fallen significantly over the last five years due to technological advances, while at the same time, the average cost of coal and gas-fired power generation has increased. Indeed, the costs of coal-fired power generation are expected to increase significantly in the coming decades. Lignite will become 70% more expensive as plants will be forced to install special carbon capture equipment and other filters, while photovoltaic panels and wind turbines will become cheaper.

The project under study will contribute, through the production of electricity from renewable energy, among other things, to the reduction of energy poverty.

4.1.3 Benefits at national, regional or local level

The proposed project, by making optimal use of the available wind potential, will help to achieve the country's environmental objectives and international obligations, as well as to meet the principles of sustainable development.

At the same time, it will contribute significantly to the uninterrupted, economic and pollution-free electricity supply of the wider region. The installation of the wind farm, through the fees paid to the Municipality, will contribute to the development of the wider region, in addition to the jobs that will be created during the construction and operation phase.

At the national level, the installation and operation of the project under consideration is of particular importance due to the following benefits that will result from its use:

- Avoidance of pollutant emissions in the production area from conventional sources (e.g. Ptolemaida, Megalopolis etc.).
- Exploiting a domestic and abundant renewable energy source, contributing to the security of energy supply.
- Reduction of grid losses, with decentralised power generation, lightening of lines, while at the same time achieving a time lag of investments in networks.
- Gradual decoupling from conventional centralised power stations, from all forms of imported energy and ensuring energy supply through decentralised generation.

- Contributing to sustainable development, quality of life and environmental protection in urban centres and the periphery
- Developing economic activities with an impact on society as a whole.
- Creating new jobs.
- The opportunity is given to the municipalities concerned to finance environmental actions and local development and social support projects through the financial benefits resulting from the payment of 1.7% of the pre-VAT electricity sales price, in accordance with Article 25 of Law 3468/2006, as in force.
- A percentage of 1% of the pre-VAT electricity sales price is passed on to household consumers through their electricity bills. The beneficiaries of the above amount are the residential consumers located within the administrative boundaries of the municipal or local community of the municipality where the Wind Farm will operate, in accordance with Article 25 of Law 3468/2006, as amended.
- A percentage of 0.3% of the pre-VAT electricity sales price, in accordance with Article 25 of Law 3468/2006, as in force, is allocated to the Green Fund, whose purpose is to enhance development through environmental protection by providing administrative, economic, technical and financial support for programmes, measures, interventions and actions aimed at promoting and restoring the environment, supporting the country's environmental policy and serving the public and social interest.

All of the above highlights the expected benefits at local, regional and national level.

4.2 HISTORICAL DEVELOPMENT OF THE PROJECT

In January 2023, the project promoter received the order no. AD-010573 Production License for the wind power plant in the location Polemistis, in the municipalities of Komotini and Organis of the Municipalities of Komotini and Arrianon respectively.

However, it proceeded to amend the issued certificate, with the new application being for the project design and power considered in this Environmental Impact Statement. The file number of the application for amendment of the issued producer certificate to the RAE is I-359301 with a submission date of 09/10/2023.

Finally, it is noted that while the project is located outside of protected areas, but within the boundaries of an Important Bird Area, a Special Ecological Assessment study was conducted as part of this EIS.

4.3 FINANCIAL DETAILS OF THE PROJECT

The investment costs include

- Expenditure on the purchase of equipment
- Expenditure on civil engineering and other studies
- Costs for the construction and installation of the medium voltage transmission network (mainly underground and to a minimum overhead), and in general the interconnection with the network of ADMIE.

The project budget for this phase is presented in the table below.

Table 4.3-1: Project budget

BUDGET FOR THE PROJECT 'WARRIOR' "			
A/N	**Object**	**Cost (€)**	**% Percentage**
1	Studies	300.000 €	0,6%
2	Supply of A/C	42.430.000 €	81,9%
3	Civil works. Engineering	2.620.000 €	5,1%
5	E/M equipment	820.000 €	1,6%
5	Interface with Network	5.200.000 €	10,0%
6	Horticultural restoration	450.000 €	0,9%
Total investment cost		**51.820.000 €**	**100,0%**

4.4 ASSOCIATION OF THE PROJECT WITH OTHER PROJECTS

For the assessment and evaluation of the synergistic and cumulative impacts, the impacts of existing, approved or planned projects in the study area and the wider area are also taken into account. Regarding the total number of RES-E projects in the Rhodope P.E., 17 RES-E projects with a total capacity of 350.95 MW are licensed, consisting of 184 Gensets in total. The licensed RES projects in the Rhodope P.E. are presented in Table 4.4 1. It is noted that all the licensed projects presented below are located within a radius of more than 7.5km from the studied RES project, therefore they cannot have synergistic effects with it.

Table 4.4-1: Licensed RES projects in the project area

a/a	Nature of the project	Company	Maximum power (MW)	Number of A/C	Distance (km)
1	ASPHE	EBRO HAZELNUTS WIND POWER COMPANY S.R.O.	4,6	2	34,7
2	ASPHE	CH.ROCAS S.R.O.	4	2	30,0
3	ASPHE	CH.ROCAS S.R.O.	33,6	8	20,5
4*	ASPHE	WIND RES ONE-PERSON LIMITED LIABILITY COMPANY	28,8	7	35,1
5	ASPHE	CH.ROCAS S.R.O.	41	26	35,3
6	ASPHE	CH.ROCAS S.R.O.	46,3	31	22,3
7	ASPHE	ENEL GREEN POWER HELLAS A.E	14,4	16	28,6
8	ASPHE	ENEL GREEN POWER HELLAS A.E	19,8	22	25,2
9	ASPHE	ENEL GREEN POWER HELLAS A.E	6,75	8	20,1
10	ASPHE	ENEL GREEN POWER HELLAS A.E	10,8	12	19,8
11	ASPHE	WIND FARM GRAMMATIKAKI S.R.O.	16,1	7	21,6
12	ASPHE	WIND FARM OF ORGANDY S.R.O.	20,7	9	8,3
13	ASPHE	WIND FARM MEGAVUNI S.R.O.	25,3	11	14,2
14	ASPHE	LITHOS AIOLOS	27,6	8	10,2
15*	ASPHE	SERVUNIO ENERGY S.R.O.	26	8	30,9
16	ASPHE	LITHOS AIOLOS	14,4	4	12,4
17	ASPHE	OSTRIA ENERGY S.R.O.	10,8	3	27,1
18	FB Stations	ENEL GREEN POWER HELLAS A.E.	2,72	0	43,8
19	FB Stations	HELIOSTREIO SA	1.0824	0	44,2

*These are ASPEE, the polygons of which extend within the boundaries of the Regional Unit of Rodopi and adjacent ones.

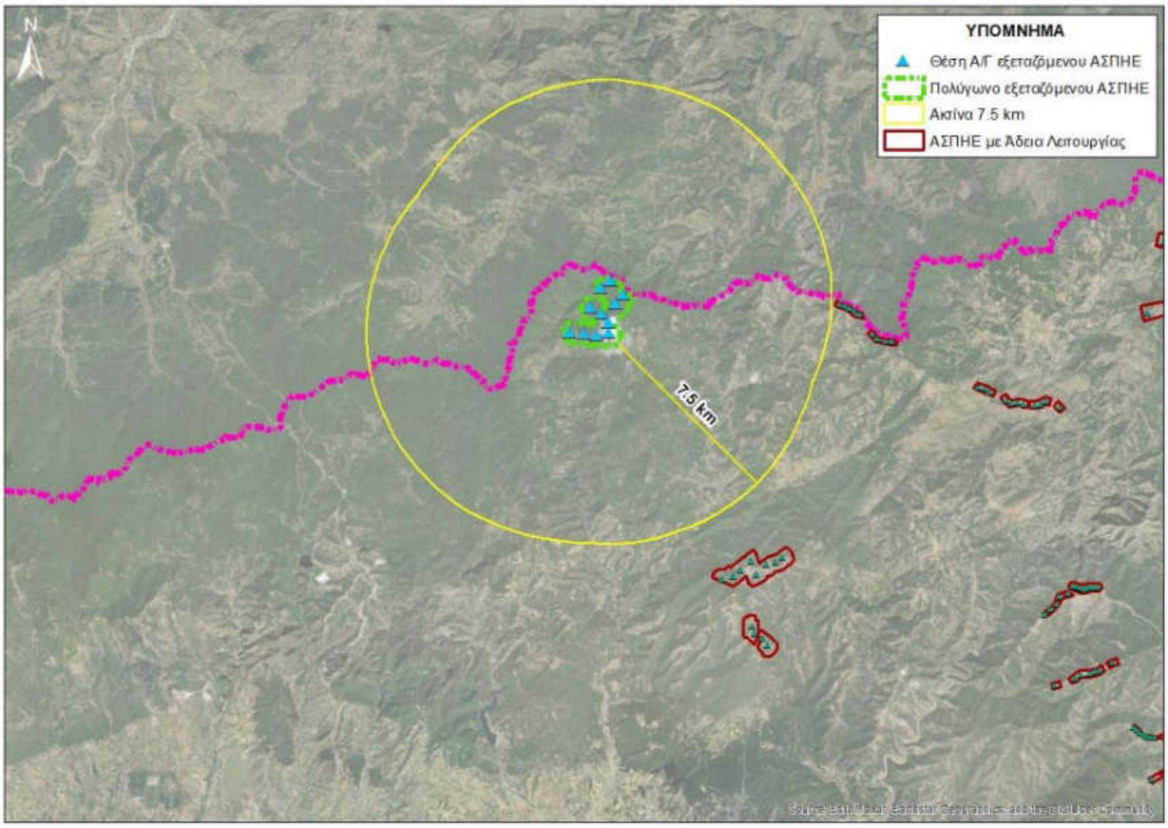

Figure 4.4- 1: Distances of the considered RES-E from licensed RES projects (Source: Geo-Information Map RAEEY - 14.03.2024 and Own colouring processing)

It is noted that a total of 128 RES-EEs are licensed in the Rhodope region, of which eight (8) are located less than 10 km from the project under consideration (**Table 4.4-2**). The RES-E projects that have received a production license (or a producer certificate) are not taken into account for the synergistic impacts assessment, since the Power Generation License today, in no way implies and does not ensure the implementation of a RES project, as it is essentially a feasibility license. According to ELETAEN data, the implementation rate of projects with a production licence or producer certificate is only 3%. However, even this percentage is not defined in the field, as it is not certain which RES projects will be licensed. Therefore, it is neither appropriate nor possible to include these projects in the synergistic-aggregate impacts. However, for the sake of greater environmental certainty (worst case) in the cumulative-collusive impacts, the nearest NPPs that have been licensed for production will also be considered in Chapter 9, together of course with the projects that are licensed to operate or install or have an AEP in the project area.

It is noted that, from the analysis carried out in Chapter 5 on the compatibility check of the project with the EIAAP for RES and, in particular, from the check of the landscape integration criteria, no exceedance of the maximum density of RES was found.

Table 4.4-2: Wind farms within a 10 km radius of the project with a production licence

a/a	Company	Maximum power (MW)	Number of A/C	Distance (km)
1	ALTERNATIVE ENERGY GAS.	15,40	4	9,23
2	WIND POUND ONE-PERSON SA.	8,40	2	8,1
3	NIATA AIOLOS UNIPERSONAL S.R.O.	16,80	4	6,30
4	WINDSPUR ENERGY S.R.O.	55,80	9	9,00
5	VENTO WIND POWER MONOPOLY S.R.O.	3,45	1	6,50
6	TSOUKA WIND FARM UNIPERSONAL S.R.O.	22,50	5	9,30
7	WIND POUND ONE-PERSON SA.	18,00	4	3,10
8	WIND ENERGY THRACE SOLE PROPRIETORSHIP ANONYMOUS COMPANY	38,4	8	6,00

The figure below shows the distances of the wind farms located within a 10km radius from the considered "Warrior" wind farm, which have been granted a production license. The data was extracted from the Geo-Information Map of RAEEY as of 14^{η} March 2024.

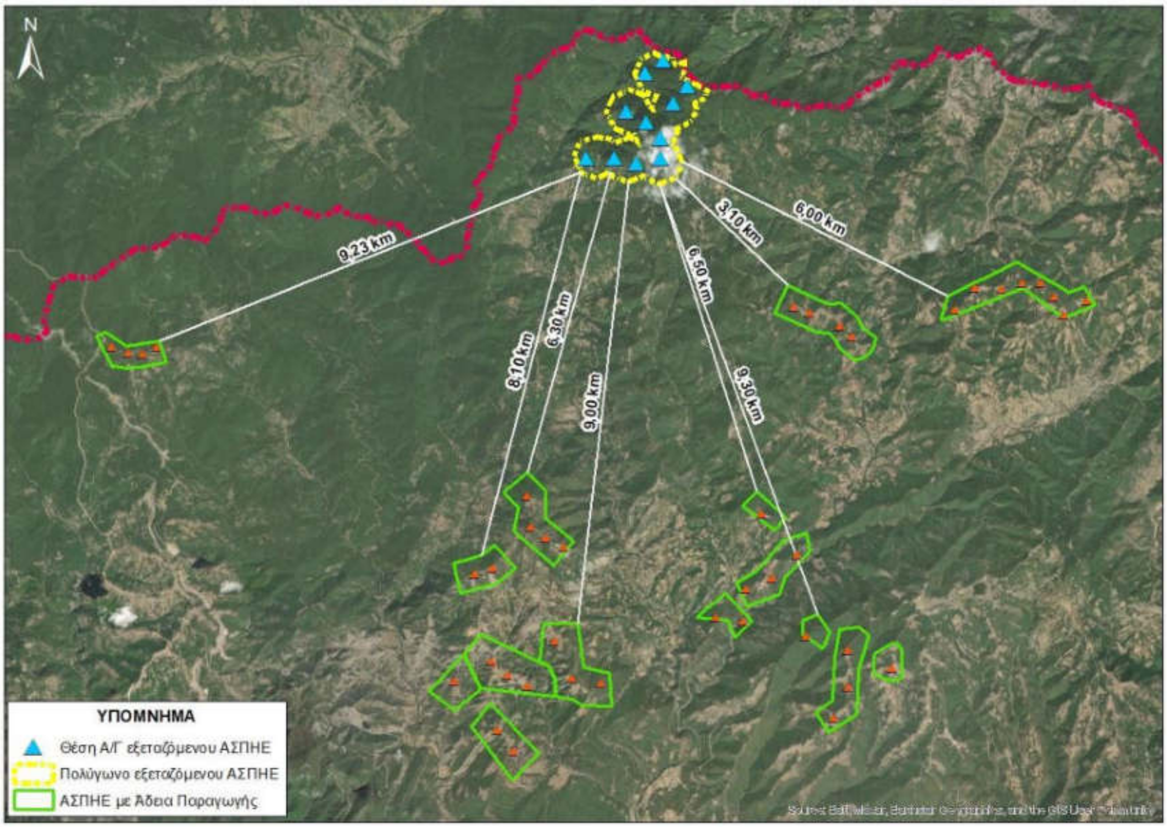

Figure 4.4- 2: Distances (within 10km radius) of the considered RES from the licensed RES (Source: RAEEY Geo-Information Map - 14.03.2024 and Original colouring processing)

In addition, based on the most recent Decennial Development Programme (DDP) of the National Electricity Transmission System (NESMIE) for the period 2022-2031, which was approved by Decision No 287/2022/24.03.2022 of the Energy Regulatory Authority (F.E.C. 4789/B/2022) for the reinforcement of the 400kV system in the region of Eastern Macedonia and Thrace, a new 400kV single-circuit (type B'B'B') 400kV single-circuit substation (type B'B'B') will be constructed, with a total length of about 140km, between Fillippon substation and N. Sanda substation. This will strengthen the Greek system on the eastern border, which is sparse, while in the future it will favour the implementation of interconnectors with Turkey and Bulgaria. In addition, it will increase the capacity to decommission energy production from RES or other conventional plants in Thrace. Finally, it is worth mentioning that according to the most recent PPA, there will be a development of the telecommunications network with the installation of optical fibres, resulting in the technological upgrade of the telecommunications network of ADMIE and the adoption of modern practices in the systems of the substations, power plants and energy control centres. Consequently, the services provided by the ADMIE network will be significantly improved.

CHAPTER 5: COMPATIBILITY OF THE PROJECT WITH ESTABLISHED SPATIAL AND PLANNING OBLIGATIONS

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5 COMPATIBILITY OF THE PROJECT WITH ESTABLISHED SPATIAL AND URBAN PLANNING OBLIGATIONS

5.1 POSITION OF THE PROJECT IN RELATION TO THE NATURAL AND MAN-MADE ENVIRONMENT OF THE AREA

The site of the wind power plant is located in the Local Community of Kalhantos, of the Municipal Unit of Komotini, of the Municipality of Komotini and a small part of the installation polygon of the ASPIE falls within the Municipal Community of Organi, of the Municipal Unit of Organi, of the Municipality of Arrianon, of the Region of Eastern Macedonia and Thrace.

Image from 5.1-1: Location of the project in Greece

The following sections describe in more detail the statutory land uses and activities, as well as the provisions of the overarching spatial and urban planning, in order to examine the integration of the project under consideration in relation to the character of the adjacent and neighbouring areas, the existing infrastructure and other services, as well as the basic characteristics of the wider area.

5.1.1 Statutory boundaries of settlements and approved urban plans

Looking at the study area, the following can be seen:

The project is located outside of settlement boundaries and outside of city plans.

Furthermore, it is worth noting that no statutory settlement is identified within the study area of the project under consideration. Specifically:

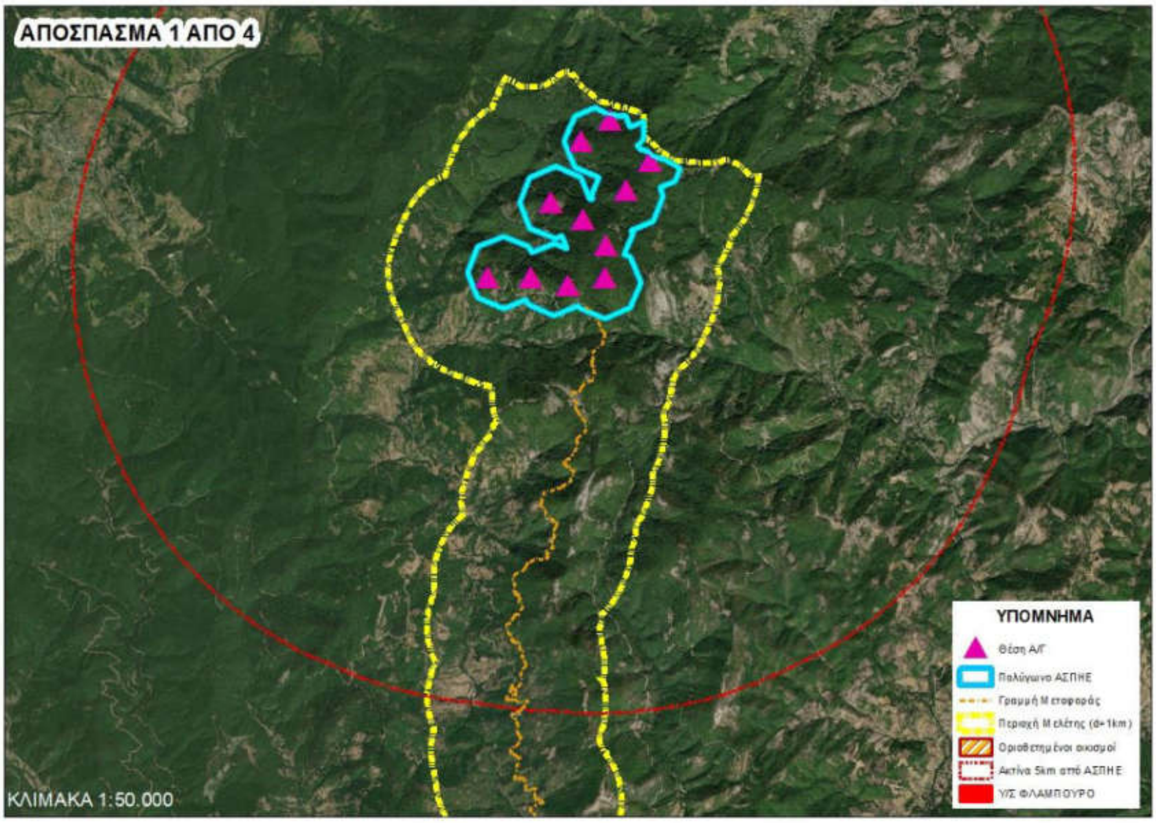
- At a distance of more than 8.1km and to the south of the ASPEO, the designated settlement '*Drymi*' is located, with a permanent population of 302 inhabitants according to the 2011 census.
- At a distance of > 9.1 km from the project is the settlement *'Ardeia'*, with a permanent population of 27 inhabitants, according to the 2011 census, and
- At a distance of > 11.1 km from the project is the settlement *'Ano Drosini'*, with a permanent population of 106 inhabitants, according to the 2011 census.

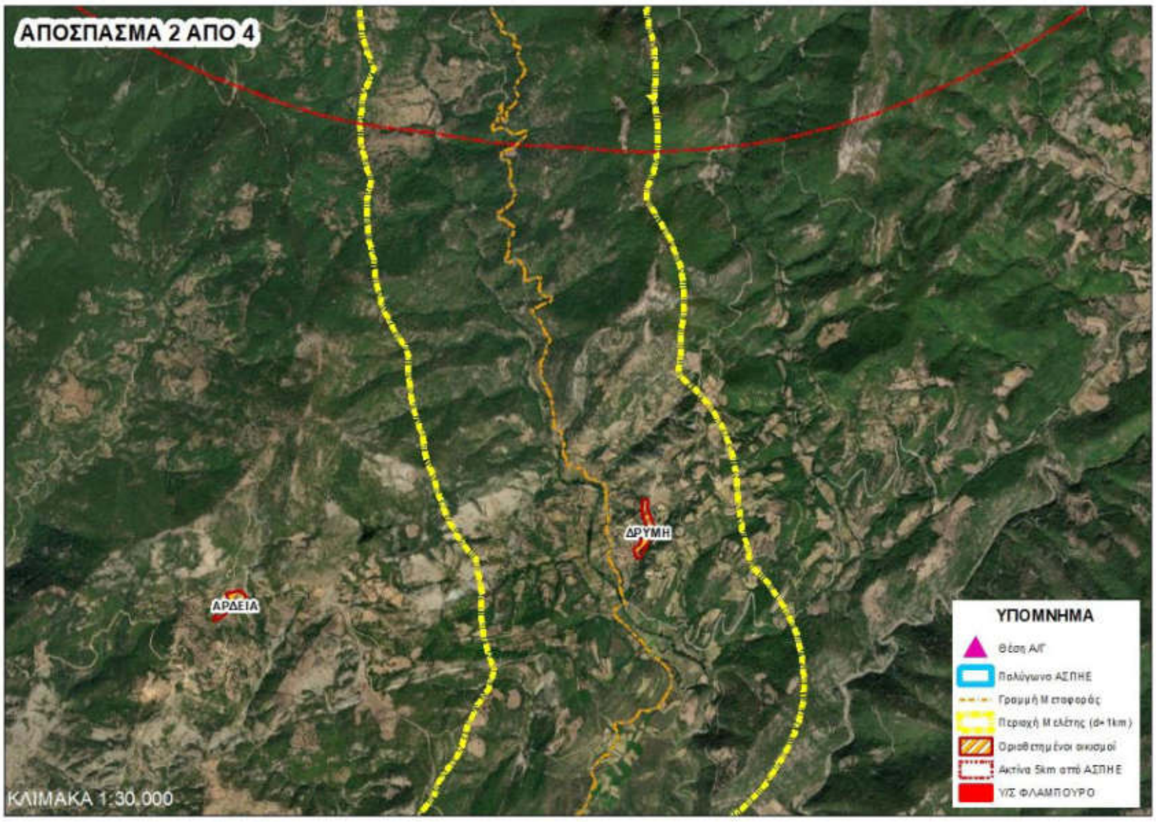
It is noted that the distances from the A/Cs under consideration are measured from the top of the pylon of the nearest A/C, since this is a fixed and dimensionless point.

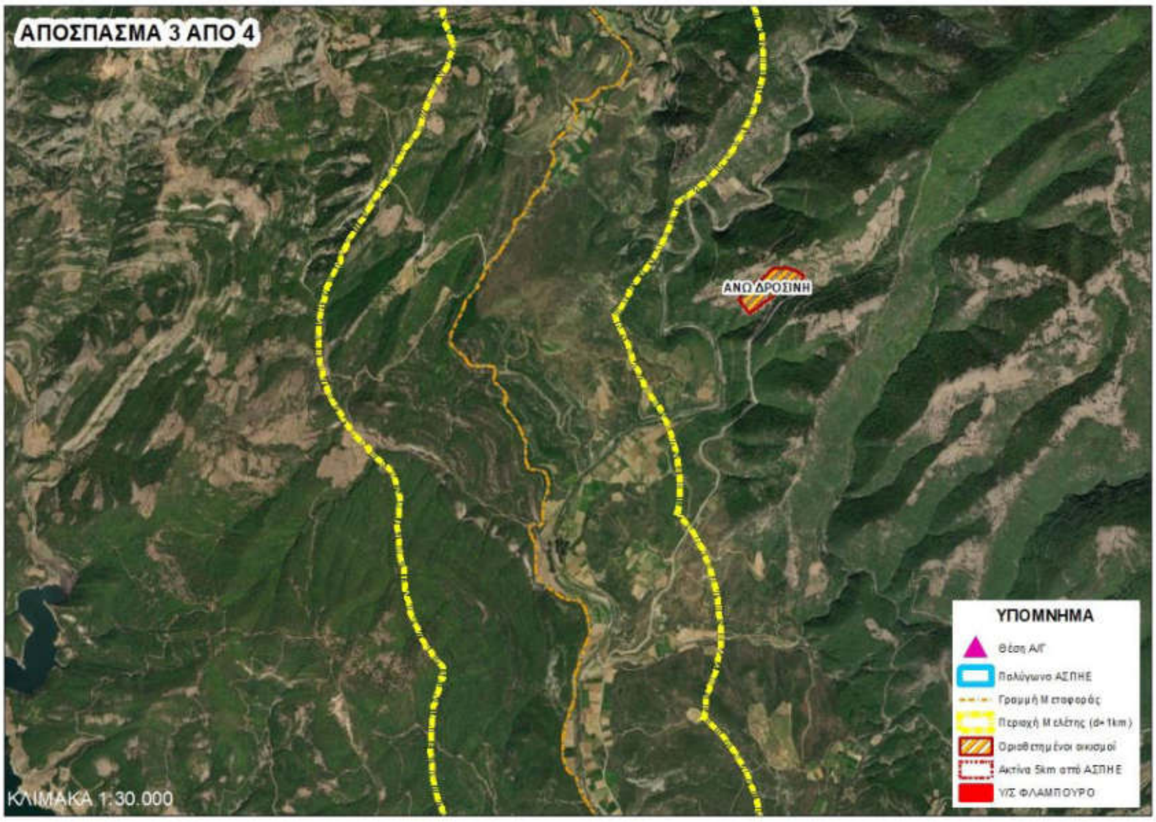
The table below lists the above settlements, inside and outside the study area, with their permanent population, according to the available data of the National Statistical Office for the 2021 census, the relevant legislation and their distance from the examined ASPEO.

Table 5.1-1: Distances of Defined Settlements from the ESDP under study

Settlement	Population	GOVERNMENT GAZETTE	Distance from the nearest A/C (km)
Oak	302	FEK 1366/D/1992	8.1 km
Ardea	25	FEK 1364/D/1992	9.1 km
Upper Drosini	97	FEK 1364/D/1992	11.1 km


ΑΠΟΣΠΑΣΜΑ 1 ΑΠΟ 4
ΥΠΟΜΝΗΜΑ
Θέση Α/Γ
Πολύγωνο ΑΣΠΗΕ
Γραμμή Μεταφοράς
Περιοχή Μελέτης (d=1km)
Οριοθετημένοι οικισμοί
Ακτίνα 5km από ΑΣΠΗΕ
Υ/Σ ΦΛΑΜΠΟΥΡΟ
ΚΛΙΜΑΚΑ 1:50.000


ΑΠΟΣΠΑΣΜΑ 2 ΑΠΟ 4
ΔΡΥΜΗ
ΑΡΔΕΙΑ
ΥΠΟΜΝΗΜΑ
Θέση Α/Γ
Πολύγωνο ΑΣΠΗΕ
Γραμμή Μεταφοράς
Περιοχή Μελέτης (d=1km)
Οριοθετημένοι οικισμοί
Ακτίνα 5km από ΑΣΠΗΕ
Υ/Σ ΦΛΑΜΠΟΥΡΟ
ΚΛΙΜΑΚΑ 1:30.000



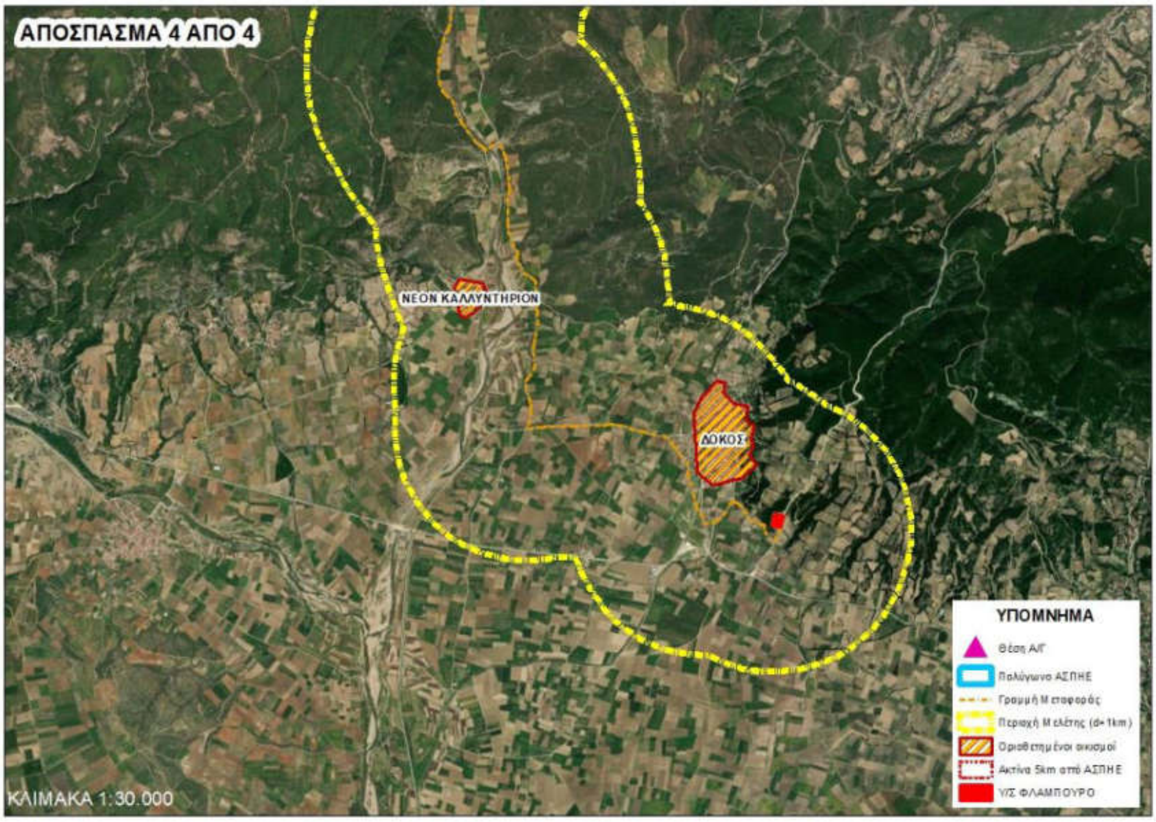


Image from 5.1-2: Defined settlements in the study area

Other settlements close to the considered ESDP, the boundaries of which are of course not established, are:

- "*Sarakini*", at a distance of more than 1000m to the southwest of the project (these are settlements dating back to 1923) and,
- *"Upper Kardamos"*, at a distance of more than 2500m to the east of the Wind Farm under study

Consequently, the considered LPP at the "Warrior" location is compatible with the permitted distances from settlements.

5.1.2 Boundaries of areas of the national system of protected areas of Law 1650/1986 (A' 160) as amended and in force

5.1.2.1 General information on Protected Areas

In 2017, new sites were included in the European Ecological Network Natura 2000 and the updating of the national list was established by the Decree 50743/2017 (Government Gazette B' 4432) "*Revision of the national list of sites of the European Ecological Network Natura 2000*". By Law 4685/2020 (Government Gazette A), the new National System for the Governance of Protected Areas was established, the Agency for the Natural Environment and Climate Change (OFYPEKA) was founded and 24 Protected Areas Management Units (PAMUs) were established, which are now subordinate to OFYPEKA. According to the provisions of paragraph 3 of Article 18 of Law 1650/1986 (Government Gazette A 160), as amended and in force (recently amended by Article 45 of Law 4685/2020), protected areas are divided into:

- Biodiversity protection areas,
- National parks,
- Wildlife sanctuaries and
- Protected landscapes and protected natural formations.

Law 4685/2020, amending provisions of Law 1650/1986, defines the criteria and procedures for designation (through the preparation of an EIA and the adoption of a PD), while it establishes four protection zones (as general uses added in PD 59/2018):

α. Total Nature Protection Zone
β. Nature Protection Zone
c. Habitat and species conservation zone .
d. Sustainable natural resources management zone

For these zones, the law lists the permitted special uses. The further definition of both the zones and the specific permitted uses will be completed in the pending P.D. after the completion of the Special Environmental Studies (SEA). The EIAs will establish an institutional framework for the delimitation and institutionalisation of classified protection zones, setting clear conditions and rules for land use and economic activity in the protected areas.

For the region of Eastern Macedonia-Thrace (including Rhodope), the second phase of the relevant EIA has been prepared and the consultation on the content of part of the EIA has been completed. However, the study has not yet been completed and certainly the management plan and the PDO have not yet been adopted.

The development lot of the project under study is located outside of areas of the national system of protected areas. Access to the project area will be provided mainly by the existing rural and rural-forestry network in the area, where interventions and improvements are proposed in order to meet the manufacturer's specifications for the movement of the A/C equipment, as well as by small new road sections. On the whole, these projects are located outside the national system of protected areas. The proposed underground medium voltage transmission line is located outside protected areas and more than 7km (measured from its terminus) from the nearest one.

As mentioned above, no PD has yet been issued for the above protected areas based on Law 4685/2020 and therefore, the zones and the permitted uses have not yet been defined.

In any case, the EIA and the expected PDO only concern Natura2000 sites and do not define uses in SPAs or other protected areas. Therefore, there is no question of compatibility of the project with the future commitments and provisions of the EIA.

5.1.2.2 Areas of Total Nature Protection and Nature Conservation

Absolute Nature Protection Zones are defined as "*areas with extremely sensitive types of natural habitats, and/or with habitats of extremely sensitive species, whose presence and representativeness is estimated to be very high or whose status requires extremely strict protection*" (paragraph 4 of Article 19 of Law 1650/1986, as in force).

Nature Protection Zones are defined as "*areas with types of natural habitats and/or habitats of species whose presence and representativeness is considered high or whose status requires strict protection*" (paragraph 4 of Article 19 of Law 1650/1986, as in force).

As mentioned above, **no Absolute Protection and Nature Conservation Zones have been established in the study area**.

5.1.2.3 National Parks

No National Parks have been designated in the study area and the wider area and therefore, there is no issue of incompatibility of the project under consideration.

5.1.2.4 Natura 2000 network sites

The licensed ESDP is located outside Special Protection Areas (SPAs) or Special Areas of Conservation (SACs). At a distance of >10.5 km (from the nearest SAC) is the Special Protection Area for avifauna named 'Filiouri Valley', code GR1130011 and covering an area of 37.565,9 ha as shown in the Image from 5.1-3**α.**

It is noted that the wind turbines under consideration will be installed outside and at a distance of more than 10.5 km from the boundaries of the Natura 2000 site in question. Also, as shown in the figure below, the accompanying access and interconnection works of the considered wind turbine project do not fall within any protected Natura 2000 network site.

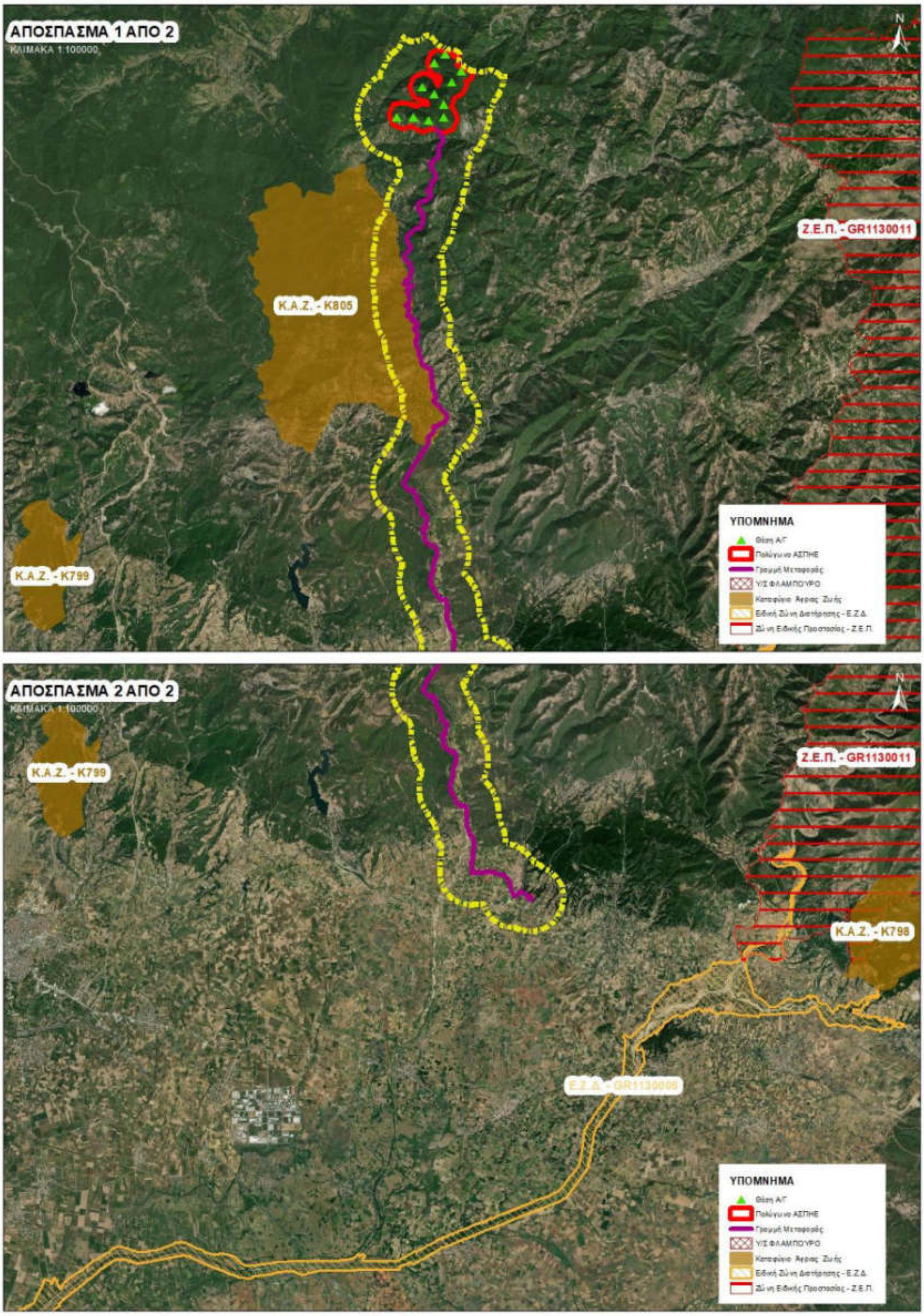


Image from 5.1-3α: Protected areas of Law 3937/2011 in the study area

Natura 2000 network sites in a neighbouring country

The project under consideration is located on the Greek-Bulgarian border. Specifically, the nearest E/C is located at a distance of ~170m. This ASEU and its impacts are investigated with 1km as the study area.

On the border of Bulgaria with Greece, in the state of Bulgaria, there is a designated Protected Area of the Natura 2000 Network.

This is the area called 'Rodopi - Iztochni' and code BG0001032 - S.C.I. , with an area of 217446.9973 ha. Using Greek terminology, the area in question falls within the Special Conservation Zones (SCZs). Based on the identity of this protected area and the species that it protects, the design of the considered SSCI is not expected to have a significant impact on the protected species. Therefore, the Wind Farm at the "Warrior" site is also compatible with the protected areas of the neighbouring state of Greece.

In any case, special reference is made to Chapter 9 of this EIS, analyzing any impacts that the project may cause to the species of the protected area, as well as to Chapter 10 , which will present the mitigation measures for the potential impacts of the project on the area.

5.1.2.5 Wildlife Sanctuaries

In the wider area and at a distance of more than 2.0km from the nearest A/E of the considered EWS up to 22km, the following Wildlife Refuges are located:

- K805 - "Petarmon-Adas Municipality of Komotini" ,
- K799 - "Nymphaea of the Municipality of Komotini" and
- K798 - "Arrianon-Nea Sanda Municipalities of Arrianon-Sapes".

The E/Cs under study are located outside the above areas and at a distance of at least 2 km. The same applies to the road works, as they are developed outside the boundaries of the nearest Wildlife Refuge. In addition, as regards the works to be carried out for the laying of the transmission line, as shown in the above figure, they fall within the existing roadworks within the boundaries of the Wildlife Reserve. 'Petarmon-Adas of the Municipality of Komotini' (K805).

5.1.2.6 Small Island Wetlands - Ramsar Wetlands

No small island wetlands, as defined by Government Gazette 229/AAPTH/19-06-2012, are identified in the study area.

In Greece, in general, 10 wetlands have been designated as Wetlands of International Importance according to the Ramsar Convention, which was ratified by Law 191/74 (Government Gazette 350/A/1974) "On the ratification of the Ramsar Convention" (as amended and in force by Law 1950/1991 (Government Gazette 84/A/1991)).

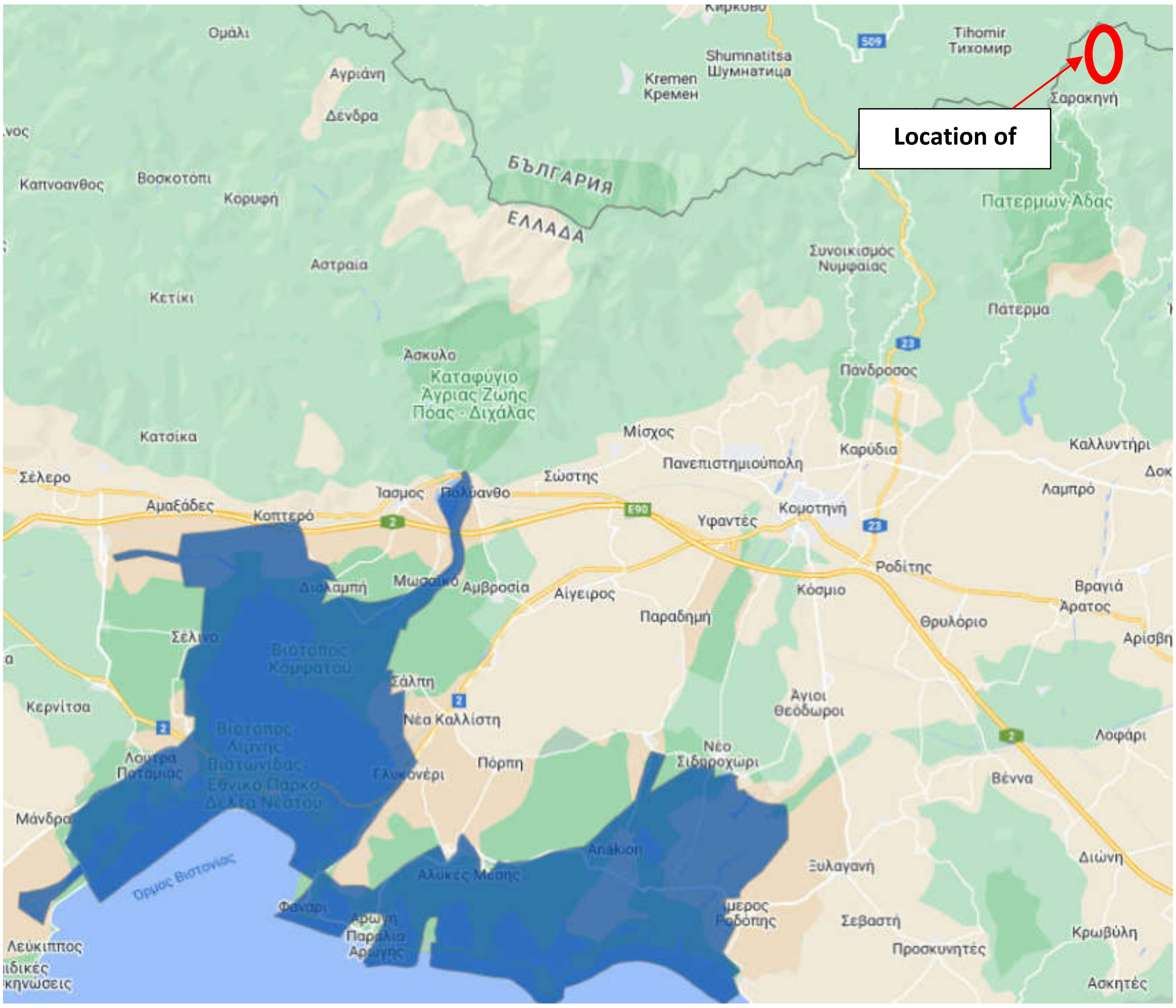


Image from 5.1-4: Ramsar wetlands in the region
(Source: http://www.oikoskopio.gr/map/)

At a distance of 34.5 km southwest of the wind turbine site, the Ramsar Wetland 'Lake Vistonis, Porto Lagos, Lake Ismaris and adjacent lagoons', with an area of 24,396ha, is located. This wetland falls within the Natura 2000 site named 'Lakes and lagoons of Thrace - Greater area and coastal zone' (EZD) and code GR1130009, as well as within the areas 'Valley of Komsatou' code GR1130012 and 'Lakes Vistonida, Ismarida-Limnothermal lagoons of Porto Lagos, Aliki, Ptelea, Xirolimni, Karatza' code GR1130010 (SPA).

It is noted that no intervention is taking place within a distance of at least 11km from the wetland of Lake Vistonis, Porto Lagos, Lake Ismaris and adjacent lagoons and therefore the project will not cause any hydromorphological alteration to the downstream wetland.

5.1.3 Areas Important for Birds

Important Bird Areas (IBAs) are defined as areas of highest priority for the conservation of biodiversity in general and for the protection of birds in particular, which are often irreplaceable or vulnerable, as they regularly host significant populations of one or more threatened, endemic or synanthropic species.

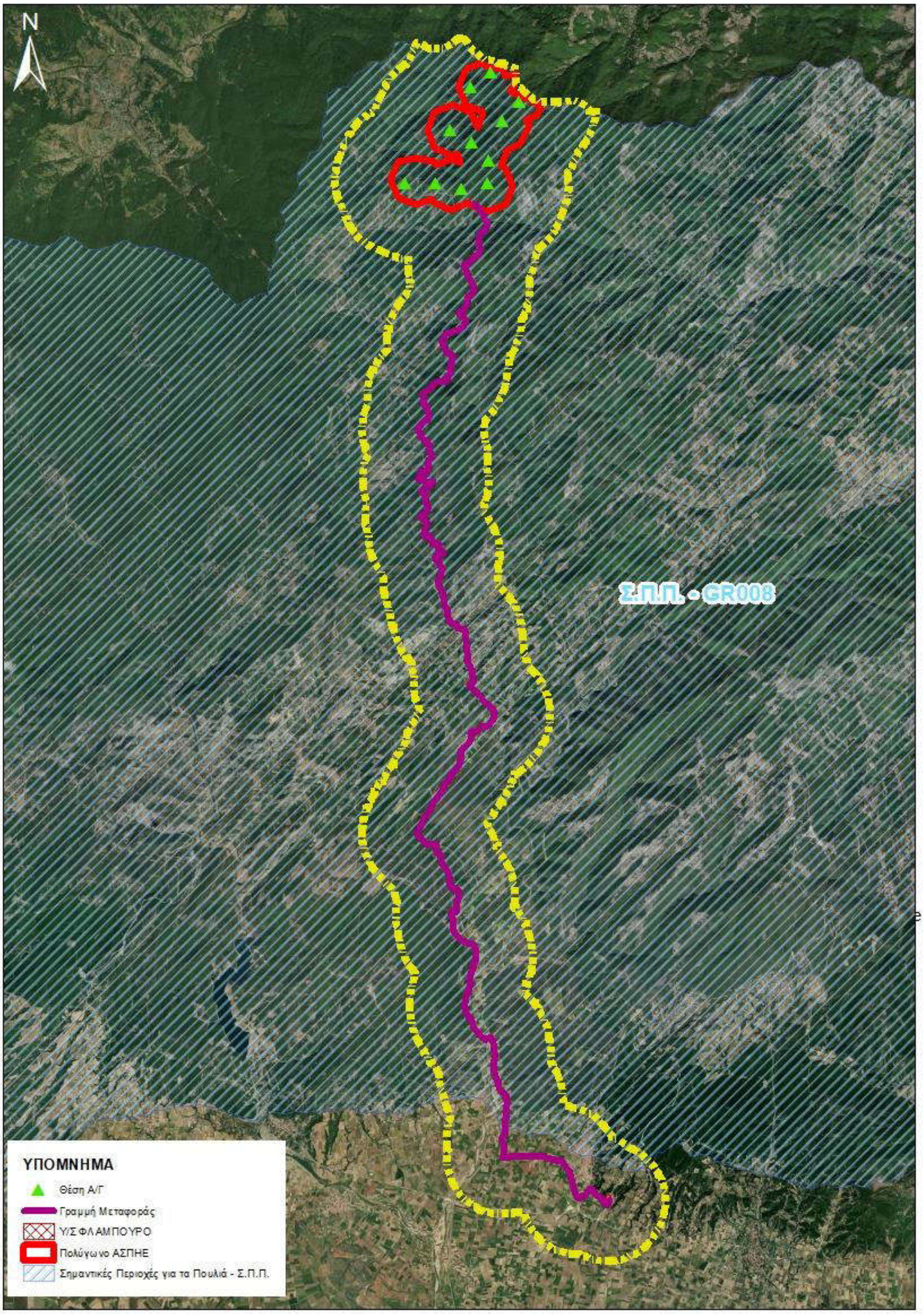


Image from 5.1-5: Important Areas for Birds in the region

The project is located within the boundaries of the Important Bird Area "Filiouris Valley and Eastern Rhodope" code GR008, as shown in the image above. Part of this SPA falls within the Natura 2000 network sites GR1130011, GR1130010, GR1130002 and GR1130005, but these sites are located far from the project.

5.1.4 Forests, wooded areas and land to be afforested

The protection of the forest ecosystems of the country is governed by the provisions of Law 998/1979 "On the protection of forests and forest areas in general of the country", as amended and in force (from Law 3208/2003, Journal of Laws 3208/2003. A303 "*Protection of forest ecosystems, preparation of forest inventory, regulation of rights in rem to forests and forest land in general and other provisions*", the Law 4280/2014, Government Gazette A159 *"Environmental Upgrading and private urbanization - Sustainable development of settlements - Forest* Legislation *Regulations & other provisions"*, etc.).

For the Municipal and Local Communities of the Municipalities of Komotini, Iasmos, Maroneia-Sapes and Arrianon of the Municipality of Rodopi, a Forest Map has been posted with the Decision of the Forestry Directorate of Rodopi (IDA: O2ONOR1Y-KN7).Specifically, according to the posted maps[1] , the project passes through areas that fall under par. 1,2,3,4 and 5 of article 3 of Law 998/79 as in force, but also from non-forested areas (see. Image from 5.1-6). The area of the polygon licensed by RAE for the installation of the ASPIE under licensing has been classified as forested areas (with forest designation ΔΔ, ΑΔ and ΔΑ), while in much smaller parts there are areas of non-forested character (with AA designation). Regarding the access road, it passes mainly through forested areas (with forest designation AD, DA AD and PD), while only 62m of the 11.1 km are in non-forested areas, while the MT interconnection line also passes through forested (most of it - >85% of its length) and non-forested areas. The location of the already constructed voltage boosting substation is located in non-forested land with a Final Act.

According to Article 4 (paragraph 4) of Law 4951/2022, *"the power plants from RES and CHP, the storage stations, as well as their accompanying projects, are allowed to be installed and operate:*

> *a) On land or on a site, on which it is in principle permitted, based on the legislation in force, the installation of a RES and CHP and/or storage station and provided that the applicant has the right of legal use.*

b) In forests, woodlands or other areas, if the execution of works is allowed on them, in accordance with articles 45 and 53 of Law No. 998/1979."

With regard to the accompanying interconnection projects, it is allowed to pass *"....b) underground from existing forest roads, without approval, but only after informing the relevant forestry authority as to the timing of the works and the exact route of the underground electricity transmission and distribution network. The above intervention is exempted from the obligation to reforest or afforest and to pay a fee for the use of the land in accordance with paragraph 1. 8 of Article 45 of Law No. 998/1979."* (Article 4(6)).

According to Article 45 (paragraphs 2 and 3) and Article 53 (paragraph 3) of Law 998/1979, as amended and in force, the construction and installation of power generation projects from Renewable Energy Sources (RES) and/or storage stations is permitted in forests and woodlands, subject to approval.

It is concluded from the above that the project under study is compatible with the legislation and the zoning rules that have been set up to date.

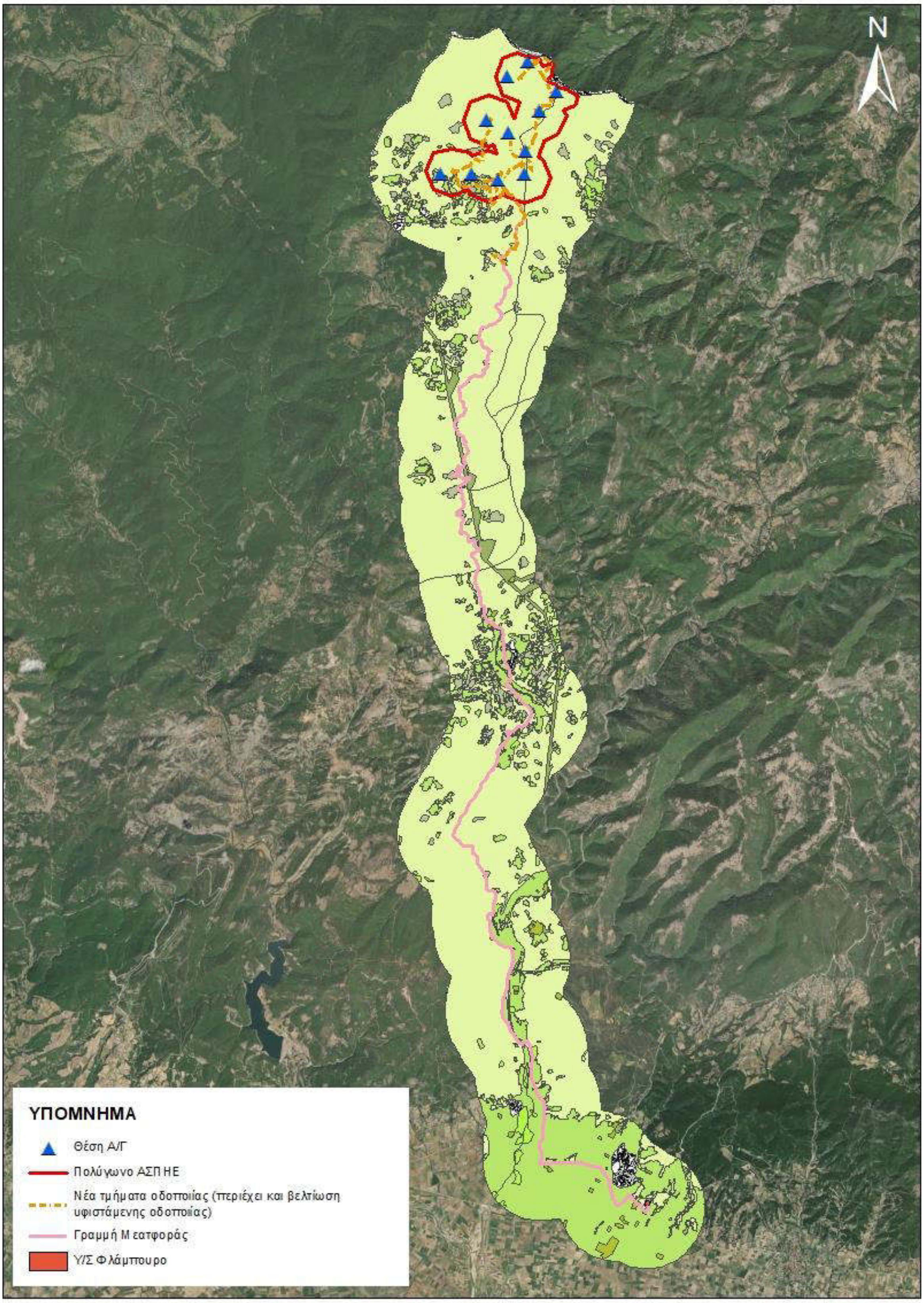


Image from 5.1-6: Categories of forest and non-forest land designation in the study area.

Table 5.1-2: Forest Map Memo

ΑΑ	ΑΛΛΗΣ ΜΟΡΦΗΣ / ΚΑΛΥΨΗΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ ΑΛΛΗΣ ΜΟΡΦΗΣ / ΚΑΛΥΨΗΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*
ΑΔ	ΑΛΛΗΣ ΜΟΡΦΗΣ / ΚΑΛΥΨΗΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ ΔΑΣΗ ΚΑΙ ΔΑΣΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*
ΔΑ	ΔΑΣΗ ΚΑΙ ΔΑΣΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ Ή ΠΡΟΫΦΙΣΤΑΜΕΝΑ ΣΤΟΙΧΕΙΑ ΑΛΛΗΣ ΜΟΡΦΗΣ / ΚΑΛΥΨΗΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*
ΔΔ	ΔΑΣΗ ΚΑΙ ΔΑΣΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ Ή ΠΡΟΫΦΙΣΤΑΜΕΝΑ ΣΤΟΙΧΕΙΑ ΔΑΣΗ ΚΑΙ ΔΑΣΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*
ΠΑ	ΤΕΛΕΣΙΔΙΚΕΣ ΠΡΑΞΕΙΣ & ΑΠΟΦΑΣΕΙΣ ΧΑΡΑΚΤΗΡΙΣΜΟΥ - ΜΗ ΔΑΣΙΚΕΣ
ΠΔ	ΤΕΛΕΣΙΔΙΚΕΣ ΠΡΑΞΕΙΣ & ΑΠΟΦΑΣΕΙΣ ΧΑΡΑΚΤΗΡΙΣΜΟΥ - ΔΑΣΙΚΕΣ
ΠΧ	ΤΕΛΕΣΙΔΙΚΕΣ ΠΡΑΞΕΙΣ & ΑΠΟΦΑΣΕΙΣ ΧΑΡΑΚΤΗΡΙΣΜΟΥ - ΧΟΡΤΟΛΙΒΑΔΙΚΕΣ
ΧΑ	ΧΟΡΤΟΛΙΒΑΔΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ ΑΛΛΗΣ ΜΟΡΦΗΣ / ΚΑΛΥΨΗΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*
ΧΧ	ΧΟΡΤΟΛΙΒΑΔΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΑΛΑΙΟΤΕΡΗΣ ΛΗΨΗΣ ΧΟΡΤΟΛΙΒΑΔΙΚΕΣ ΕΚΤΑΣΕΙΣ ΣΤΙΣ Α/Φ ΠΡΟΣΦΑΤΗΣ ΛΗΨΗΣ & ΣΤΙΣ ΑΥΤΟΨΙΕΣ*

* or in the Land Maps of Law 248/1976

5.1.5 Social infrastructure facilities, utilities, etc.

The most important social infrastructure and utilities are road and rail networks, electricity, water and sewerage, gas and telecommunications networks. More generally, social infrastructure also includes education, sports, recreation and health care facilities.

Due to the location of the project under consideration (ridge-top installation), no social infrastructure facilities are identified in the immediate area of the polygon of the siting of the considered LSEA.

In the wider study area, the local provincial road network, telecommunications and electricity networks are located. The municipalities of Komotini and Arrianon, as well as the wider area are covered by the telecommunications network of OTE. In addition, it is noted that the Municipality of Komotini and the Municipality of Arrianon have a water supply network, but not a sewerage network in their entirety. The settlements are mainly served by septic or absorption tanks. However, it should be noted that Komotini has an E.E.L., which covers the needs of the settlements in the P.E. Rodopi.

As shown in the image below, south of the development site of the ASPIE there is a 150kV single circuit overhead transmission line, as well as a 150kV/MT substation for the connection of the A/P at Flambouro. In addition, the 400/150kV extra-high voltage substation is located to the south-east in the area of Nea Sanda.

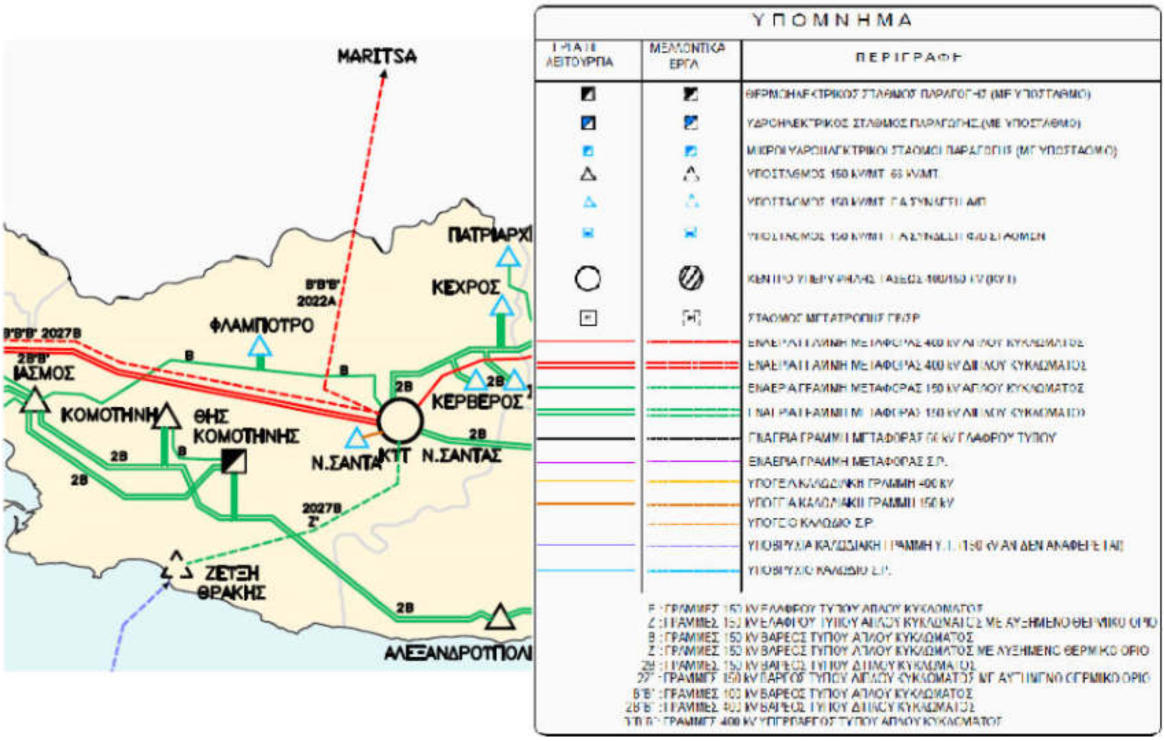


Image from 5.1-7: Energy infrastructure networks in the region

(Source: Map of the Greek interconnected electricity transmission system with a time horizon until 2031; Decennial Development Programme for the period 2022-2031, Government Gazette 4789/B/2022)

Finally, according to the data available on the website of the National Natural Gas System[2] , a natural gas pipeline is located in the wider area, while in Komotini and in the settlement of Hamilo there are operating stations, as shown in Image from 5.1-8. It should be noted that an independent PV system is planned to the west of the project location with a final investment decision.

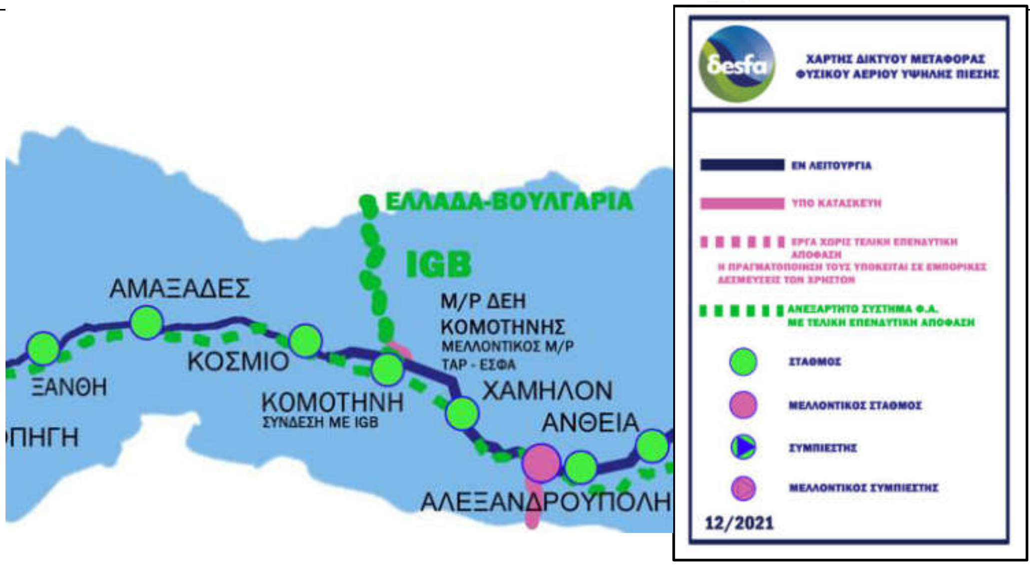


Image from 5.1-8: Extract from the High Pressure Gas Transmission Network Map
(Source: https://www.desfa.gr/national-natural-gas-system/transmission)

5.1.6 Sites of archaeological interest

The ASPEE under study is located outside of cultural heritage sites and monuments, and the area does not belong to an archaeological zone. No archaeological sites with Absolute Protection Zones are identified in the wider area.

According to the Permanent List of the Declared Archaeological Sites and Monuments of Greece[3] , the following areas of archaeological interest are listed, which are located at a significant distance from the project site:

- Monument of the Fortified enclosure of Asar-Tepé Sarakinis in Rodopi (Government Gazette 468/B/1981), at a distance of >1.4km southwest of the project.
- Archaeological site Kale Tepe Nymfaias hill in Rodopi (Government Gazette 731/B/1979) at a distance of >9.8 km southwest of the project.
- Kale-Teppe Nymphaea perimeter (Government Gazette 731/B/1979) at a distance of >13.4 km southwest of the project.

In any case, in order to ensure the protection of the cultural environment, excavations during the construction phase of the works will be carried out under the supervision of the competent archaeological services after their timely and written notification and under the responsibility of the project promoter.

The following table lists the sites of archaeological interest, according to the Permanent List of the Declared Archaeological Sites and Monuments of Greece, in the wider area of the project.

Table 5.1-3: Sites of archaeological interest in the wider study area

Name of the Monument	Administrative Treatment	Protection regime
Historical listed monument Workhouse	DE Komotini	GOVERNMENT GAZETTE 63/B/1950
Byzantine walls of the city of Komotini	DE Komotini	FEK 239/B/1964, FEK 404/B/1965
Ruins of Byzantine walls of Gratianople (beyond the present village of Gratini)	DE Komotini	GOVERNMENT GAZETTE 239/B/1964
Archaeological site of the ruins of the ancient city of Maroneia and its walls, including the acropolis and its enclosed areas	DE Komotini	GOVERNMENT GAZETTE 239/B/1964
Archaeological site of the prehistoric tomb of Paradimi	DE Komotini	GOVERNMENT GAZETTE 239/B/1964
Historical monument of the Church of the Assumption of the Virgin Mary in Komotini	DE Komotini	GOVERNMENT GAZETTE 521/B/1968
Building in need of special state protection, the Mansion of the Hellenic Urban School (Tsanaklis Mansion)	DE Komotini	GOVERNMENT GAZETTE 136/B/1974
Byzantine fortress	DE Komotini	GOVERNMENT GAZETTE 731/B/1979
Ellipsoidal enclosure defence complex	DE Komotini	GOVERNMENT GAZETTE 731/B/1979
Roman baths and later cemetery (Arrianon)	DE Arrianon	GOVERNMENT GAZETTE 731/B/1979
The Peidou Mansion in Komotini (property of the Cultural Group)	DE Komotini	GOVERNMENT GAZETTE 750/B/1979
Prehistoric fortification enclosure at the Asar-Tepé Hill (Tash Hill)	DE Komotini	GOVERNMENT GAZETTE 468/B/1981
The building of the Jewish Synagogue of Komotini (owned by the Central Board of Jewish Communities)	DE Komotini	GOVERNMENT GAZETTE 888/B/1982
Work of art Building at 42 Agios Georgios Street (owned by the State)	DE Komotini	GOVERNMENT GAZETTE 562/B/1983
Work of art Building at 15 Tsanaklis Street (property of Aiko Tamaresi)	DE Komotini	GOVERNMENT GAZETTE 683/B/1984
Work of art Stalios Mansion at 64 Kondyli Street (owned by Afon Kyrazoglou)	DE Komotini	FEK 344/B/1985, FEK 795/B/1988
Work of art Archontiko Dermetzoglou at 23 Nestoros Tsanaklis Street	DE Komotini	GOVERNMENT GAZETTE 344/B/1985
Work of art Building on Tsanaklis street no. 6-Iliadis Mansion (owned by G. Antoniadis)	DE Komotini	GOVERNMENT GAZETTE 568/B/1985
Archaeological site of Papikio Oros	DE Komotini	FEK 364/B/1986, FEK 284/B/1987

Name of the Monument	Administrative Treatment	Protection regime
The Astoria Hotel is a historical monument	DE Komotini	GOVERNMENT GAZETTE 345/B/1990
The building of the Tobacco Warehouse on 8 Parnassos Street (property of the Thrace Technical Chamber of Thrace)	DE Komotini	GOVERNMENT GAZETTE 112/B/1992
The building on Ioakim III Street (owned by Ant. George) is a historical monument	DE Komotini	GOVERNMENT GAZETTE 594/B/1995
Work of art Smokehouse in the central square of Komotini (property of I. Kaldirimtzi)	DE Komotini	FEK 882/REV/1995, FEK 420/REV/1998
Historical monuments and works of art five (5) buildings in Komotini together with their surroundings	DE Komotini	FEK 1719/REV/1999
Historical place part of the traditional market of Komotini	DE Komotini	FEK 2059/REV/1999
Historical monument and work of art Two-storey auxiliary building on Heroes Avenue (owned by the Ministry of National Defence)	DE Komotini	GOVERNMENT GAZETTE 793/B/2002
Historical monument and work of art building of the Old Division on Heroes Avenue (property of the Ministry of National Defence)	DE Komotini	GOVERNMENT GAZETTE 793/B/2002
Building at the junction of Al. Symeonidi 4 and Vyronos where the Archaeological Museum of Komotini is housed (Ith ' EPKA) (property of the Greek State)	DE Komotini	FEK 121/AAP/2011
Archaeological site of Dikaia at the sites 'Lasspotopos' and 'Fountain of Daout'	DE Komotini	FEK 298/AAP/2012

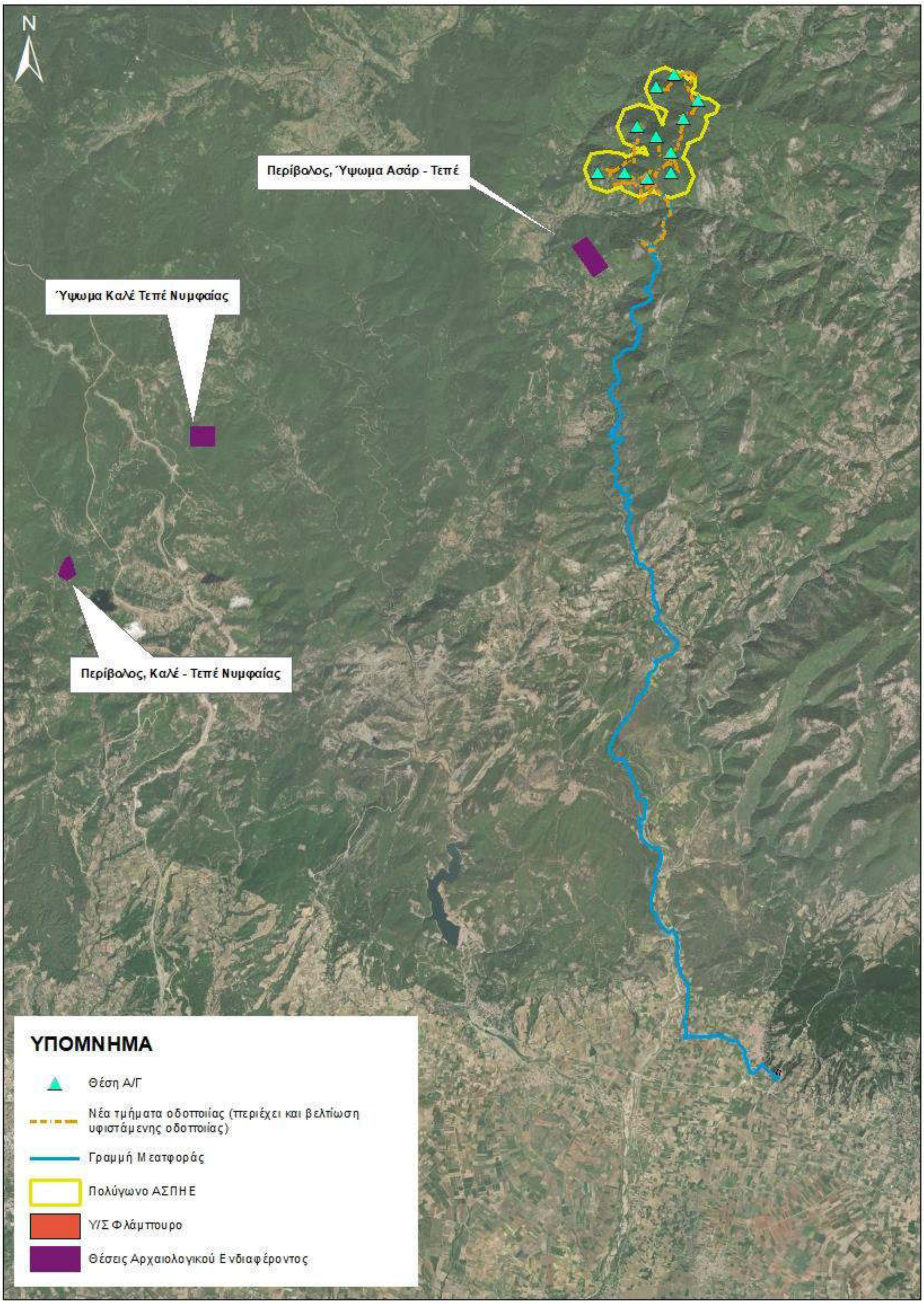


Image from 5.1-9: Archaeological Sites in the study area

5.2 EXISTING LAND-USE AND PLANNING REGULATIONS IN THE AREA OF THE PROJECT

The proposed project is located in zones inside and outside the urban plan, outside the boundaries of settlements and, in general, within areas and uses where RES infrastructure projects are allowed.

The following paragraphs describe in more detail the basic spatial options that have been established at the level of Strategic and Regulatory Spatial Planning of Law 4447/2016 (Government Gazette 241/A/23-12-2016) for the study area and the compatibility of the project under study with them.

5.2.1 Projections and guidelines of the National, Special and Regional Spatial Planning and Sustainable Development Framework

5.2.1.1 General Framework for Spatial Planning and Sustainable Development

The General Framework for Spatial Planning and Sustainable Development (Government Gazette 128/A/2008) is the basis of the National Spatial Planning Policy and includes a set of texts and plans, which record and evaluate the factors that affect the long-term spatial development and structure of the national territory, assess the spatial impact of international, European and national policies and identify the key priorities and strategic directions for integrated spatial development and sustainable development, with a 15-year perspective.

Article 3 of the current GFSAP distinguishes 3 axes of the country's development orientation: north-west towards the European central development cluster, north-east towards the Balkans, central and eastern Europe and south-south-east towards the south-east and the wider Mediterranean, as well as towards the Red Sea, as reflected in the Image from 5.2-1. The integration of these three axes can make the country an international hub within a fluid geopolitical environment. The country's geographical location provides advantages for cooperation in the fields of economy, transport, energy, etc. with the countries of the wider region (Balkans, Black Sea countries - Russia, Middle East). In this context, the country seeks to improve its ability to meet the needs arising from globalisation and to **develop energy networks.**

In order for Greece to be able to meet its obligations under the Kyoto Protocol and the European Union's decisions to reduce emissions of greenhouse gases, it is explicitly stated in the GEFSP that, among other measures, measures for the **increase of energy from Renewable Energy Sources are** foreseen. Specifically for the energy sector, it seeks (Article 6):

(a) *ensuring that energy needs are fully covered at all points of the national territory (together with the continuous effort to save energy in all sectors),*

(b) ***enhancing energy security by fully developing renewable energy sources****, promoting the use of alternative fuels and exploiting domestic resources,*

(c) the effective monitoring of the environmental performance of the energy sector and the reduction of the sector's impact on climate change in the context of our country's commitments in this regard.

In particular, as regards energy production and transmission infrastructure, it seeks to:

a) supporting the development options proposed by this framework,

(b) increasing the rate of penetration of renewable energy sources in overall energy production, in accordance with the specific guidelines of the relevant Specific Framework,

(c) the modernisation of lignite-fired power plants and the gradual reduction of the contribution of lignite to the energy balance,

(d) the strengthening of the international role of our country as a centre of electricity, gas and oil transmission,

(e) the undergrounding of electricity distribution networks in traditional settlements and archaeological sites, with the provision of suitable sites for distribution substations. Also, avoiding the passage of transmission networks through archaeological sites and, as far as possible, through Natura 2000 sites and protected landscapes.

Regarding energy infrastructure, the integration of strategic energy infrastructure into national spatial planning requires the following regulations and interventions:

α. *Exploitation for energy production of the particular energy advantages of specific regions of the country, in particular:*

- *the water potential of Western Greece - Epirus and the rivers Axios, Aliakmonas and Nestos in Northern Greece,*

- *of the country's lignite reserves, particularly in the Central Peloponnese and Western Macedonia,*

- ***the country's potential in renewable energy sources, in accordance with the specific guidelines of the Special Spatial Framework for Renewable Energy Sources***. (see specific guidelines for the development of renewable energy sources in the framework of the Special Plan of Action for renewable energy sources (see. § 5.2.1.1) (...)

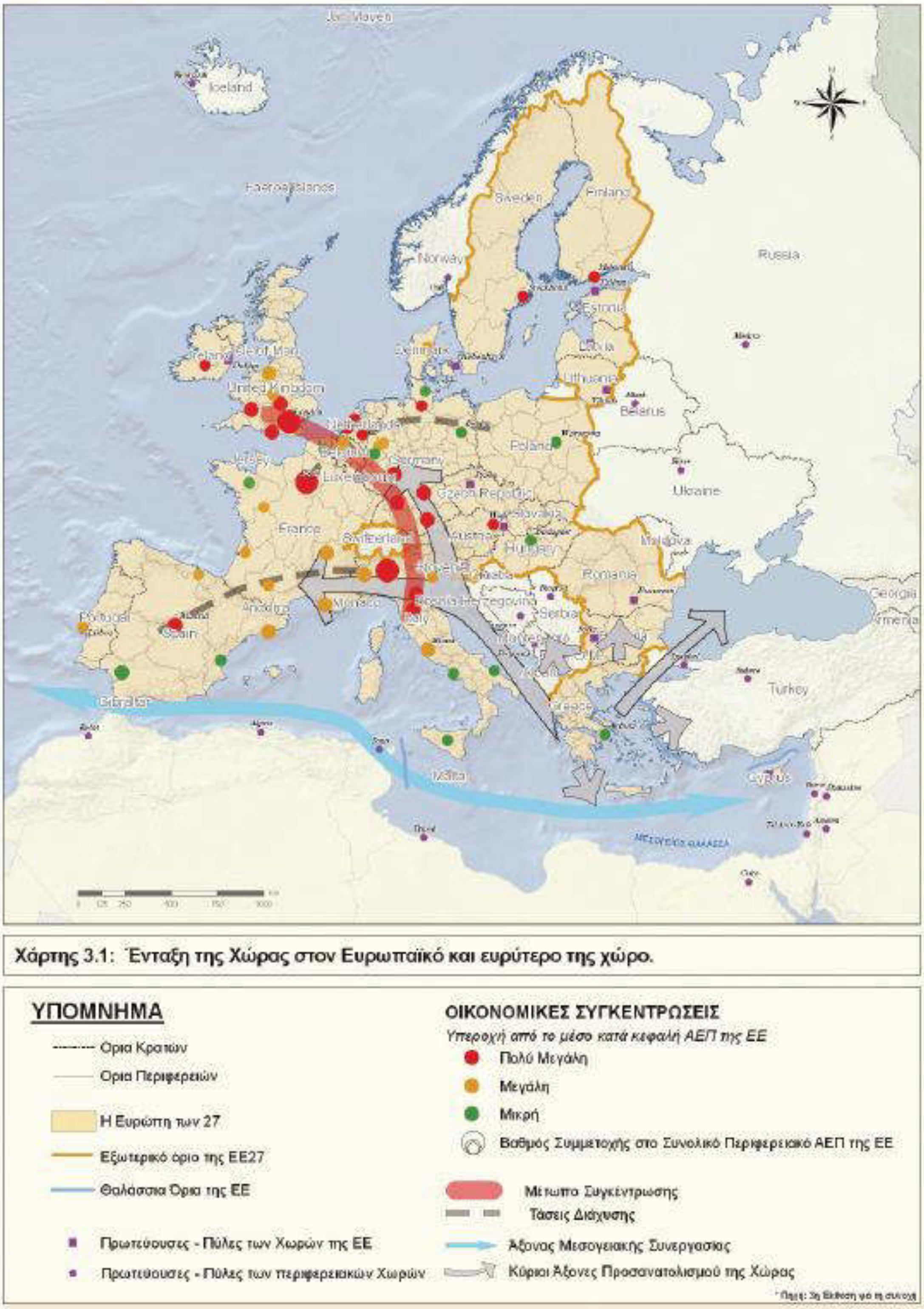
d. *Radical improvement of the electricity generation and transmission system and in particular:*

- (...) Addressing the problems of particularly energy-sensitive areas (e.g. large urban centres, industrial concentrations) by strengthening the 400kV, 150kV, 66 kV, 20 kV, etc. and the corresponding substations, compensation of reactive power and a system for connecting RES plants and

- Connection of all the inhabited islands of the country to the energy transmission network of the mainland, i.e. to the interconnected network of the PPC, which will also maintain their autonomous energy production units in reserve.

It is important to emphasize that the interconnection of the ASPHE under study with the existing Flamburo Lifting Substation is via an underground route, as described in more detail in Chapter 6, to avoid disturbance of the landscape.

Moreover, as documented in the next paragraph, the particular energy advantages of the study area are exploited, taking into account the optimal energy efficiency of the installation, always in compliance with the institutional spatial and urban planning constraints.



Χάρτης 3.1: Ένταξη της Χώρας στον Ευρωπαϊκό και ευρύτερο της χώρο.

Image from 5.2-1: Map of the country's integration in the European and wider area
(Source: Map 3.1, GFSPA - Government Gazette 128/A/2008)

5.2.1.2 Regional Spatial Planning and Sustainable Development Framework for Eastern Macedonia - Thrace

The Regional Framework for Spatial Planning and Sustainable Development of the Region of Eastern Macedonia - Thrace was initially approved by the Decision of the Minister of Environment, Spatial Planning and Public Works No. 29310/21.07.2003 (Government Gazette 1471/B/09.10.2003). YPEN/DXORS/68605/1092/12.10.2018 Decision of the Minister and Deputy Minister of Environment and Energy (Government Gazette 248/A.A.P./25.10.2018), the current revision of the Regional Spatial Framework of the Region of Macedonia-Thrace was approved.

Specifically, according to the principles of organization of the spatial model of the current P.H.P. (article 4), secondary axes of regional scope are formed, connecting the main poles of the region with smaller urban centers, including the axis Komotini-Fillyra-Sapes.

Furthermore, with regard to the main axes and development poles/gates of the transport network and transit centres of national and regional scope (Article 5), Komotini is a primary national pole of international and inter-regional scope, while it is also a residential centre of 2ου level.

With regard to the wider territorial units (Article 6), among the territorial units for the development of livestock farming is the Municipality of Arrianon, where "*extensive livestock farming, the promotion of vertical production, the integrated management of pastures, the management of environmental pressures from waste from installations and the definition of areas for the targeted development of livestock farming through the creation or modernisation of processing facilities*".

With regard to point production activities of national and regional scope (Article 7), and in particular in the field of energy resources, "*the location of wind farms shall be promoted as a priority within the spatial units for the development of renewable energy sources*".

Regarding the structure and hierarchy of the settlement network (Article 9) it is stated that Komotini is a primary national pole of 1ου level, as it is the seat of the Region, while the seats of Municipal Units (former Kapodistrian OTAs) are included in the other urban centres of 7ου level.

Then, in the spatial organisation and development of the coastal, mountain and island area (Article 10), in the eastern Rhodopes, the development of RES in Arriana is promoted. In addition, with regard to the spatial definition of sustainable development units (Article 11), it is noted that the district of Komotini is a '*combined urban development unit, as a zone of influence of Komotini. It is a unit of intensive agricultural development, with individual areas of manufacturing activity*'. Furthermore, the district of Sapes and the municipality of Arrianon include '*on the one hand, areas of combined eco-development, forestry-hylotourism and RES development and, on the other hand, areas of intensive agricultural development and manufacturing activity*'.

With regard to the spatial structure of the basic technical infrastructure networks (Article 13), it is stated that the "*Development of all energy sources, including in particular renewable energy sources, with a view to protecting the natural and cultural environment and the landscape of the Region". In* addition, in the spatial structure, specialisation and complementarity of productive activities (Article 14) it is stated that '*The Komotini Industrial Estate is included in a Type A OP scheme with the aim of attracting agro-industrial units for the processing, packaging and standardisation of agricultural products, with supporting services and logistics management infrastructure*'.

It is also mentioned, with regard to the definition of areas for the implementation of the MAPs and SEAPs (Article 17), that the possibility of preparing SEAPs in the city of Komotini and its suburban area is also provided for.

Based on the above analysis, the proposed project is compatible with the objectives of the Region for its integration into international energy networks and the development of soft - renewable energy sources, since as a RES infrastructure it contributes to the protection, preservation and promotion of natural and cultural heritage and enhances the ADMIE system.

5.2.1.3 Special Spatial Planning and Sustainable Development Framework for Renewable Energy Sources

In December 2008, the "Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources" was approved with the KYA 49828 (Government Gazette 2464B/03.12.2008), which incorporates the necessary conditions, restrictions and guidelines for the protection and management of the environment and the management of significant environmental impacts that may arise.

The preparation and the approval of the E.P.H.H.S.A.A. for RES is an integral part of the integrated spatial planning of Greece and the implementation of the provisions of Law 2742/1999 and the KYA 6876/4871 (Government Gazette 128A/03.07.2008). Its main objectives are the following:

- -The formulation of policies for the siting of RES installations.
- -The establishment of rules and criteria for the siting of RES installations
- -The creation of an effective mechanism for the siting of RES installations.

At the time of drafting this EIA, the procedures for the revision of the current Special Spatial Planning and Sustainable Development Framework for RES are underway, but no relevant data are available to assess the compatibility of the project under study with the revised framework under preparation.

In this section, the compatibility of the studied RES-E project with the requirements of the E.P.H.S.A.A. for RES, as it was approved by the KYA 49828 (Government Gazette 2464B/03.12.2008), is examined and it is proven that all the criteria for the siting of RES projects are met and satisfied.

The Wind Power Plant at the location "Polemistis", with a capacity of 44 MW, is administratively under the Municipal Unit of Komotini of the Municipality of Komotini and a part of it under the Municipal Unit of Organi of the Municipality of Arrianon. Based on the categorisation of the area under consideration according to the zones established, this area is classified as a wind power plant siting category in an Area of Wind Suitability (AAW). It is worth noting that, due to the small section mentioned above, the considered APSO is also included in a Wind Priority Area (PPA) and specifically, according to Annex I, in Area 1 of the Wind Priority Areas.

The PPAs are the areas of the mainland, identified in the form of a table in Annex I of the EIA 49828/2008, which have comparative advantages for the installation of wind power plants, while at the same time they are suitable for achieving the spatial planning objectives. According to the NAPA for RES in the Wind Priority Areas (PPAs), the development of wind installations is considered imperative for the achievement of national objectives and the country's international commitments.

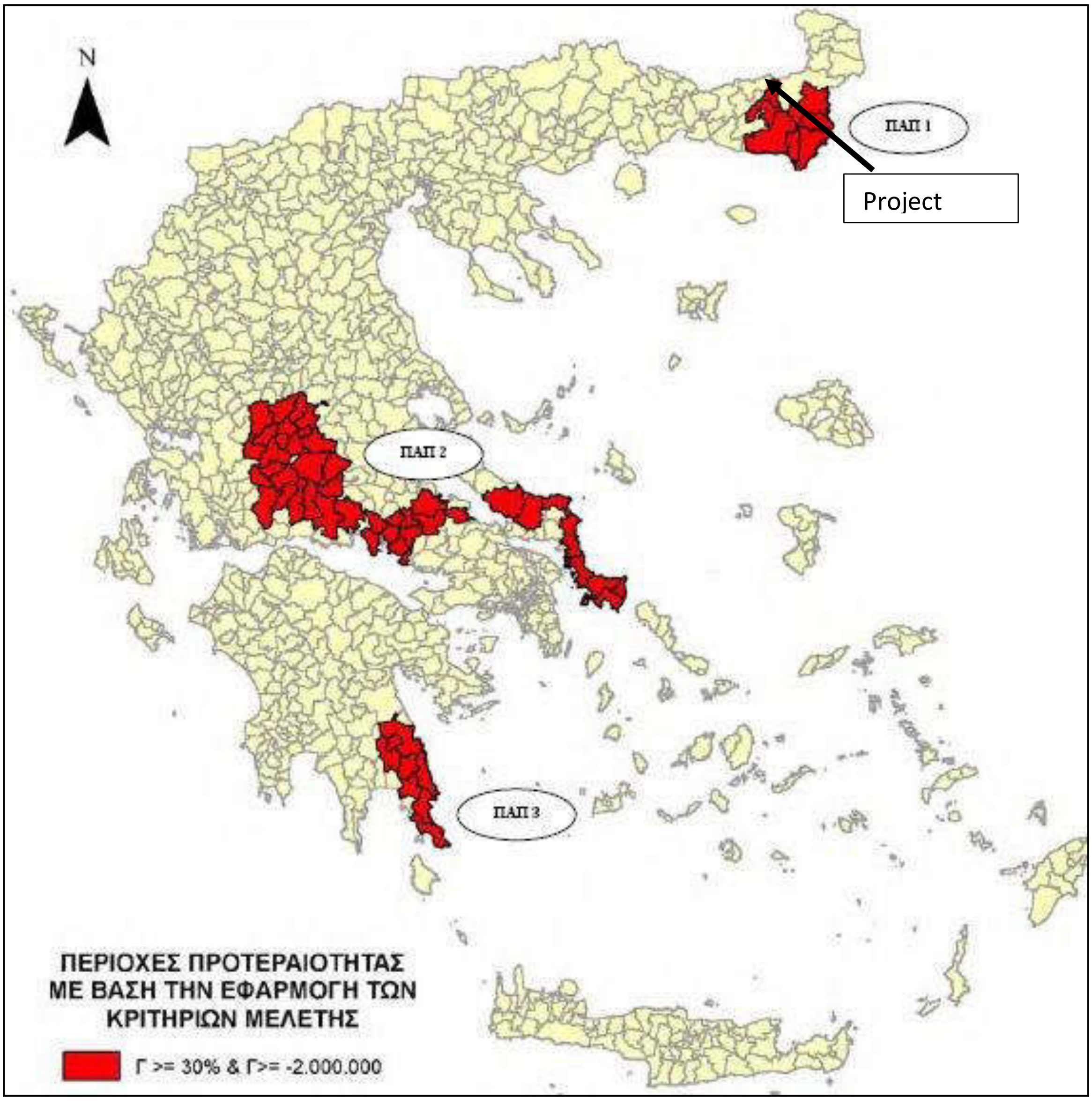


Image from 5.2-2: Distinction between V.I.P. & M.I.C. in the mainland
(Source: EPXSASA for RES - Government Gazette 2464/B/2008)

11 gensets of the indicative type V- 150 are to be installed, with a nominal power of 4.00 MW, with a rotor diameter of 150 m. Therefore, the equivalent genset will be calculated from the formula:

(Nis)=D/DT =150/85

(Nis) =1,76

Where Nis is the equivalent number of standard A/Cs, D is the rotor diameter of the A/C to be installed and DT is the rotor diameter of the standard 85 m A/C.

1. Checking the criterion of the maximum permissible density of wind installations at the level of primary local authorities - Calculation of the carrying capacity of the municipality

According to Article 7 of the KYA 49828 (Government Gazette 2464B/03.12.2008) which approved the N.P.H.S.A.A. for the Wind Energy, Wind Suitability Areas, the maximum permissible percentage of land coverage by wind installations in the primary areas may not exceed 5% per area or 0.66 typical A / 1,000 acres.

In the table below, the density of wind installations for the Municipal Unit of Komotini where the wind turbines of the considered wind farm are to be installed.

Table 5.2- 1: Density of Wind Installations within the area covered by the project under consideration (Source: RUEEY 22/03/2024 - Own editing)

WIND FARM DENSITY (RAI 22/03/2024)									
REGIONAL UNIT	MUNICIPALITY	MUNICIPAL UNIT	AREA (HECTARES)	MAXIMUM AUTHORISED COVERAGE (TYP. A/1000 HA)	MAXIMUM PERMISSIBLE NUMBER OF TYPICAL SAINTS	NUMBER OF EQUIVALENT TYPICAL FARMS WITH PRODUCTION QUOTAS	NUMBER OF EQUIVALENT TYPICAL BOYS WITH EP IN PAP DISTRICT	%OF THE PERMISSIBLE CARRYING CAPACITY	OBSERVATIONS
RODOPIS	KOMOTINI	KOMOTINI	384.907,96	0,66	254,04	46,22	0	18,19	0

According to the above table and the data of the project under consideration, it can be concluded that:

For the 384.907,96 acres of the Municipal Unit of Komotini, according to the provisions of the H.P.H.S.A.A.A. for the A.P.E., the maximum allowed number of typical A.G. is 254,04. For the area in question, the number of equivalent standard AGs with a production licence is 46,22. This number includes the equivalent typical AGs of the considered RES-EU (i.e. 1,76 x 11 = 19,36), thus covering, together with the AGs of the other RES-EUs, 18,19 % of the authorised carrying capacity. Therefore, the wind turbines of the considered GIS are not located in an area where the maximum wind density is exceeded and the criterion is fulfilled.

It should be noted that paragraph d of Article 7 of the E.P.H.H.S.A.A. for RES, does not apply to the considered RES-EE because the RES are to be installed within the boundaries of a local authority. However, due to the fact that the polygon of the considered RES falls within a second LPA, the wind density of installations for this area is also checked, thus covering the possibility of moving one or more turbines within its boundaries (i.e. the adjacent LPA). The table below lists the density of wind installations for the Arrianon Municipal Unit of the Municipality of the same name, where the wind turbines of the considered wind farm are to be installed (in case they are moved from their current locations).

Table 5.2- 2: Density of Wind Installations in the Municipality of Arrianon (Source.)

WIND FARM DENSITY (RAI 22/03/2024)									
REGIONAL UNIT	MUNICIPALITY	MUNICIPAL UNIT	AREA (HECTARES)	MAXIMUM PERMITTED COVERAGE (TYP. A/1000 HA)	MAXIMUM PERMISSIBLE NUMBER OF TYPICAL SAINTS	NUMBER OF EQUIVALENT TYPICAL FARMS WITH PRODUCTION QUOTAS	NUMBER OF EQUIVALENT TYPICAL BOYS WITH EP IN PAP DISTRICT	%OF THE PERMISSIBLE CARRYING CAPACITY	OBSERVATIONS
RODOPIS	ARIANON	ARIANON	178.166,46	1,05	187,07	93,92	44,69	23,89	0

The Municipality of Arrianon is a Wind Priority Area (P.A.P.), and according to article 7 of the KYA 49828 (Government Gazette 2464B/03.12.2008) with which the N.P.H.S.A.A. for wind energy was approved, in these areas, the maximum permitted percentage of land coverage by wind farms in the primary ZHAs may not exceed 8 % per ZHA, or 1,05 typical wind turbines per 1 000 hectares.

For the 178.166,46 acres of the Municipal Unit of Arrianon, according to the provisions of the N.P.H.S.A.A. for the A.P.E., the maximum number of typical A.P.E. is 187,07. For the area in question, the number of equivalent standard AGs with a production licence is 93,92. Therefore, for the project under consideration, the criterion is still met for the scenario of moving all the AGs, because:

Number of equivalent typical licensed generating units + Equivalent typical generating units of the "Warrior" CSF = 93,92 + 19,36 = 113,28 < 187,07

2. Control of exclusion zones

In accordance with Article 6 of KYA 49828 (Government Gazette 2464B/3.12.2008), which approved the N.P.H.S. & A.A. for RES, the proposed site of the proposed installation of both the RES and the accompanying works (access roads and electricity transmission network) **does not fall within the categories of exclusion zones**, which include:

α. The declared World Heritage Sites and the other monuments of major importance of par. 5 bb) of Article 50 of Law No. 3028 / 2002, as well as the demarcated archaeological protection zones A that have been determined in accordance with the provisions of Article 91 of Law. 1892/1991 or determined according to the provisions of Law No. 3028 / 2002.

β. The areas of absolute protection of nature and nature protection established in accordance with the provisions of Articles 19 par. 1 and 2 and 21 of Law no. 1650 / 1986.

c. The boundaries of Wetlands of International Importance (Ramsar Wetlands).

δ. The cores of national parks and declared natural monuments and aesthetic forests not included in the areas of case b' of this article.

ε. The priority habitats of priority areas of the Territory that have been included as sites of Community importance in the NATURA 2000 network according to Commission Decision 2006/613/EC (OJ L 259 of 21.9.2006, p.1).

f. Towns and settlement boundaries within planned towns and settlement boundaries before 1923 or areas with less than 2,000 inhabitants.

ζ. The P.O.T.A. of article 29 of Law. 2545 / 97, the Areas of Organized Development of Productive Activities of the tertiary sector of article 10 of Law. 2742/99, the theme parks and tourist ports.

η. The informally formed, in the context of off-plan building, tourist and residential areas.

θ. The bathing beaches included in the bathing water quality monitoring programme coordinated by the Ministry of Environment, Public Works and Water Management.

ι. The parts of quarrying areas and mining and quarrying zones that operate on the surface.

According to ANNEX II 'Distances of wind installations from adjacent land uses, activities and technical infrastructure networks', the following shall apply:

Table 5.2- 3A. Distances to ensure the functionality and efficiency of wind installations

Parameter	Distance	Proposed ESDP
A. Maximum distance from an existing land access road of any category	- **For installed capacity/unit below 10 MWe: In P.A.P. and Attica: 20 km length of pipeline** - In other areas (P.A.C.): 15 km regardless of the installed capacity/unit - On islands: 10 km regardless of the installed capacity/unit.	The access to the project's ADF is from an existing forest road at a distance of 2,000 m. The nearest forest road is located 650 m from the project. The project therefore meets the criterion.
B. Maximum distance from the High Voltage (HV) electricity transmission system	As defined in the terms of connection of the installation (high voltage) and the PPC (medium and low voltage)	The project will be interconnected to the existing "Flamburo" voltage boosting substation.
C. Minimum distance (A) between wind turbines.	2,5 times the diameter (d) of the wind turbine blade (A=2,5d)	A= 2.5*D = 2.5*150 = 375 m. In the considered ASPHE, 11 gensets will be installed in a polygon. The shortest minimum distance between the project AGs is 416 m and concerns AG4 - AG7. The rest are located at longer distances. The project therefore meets the criterion.

Table 5.2- 4: B. Distances from sites of environmental interest

Unconventional use	Minimum installation distance from incompatible use	Proposed ESDP
Areas of absolute protection of nature and nature protection of article 19 par.1, 2 of Law 1650/86 (A΄160)	According to the approved N.P.M. or the relevant P.D. (article 21 of Law 1650/86) or the relevant K.Y.A. (Law 3044/02)	There is no Area of Outstanding Natural Beauty in the wider study area. The project therefore meets the criterion.
- Core areas of National Parks, declared nature monuments, aesthetic forests not included in the areas of absolute nature protection and nature protection of par. 1 and 2 of Article 19 of Law No. 1650/1986. - The RAMSAR wetlands - The priority habitats of the priority areas of the Territory included in the list of sites of Community importance of the NATURA 2000 network in accordance with Commission Decision 2006/613/EC (OJ L 259, 21.9.2006, p. 1).	Judged on a case-by-case basis within the EPO	No areas of this category are identified within 34.5km of the project under study. The nearest wetland RAMSAR (Lake Vistonis, Porto Lagos, Lake Ismaris and adjacent lagoons) is >34.5 km away. The nearest priority habitat is the habitat "East Platanos Forests" (92C0*) at a distance of at least 16 km from the project. As documented in paragraph 5.1.2.3., there is no issue of compatibility of the project according to the EIA 35633 /2006. The project therefore meets the criterion.

Bathing beaches, included in the bathing water quality monitoring programme coordinated by the Ministry of Environment, Public Works and Water Management.	1500**μ.** [5]	The nearest bathing beach is the bathing beach 'Imeros' (GRBW129022028) at a distance of >43.6 km. The project therefore meets the criterion.
Birdlife SPAs (SPAs)	Judged on a case-by-case basis within the EPO, after a specific ornithological study	The nearest SPA is GR1130011 "Filiouri Valley" at a distance of 10.6 km. As documented in the Special Ecological Assessment study carried out in the context of the authorisation of the project under consideration, the ESDP does not affect the structure and functions of the SPA and does not in any way compromise its integrity. The project therefore meets the criterion.

Table 5.2- 5: Γ. Distances to heritage sites and features

Unconventional use	Minimum distance [2] installation from incompatible use	Proposed ESPO
Inscribed on the World Heritage List and the other major monuments, archaeological sites and historic sites of Para. 5. subparagraph bb of article 50 of Law 3028/02	3.000 μ.	The nearest World Heritage Site is the town of Philippi in Eastern Macedonia (near the city of Kavala), at a distance of >112 km from the project. The project therefore meets the criterion.
Absolute Protection Zone (Zone A) of other archaeological sites	A = 7d, where (d) is the diameter of the wind turbine blade, at least 500 m.	A = 7*150 = 1050 m. There are no Absolute Protection Zones for Archaeological Sites within 10 km. The nearest site of archaeological interest is located 1,4 km from the project. The project therefore meets the criterion.
Declared cultural monuments and historic sites	A = 7d, where (d) is the diameter of the wind turbine blade, at least 500 m.	A = 7*150 = 1050 m. The nearest area of archaeological interest is 1.5 km (>A=1050 m) from the project. The project therefore meets the criterion.

Table 5.2- 6: D. Distances from residential activities

Unconventional use	Minimum installation distance[2] from incompatible use	Proposed ESDP

[5] The stated distance shall not be taken into account in the case where the fuselage of an A/C is not visible from the incompatible use.

Towns and settlements with a population of >2000 inhabitants or settlements with a population of <2000 inhabitants that are characterized as dynamic, touristic or remarkable within the meaning of article 2 of the Decree 24.4/3.5.1985	1.000 m from the boundary[6] of the settlement or city plan, if applicable	The nearest statutory settlement 'Drymi' to the ASPHE under study is located at a distance of 8.100m (>1.000 m). No dynamic, touristic or notable ones are identified within at least 5 km of the project. The project therefore meets the criterion.
Traditional settlements	1.500 m from the boundary[7] of the settlement By derogation from the above, it is possible by decision of the General Secretary of the Ministry of Environment, Planning and Urban Development, following the recommendation of the competent Department of the Ministry of Environment, Planning and Urban Development, to reduce the above distance up to 1000 m if the number of houses that make up the settlement is less than twenty.	No traditional settlements are identified within a distance of at least 5 km from the project. The project therefore meets the criterion.
Other settlements	500 m from the boundary[3] of the settlement	The distance from the nearest settlement is 1000m (i.e. Sarakini settlement). The project therefore meets the criterion.
Organized A' or B' residential development (P.E.R.P.O., Cooperatives, etc.) or developed B' residential areas, as identified in the P.E.P. of each individual wind farm installation	1,000 m from the boundaries of the project or the landscaped area respectively.	There are no areas of this category within this distance The project therefore meets the criterion.
Holy Monasteries	500 m. from the boundaries of the Monastery	No Holy Monasteries are identified within a distance of at least 24 km from the project. Therefore, the project fulfils the criterion.
Single dwelling (legally existing)	Ensure a minimum noise level of less than 45 db.	As documented in the environmental noise assessment study, the noise intensity at the nearest residence is 32.47<45 dBA. The project therefore meets the criterion.

[6] In cases where the settlement has not been delimited, the distance is calculated from the centre of the settlement increased by 500 metres and, in any case, at a distance of more than 500 metres from the last residence of the settlement.

[7] In cases where the settlement has not been delimited, the distance is calculated from the centre of the settlement increased by 500 metres and, in any case, at a distance of more than 500 metres from the last residence of the settlement.

Table 5.2- 7E. Distances from technical infrastructure networks and specific uses

Unconventional use	Minimum installation distance from incompatible use	Proposed ESPO
Main roads, roads under the responsibility of local authorities and railway lines.	Safety distance of 1,5d from the boundaries of the expropriation zone of the road or railway network respectively.	A = 1,5*150 = 225 m. The studied ESDP is more than 4,3km from the nearest road of the area (Provincial Road Drania-Kardamos-Kymi-Smigada). The project therefore meets the criterion.
High-voltage lines	Safety distance of 1,5d from the crossing limits of the HS lines.	A = 1,5*150 = 225 m. The studied RES is more than 15km away from the overhead 150 kV single circuit GM 'N. Sanda-Flampouro-Iasmos substation'. Therefore, the project meets the criterion.
Telecommunications infrastructure (antennas), RADAR	Where appropriate, following the opinion of the competent body.	No telecommunication infrastructure can be found within a distance of at least 1.5 km.
Aviation installations or activities	Where appropriate, following the opinion of the competent body.	The nearest aviation infrastructure is the Alexandroupolis "Demokritos" Airport, which has a C-VOR radio aid, at a distance of >57km. Therefore the distance of 15km set by the CAA is respected.

Table 5.2- 8: F. Distances from zones or establishments of productive activities

Unconventional use	Minimum installation distance from incompatible use	Proposed ESPO
Highly productive agricultural land, reparcelling zones, irrigated land	Safety distance 1,5d	A = 1,5*150 = 225 m. There are no areas of this category within a distance of at least 1 km. The project therefore meets the criterion.
Fish farms	Safety distance 1,5d	A = 1.5*150 = 225 m. The minimum distance from the coast is greater than 43.6 km. The project therefore meets the criterion.
Crucified livestock units:	Safety distance 1,5d	A = 1,5*150 = 225 m. No units of cross-farming are found within a distance of at least 0,5 km. The project therefore meets the criterion.
Mining zones and activities	As defined in the applicable legislation.	The nearest quarry zone is >19.25km away, as mentioned in paragraph 2.1.5. The project therefore meets the criterion.
Operating surface mining - extraction zones and activities	500 μ.	No mining - extraction zones are identified within a radius of at least >19.2km. The project therefore meets the criterion.

PDPAs and other Areas of Organised Development of Productive Activities of the tertiary sector, theme parks, tourist ports and other statutory or designated tourist areas (as identified in the wind farm's EIA for each individual installation). Tourist accommodation and special tourist infrastructure,	1,000 m from the zone/area boundaries[5] [6]	No areas of this category are found within 1km. The project therefore meets the criterion.

5 The stated distance shall not be taken into account in the case where the fuselage of an A/C is not visible from the incompatible use.

6 These distances may be reduced with the agreement of the operator of the incompatible use, which shall be given for the entire life cycle of the installations concerned and in any case for a period at least equal to the period of validity of the relevant production permits (25 years). In any case, this distance may not be less than 500 m from the boundaries of the overnight accommodation facilities and 1,5 d from the boundaries of other facilities.

3. Checking landscape integration criteria

This screening stage takes into account the visual interference of the wind farm from various points of 'special interest' located in the area. As shown in the table below, no points of particular interest, such as World Heritage Sites, National Parks or Aesthetic Forests and established tourist areas or settlements, are identified within the distances/zones defined by the EIA for RES, and in the wider area.

According to the Permanent List of the Declared Archaeological Sites and Monuments of Greece[8] , the nearest area of archaeological interest is the Monument of the Fortified enclosure of Asar-Tepe Sarakinis, in Rodopi (Government Gazette 468/B/1981), at a distance of >1.4km southwest of the project. This monument does not fall under subsection bb) of paragraph 5. of Article 50 of Law 3028, nor have Absolute Protection Zones (Zone A') been defined.

Table 5.2- 9: Checking landscape integration criteria

Point of particular interest	Zone Rays in PAP (in km)			Comments
	A	B	Γ	
World Heritage Sites	3	4,5	6	They are not located within 112 km.
Boundaries of the Absolute Protection Zone (Zone A') of archaeological sites	0,5	3	6	They are not located within 10 km.

Boundaries of an Established Core National Park, Nature Monument, Aesthetic Forest	0,2	0,8	-	No areas of this category are found within tens of kilometres of the project (see. **Error! Reference source not found.**)
Boundaries of an Established Traditional Settlement	1,5	3	6	No traditional settlements are identified within 5km.
Boundaries of towns or settlements > 2000 inhabitants and boundaries of settlements < 2000 inhabitants designated as tourist or significant	1	2	-	No settlements of this category are identified within 8.1km.
Boundaries of settlements <2000 inhabitants that are not classified as tourist or significant	0,5	1	2	The settlement "Koila" is located at a distance of 8.1 km.
Boundaries of an established or designated tourist area, tourist accommodation, special tourist infrastructure, tourist ports.	1	1,5	2	They are not located within 3 km.

Control for Zone A (0.5km)

Zone A is in fact the exclusion zone and from the check made in the previous table, no A/C is detected within the exclusion zone.

Control for Zone B (1km)

The limit of typical A/C set by the specific zoning per square kilometre for *zone B* (PAP area) is 4. Within a distance of up to 5km from the project site there are no points of particular interest as defined in the EIAAP for RES, so the project under consideration will not result in exceeding the density and visual coverage rate criteria.

Check for Zone C (2km)

The limit of typical A/C set by the specific zoning per square kilometre for *zone C* (PAP area) is 7. It should be noted that there are no sites of special interest within 5 km of the project site, except for an archaeological site within 1,5 km of the nearest A/E, but without an absolute protection zone being defined for it. Therefore, the project under consideration is not expected to result in the density and visual coverage criteria being exceeded.

In conclusion, the proposed project is fully in line with the guidelines and constraints of the EIAAP for RES.

5.2.1.4 Law 4685 /2020

According to Law 4685/2020 on "*Modernization of environmental legislation, incorporation into Greek law of Directives 2018/844 and 2019/692 of the European Parliament and of the Council and other provisions*", regarding the Renewable Energy Sources Licensing Procedure (Chapter B), and Article 21 of Law 4685/2020. 4951/2022 on "*Modernization of the Licensing Procedure for Renewable Energy Sources Phase B, Licensing of Electricity Production and Storage, Framework for the Development of Pilot Offshore Floating Photovoltaic Plants and specific provisions for energy and environmental protection*", further restrictions for the siting of RES are defined. With regard to onshore wind farms, it is <u>not allowed</u>:

(a) The distance between wind turbines of the same station placed in the same polygon must be greater than 5*D.

(b) The distance between wind turbines shall be less than 2.5*D, subject to the provisions of the Special Framework for Spatial Planning and Sustainable Development for RES. For the above, D is considered to be the largest diameter of the neighbouring wind turbines.

(c) The boundaries of the polygon shall extend at a distance greater than 3.5*D from the locations of the wind turbines.

A total of 11 gensets will be installed in the ASPEE under study. The distance between the gensets is:

AG1 / AG2 = 557 m

AG2 / AG3 = 474 m

AG3 / AG4 = 487 m

AG4 / AG7 = 416 m

AG5 / AG6 = 461 m

AG6 / AG7 = 435 m

AG7 / AG8 = 739 m

AG8 / AG11 = 463 m

AG9 / AG10 = 447 m

AG10 / AG11 = 713 m

,i.e. distances of less than 750m= 5*D=5*150m. <u>Therefore, the first criterion (a) is met.</u>

Regarding criterion (b), the distance between the adjacent AGs is checked, which should be greater than 2.5xD = 2.5 x 150 = 375m. Based on the above distances mentioned in the check of criterion (a), it follows that all the distances between the adjacent AGs are greater than 375 m. Therefore, criterion (b) is met.

Finally, for criterion (c), all AG locations except AG6 are tested because it is the only one surrounded by others. From the check it follows:

AG1 / polygon boundary = 219 m

AG2 / polygon boundary = 275 m

AG3 / polygon boundary = 280 m

AG4 / polygon boundary = 445 m

AG5 / polygon boundary = 374 m

AG7 / polygon boundary = 265 m

AG8 / polygon boundary = 459 m

AG9 / polygon boundary = 203 m

AG10 / polygon boundary = 86 m

AG11 / polygon boundary = 76 m

,therefore all the distances of the positions of the AGs are less than 3.5XD, and criterion (c) is satisfied.

It is evident from the above that the proposed project is in accordance and in compliance with the conditions set out in Laws 4685/2020 and 4981/2022.

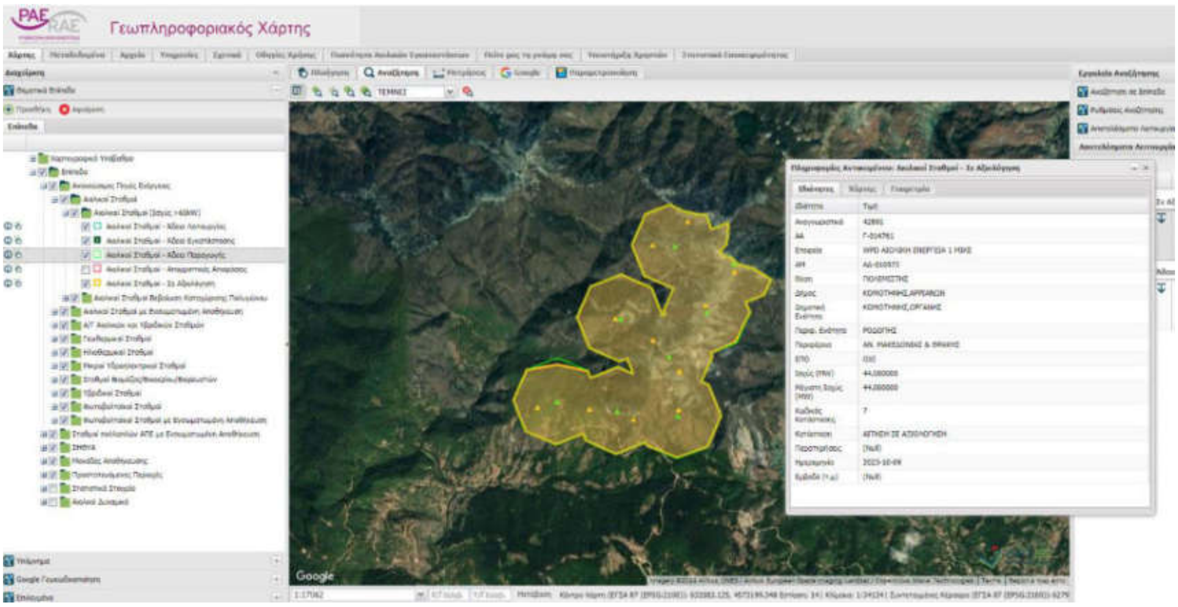
It should also be noted that the considered RES-E is checked for safety distances and in accordance with Article 21 of Law 4951/2021 "*Modernization of the licensing procedure for Renewable Energy Sources Phase B, Licensing of electricity production and storage, framework for the development of Pilot Marine Floating Photovoltaic Stations and special provisions for energy and environmental protection*". In particular:

As mentioned above, the distance between the AGs of the considered ASPHE is less than 2.5xD, therefore the criterion is met.

With regard to the issuance of an installation permit, it should be ensured that the distance between the considered RES-EEO and the neighbouring station (only those with an Installation or

Operation License) is equal to or greater than 5xD = 750m. According to the RAEEY data, within a radius of 1000m from the considered ASPHE there is no wind power plant with an Installation or Operation License, nor also with a Production License. Therefore, this criterion is also met.

Finally, as noted above in Chapter 4, the project proponent has submitted an application to the RAEEY to amend the issued producer certificate, with the new application being for the project design and scope considered in this Environmental Impact Statement. Accordingly, the polygon considered in this study is the same as that considered in the amendment application. This is confirmed by the figure below which is an extract from the geo-information map of the RAEEY and shows the polygon (yellow colour) of the considered APSE after the submission of the amendment application of the Producer Certificate.



In addition, attached to the annex is the Technical Description which is an accompanying document to the application for modification to the RAEEY as submitted by the project promoter. The Technical Description shows that the coordinates given therein with the coordinates given in this RIA (Chapters 1, 6 and 12) are identical, thus ensuring that the polygon will not be altered due to the application for amendment of the Producer's Certificate.

5.2.2 Institutional land use regime of the study area

After reviewing the established land uses of the immediate project area, it was found that the proposed project as a whole is zoned outside of the city and settlement boundaries. In particular, no settlements are identified at a distance of less than 5 km, while the nearest settlement to the project area is the settlement of Drimi at a distance of more than 8.1 km.

Also, it is mentioned that according to the posted forest map of the Municipal and Local Communities of the Municipalities of Komotini, Iasmos, Maronia-Sapes and Arrianon of the Prefecture of Rodopi, the area of the polygon of the installation of the A/C of the ASPIE under study bears mainly the characterization of the NW (forests and forest areas in the aerial photographs of older or existing data and forests/forest areas in the aerial photographs of recent downloads & in the autopsies), in smaller parts it carries the designation AD (other landform/cover in the aerial photographs of earlier and recent aerial photographs & in the autopsies), AA (other landform/cover in the aerial photographs of earlier and recent aerial photographs & in autopsies) and AA (forest and woodland in aerial photographs of earlier or pre-existing data and other types/coverage in aerial photographs of recent and autopsies). The access road passes predominantly through forested areas (with forest designation AD, DA AD and ID), while only 62m of the 11.1 km are in non-forested areas, and the MT interconnection line passes through forested (most of it - >85% of its alignment) and non-forested areas.

No other constraints for the project arise from the established land uses in the area.

Therefore, the proposed project is also consistent with the institutional land use pattern of the study area.

5.2.3 Special Management Plans

The Special Management Plans, due to their macroscopic nature and their subject matter, do not refer in a straightforward manner to the present project, nor do they contain even indirect guidelines that clearly relate to it.

5.2.3.1 River Basin Management Plan for the Thrace River Basin Management Area (EL 12)

The project is located in the Ministry of Thrace, whose River Basin Management Plan was prepared in application of Directive 2000/60/EC establishing a framework for Community action in the field of water policy. The current $1^{η}$ Revision of the River Basin Management Plan of the Thrace River Basin District was approved by the Commission Decision No. C.G. οικ. 900/21.12.2017 Decision of the National Water Commission (Government Gazette 4680/B/2017).

The project under consideration falls within the River Basin of the Komotini-Loutroi Evros Rivers (EL 1209), with an area of 1.958,3km^2 , average elevation 289m, maximum elevation 1.459m and minimum elevation 0m.

The project includes the wind farm, as well as the accompanying works of opening a new access road and improving the existing one to the ASPHE and the underground MT interconnection network. Due to its nature it cannot put pressure on the qualitative, hydromorphological and quantitative characteristics of the Water Systems - surface and underground - of the study area, ;or act towards creating flooding conditions in any way. The main project is located on a ridge and therefore away from streams and rivers. The nearest surface water bodies are the Iron Creek R. (EL1209R00020400101N) located approximately 5.0 km southeast of the ESDP, and the Almond Creek R. (EL1209R00020402100N), which is located more than 9.5 km south of the ESDP.

Regarding access roads, it is noted that the nearest river system identified by the Management Plan is 5km away. In addition, the alignment of the transmission line (up to the existing Flamburo PSU) is designed on existing roads, and although it passes close to a river system, it is not expected to cause any impacts on the river's diet. Therefore, no impact to the system is caused by the project under consideration.

Table 5.2- 10: River water bodies and new typology in the project area

A/A	Name of PS	HS code	Category*	Length (km)	Direct River Basin (km2)	Cumulative catchment area (km2)	Middle Annual Drainage (hm3)	Type of PS
LAP OF COMOTINI - EVROS SPA (EL1209)								
93	SIDERROME R.	EL1209R000204001010 1N	PHYS	23,26	153,23	153,2	31,14	R-M2
94	SIDERROME R.	EL1209R0002040096N	PHYS	3,54	41,36	362,7	73,71	R-M1
95	SIDERROME R.	EL1209R0002040097N	ITYS	3,01	5,39	321,3	65,3	R-M1
96	SIDERROME R.	EL1209R0002040098N	PHYS	13,85	70,53	314,9	64,01	R-M1
97	ALMOND CREAM R.	EL1209R0002040199N	ITYS	6,08	22,34	91,2	18,53	R-M1
98	ALMOND CREAM R.	EL1209R00020402100N	PHYS	4,09	58,92	58,9	11,97	R-M1
**FYS: Natural Water Body, ITYS: Specially Modified Water Body, TYS: Artificial Water Body*								

Source: 1st Revision of the Thrace SDLAP (Table 4-3 and own editing)

In any case, it is stressed that the status of the above river basins will not be affected by the construction and operation of the ASPHE under consideration.

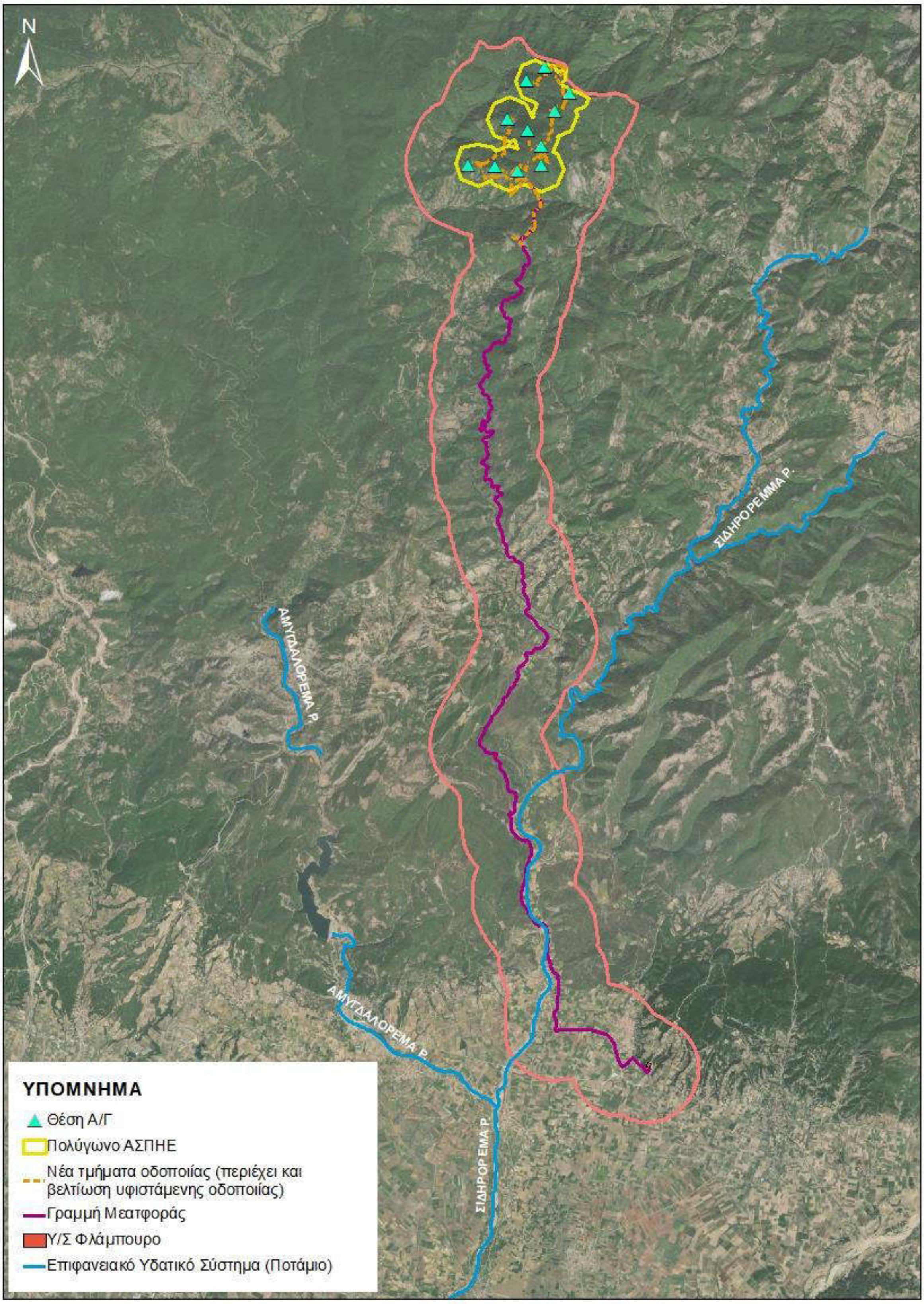


Image from 5.2-3: Surface Water Systems in the study area

The project under consideration falls within the "Drosini System" (EL120B100) mainly and a part of the transmission line within the "Filiouri System" (EL1200040). Their chemical status differs, the former being good and the latter being classified as poor. However, both are qualitatively in good condition.

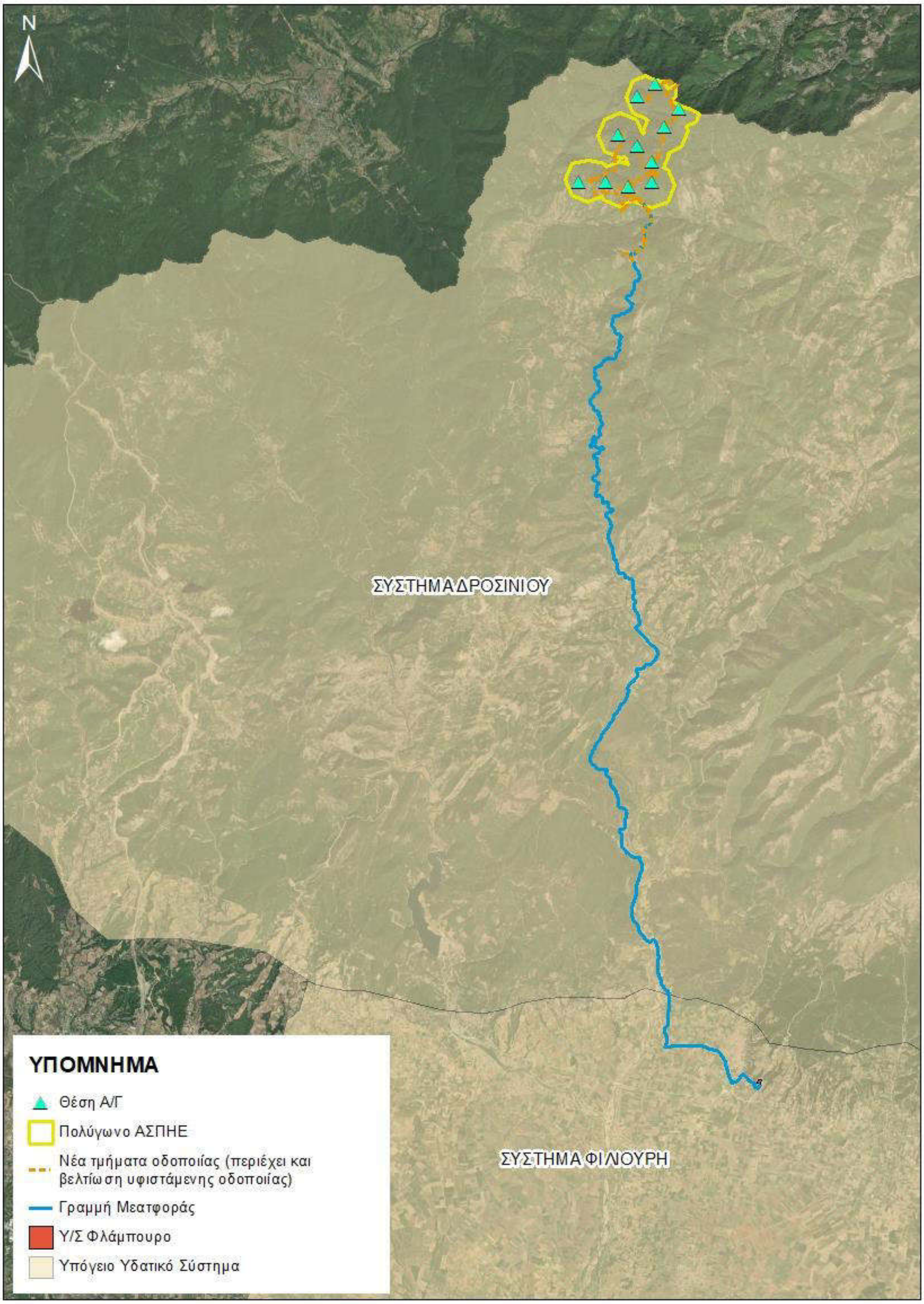


Image from 5.2-4: Groundwater Systems in the study area

The A/Cs of the subject AIS under consideration are located on ridges and therefore the projects do not cross streams and therefore, do not affect them. For the placement of the transmission line, where in some places they cross, no problem arises because the line has been laid on existing roads with provision for the necessary engineering works. However, where preventive or remedial measures need to be taken, they will be implemented following the indications of the relevant Water Directorate. **In conclusion, the project, by its nature, cannot in any way affect the surface water and groundwater in the area, nor degrade their status, or prevent them from achieving good status.**

5.2.3.2 Flood Risk Management Plans of the Thrace Water Department (EL 12)

In the context of the implementation of Directive 2007/60/EC, River Basin Flood Risk Management Plans have been prepared, aiming at reducing the negative impacts on human health, the natural and cultural environment and the economic activities of each spatial unit. The geographical unit of application for the assessment and management of flood risks is the River Basin District, which is the same geographical unit as in the Water Directive 2000/60/EC.

The River Basin Flood Risk Management Plan for the Thrace River Basin (EL12) was approved by the Water Department of Thrace (EL12) with the decision no. YPEN/GREGY/41394/334/29.06.2018 Decision of the National Water Commission (Government Gazette 2688/B/06.07.2018).

Also, in the context of the implementation of the Directive, the Special Secretariat for Water of the Ministry of Environment and Energy (E.G.Y./Y.P.EN.) completed the compilation and publication of the Flood Risk Maps and Flood Hazard Maps for all the Water Departments of the country[9] . These maps have been prepared for the sections of rivers, streams, torrents and lakes included within Zones of Potentially High Flood Risk (ZHFR), as defined within the preparation of the Preliminary Flood Risk Assessment (2012) and describe the potential impacts arising from flooding.

Furthermore, during the 1st Revision of the Preliminary Flood Risk Assessment for the 14 Water Departments of the country[10] , which was posted on the specially designed website of the Ministry of Environment and Natural Resources.[11] as part of the reassessment of the current plan, the Potentially High Flood Risk Zones were reviewed, historical floods from 2012 onwards were recorded with their main characteristics and significant historical floods were identified based on their consequences, and finally, areas where flooding is likely to occur were identified and the potential negative impacts of future flooding were assessed, taking into account historical flood data and changes in floodplain conditions since then.

As shown in Image from 5.2-5, the entire project, with the exception of a section of the underground transmission line, is located outside the Revised Potentially High Flood Risk Zones (EIA, 2019). It is also evident that as many flood events as have occurred in the past in the vicinity of the project under consideration, none have been recorded in the locations where it is located.

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[9] The flood hazard and risk maps are posted on the dedicated website of the Ministry of Environment and Natural Resources http://floods.ypeka.gr/

[10] 'IMPLEMENTATION OF DIRECTIVE 2007/60/EC, 1^{η} REVIEW OF THE PRELIMINARY FLOOD RISK ASSESSMENT', GENERAL SECRETARIAT FOR THE NATURAL ENVIRONMENT & WATER, ATHENS 2019

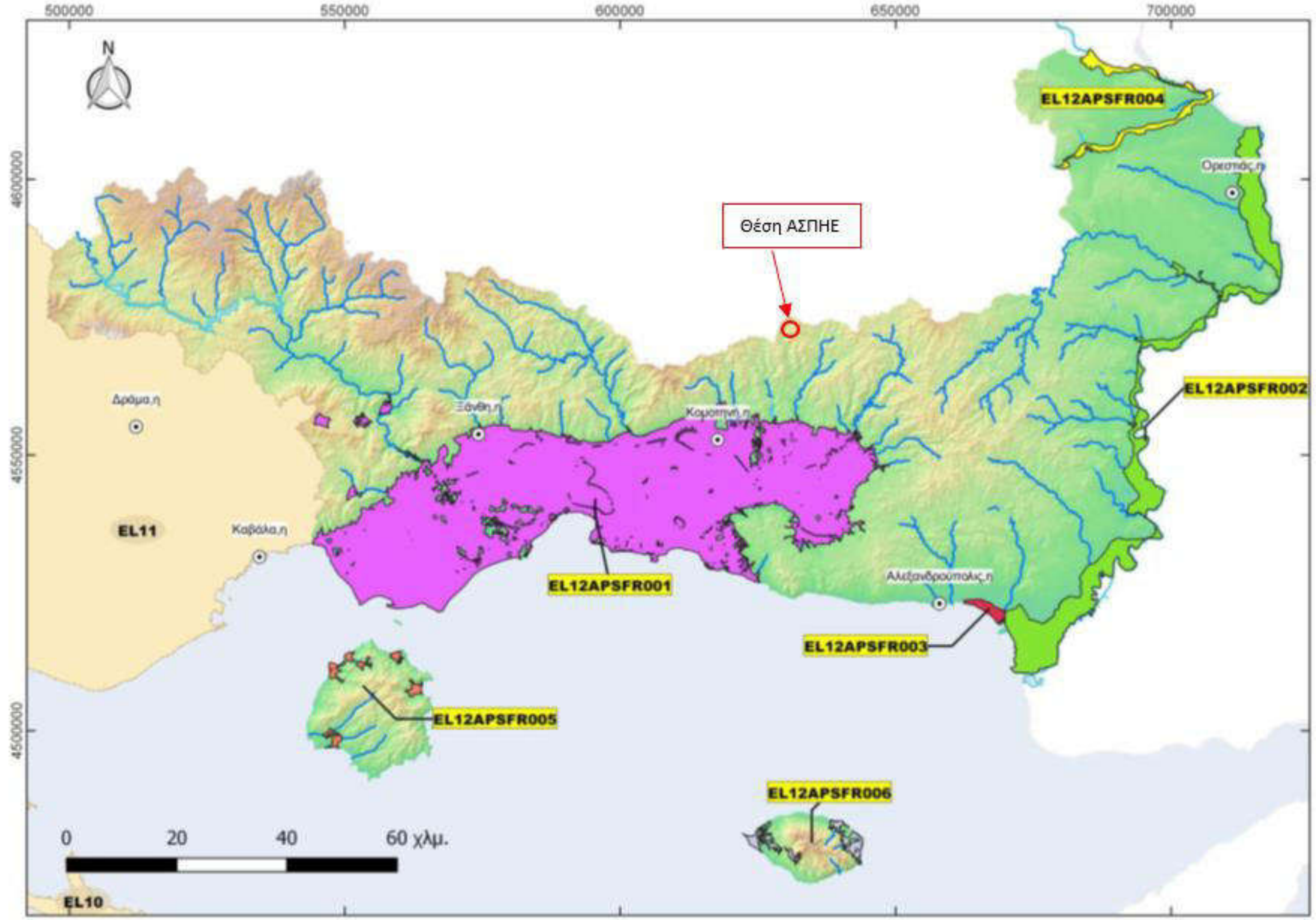

Image from 5.2-5: Zones of Potentially High Flood Risk in the region (1η Revision EIA, 2019)

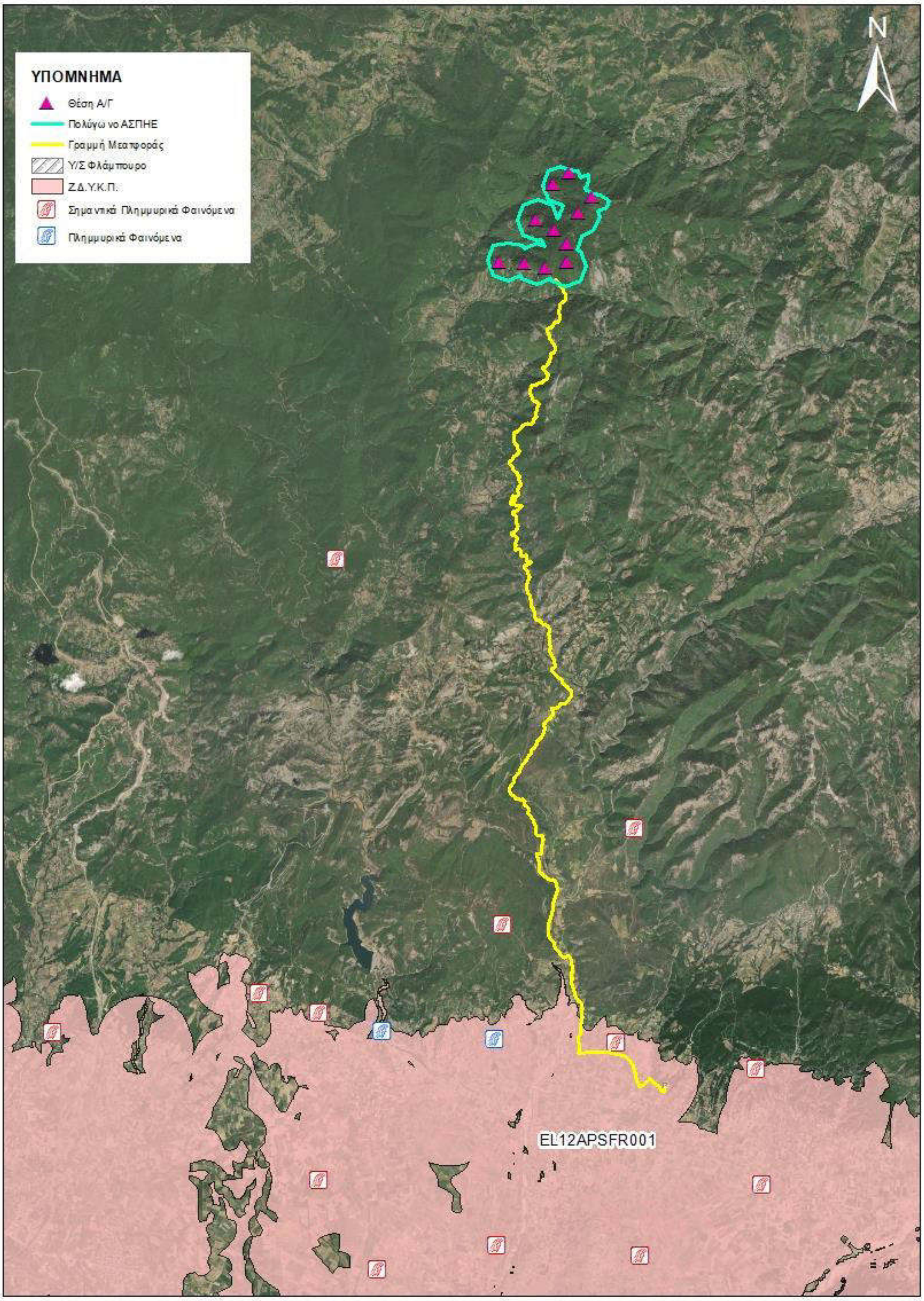

Image from 5.2-6: Potentially High Flood Risk Zones in the region (1η Revision EIA, 2019)

Due to its nature, the project cannot affect the response of the watercourses to flood events as it does not involve in-bed interventions and does not divert additional flood flows.

5.2.3.3 National Strategy for Adaptation to Climate Change (NSAPCA) (YPEN, 2016)

Article 45 of Law 4414/2016 (Government Gazette 149/A/2016) approved the first National Strategy for Adaptation to Climate Change (ESPKA)[12] . The National Strategy for Adaptation to Climate Change, sets the general objectives, guiding principles and means of implementation of a modern effective and developmental adaptation strategy in the framework defined by the United Nations Convention on Climate Change, European guidelines and international experience.

The primary purpose of this National Strategy is to help strengthen the country's resilience to the impacts of climate change. To this end, the conditions must be created so that (public and private) decisions on the shaping of the productive and consumer fabric of Greek society are taken with sufficient information and long-term orientation, addressing the risks and exploiting the opportunities arising from climate change.

The NSRF is a strategic guidance document with the aim of setting guidelines. It does not analyse in depth the necessary sectoral policies, does not decide on the feasibility of individual adaptation measures and actions at local/regional level and does not attempt to prioritise the indicatively proposed measures and actions, a topic covered by the relevant Regional Climate Change Adaptation Plans (RCCAPs) which specify the guidelines of the NCCAP by defining the immediate adaptation priorities at regional/local level.

The ESRP examines in principle 15 sectoral policies and proposes indicative actions and measures. These sectoral policies include energy. With regard to the energy sector, it is noted that climate change mitigation policies seek to drastically reduce greenhouse gas emissions and therefore primarily concern the energy sector. In this context, the aim is obviously to reduce the use of lignite in electricity generation in favour of carbon-free forms of energy, such as renewable energy sources. Therefore, the carbon mitigation policy consists mainly of investments such as renewable energy sources, modern grid infrastructure, savings in the residential environment, electrification of transport, biofuel production, etc. The ESRP states that the vulnerability analysis of energy infrastructure needs to be defined in great geographical detail and that the vulnerability of certain infrastructure has a significant impact on the energy system as a whole given the high interconnectedness of energy infrastructure. The ESRP briefly mentions some cases of vulnerability and among them it states that: "*Vulnerabilities also exist for renewable generation facilities, mainly* *wind and secondarily solar. The reason is the extreme weather events that are expected to be severe in the context of climate change*'. Some of the vulnerabilities are local or regional in nature. However, on the one hand they should not be ignored because of their impact on the overall energy system, and on the other hand they should not be dealt with in isolation, but in the context of a broader energy system protection plan.

Regarding the candidate adaptation projects, the ESRP states - classifies the proposed actions into different categories ("Protection of Main System Energy Infrastructure", "Projects for the protection of coastal energy installations and island systems" etc.) and among the proposed measures, mentions the following (measure 5.1): "*Incorporate preventive protection measures regarding the siting of energy projects (thermal plants, renewable energy plants, gas and oil infrastructure) and electricity networks. The preventive measures will relate to avoiding their siting in locations with high vulnerability to climate change, such as coastal areas, areas at risk of flooding and any vulnerable to the effects of extreme weather events*".

The considered RES-EPP is located in a location that is not vulnerable to extreme weather events. **Due to the nature of the project, its location and the specific measures taken, the project is fully in line with the NPPF guidelines.**

National Climate Law (Law 4936/2022)

The adoption of this law was aimed at creating a coherent framework to improve the country's adaptive capacity and climate resilience and to ensure the country's gradual transition to climate neutrality by 2050 in the most environmentally sustainable, socially equitable and cost-effective way.

The framework and the measures adopted to mitigate climate change aim to minimise emissions and increase removals, enhance legal certainty for investors and citizens and ensure a smooth transition of the economy and society to climate neutrality.

In order to achieve the long-term goal of climate neutrality, interim climate targets have been set for 2030 and 2040 to reduce net anthropogenic greenhouse gas emissions by at least 55% and 80% respectively, compared to 1990 levels. This took into account the projections of the National Energy Plan (NEEAP).

The measures adopted by this law are:

(a) measures and policies to enhance adaptation to climate change at the lowest possible cost,

(b) interim anthropogenic emission mitigation targets for the years 2030 and 2040 as mentioned above,

(c) indicators to monitor progress towards the achievement of the relevant objectives,

(d) procedures for evaluating and adjusting targets and taking additional measures; and,

(e) measures to mitigate emissions from the power generation, building, transport and business sectors.

The considered RES-E, which is licensed under environmental licensing and is a Category A project, falls under Article 18 of the present law "Strengthening the climate change dimension in environmental licensing". Taking into account this Article, an assessment and description of the potential significant impacts that the project may cause to the environment is carried out. As discussed in detail in Chapter 9 of this EIA, the potential impacts of the project under consideration are characterised by a low probability of occurrence and most of them are reversible and mainly concern the construction phase. However, it is worth pointing out that this LDC makes a significant positive contribution to climate change during the operation phase in terms of issues such as reducing gas emissions and carbon footprint. In particular, during the construction of the projects there are expected to be emissions of gaseous pollutants, including CO_2 emissions. These emissions are mainly due to the movement of heavy vehicles and the operation of construction machinery (excavators, etc.) for small-scale work on the opening of small sections of access roads, for the landscaping of the A/C plazas, etc. Taking into account the simultaneous construction of the works in distinct spatial areas, these emissions will be of limited intensity and duration and will in no case cause a direct change in the climate and bioclimatic characteristics of the study area (wind direction, upward or downward currents or changes in the temperature of the area).

A typical construction site composition was presented in chapter 6 for the estimation of the generated air pollutants. The CO_2 emissions for a worst case scenario of simultaneous operation of all construction machinery amount to 0.47 tn/hr. In comparison, an Airbus A-319 aircraft during the LTO cycle alone, i.e. without the rest of the flight, emits 3.17 tn/hr of CO_2 based on EEA and ICAO emissions data. That is almost 6-7 times more CO_2 than all the manufacturing machinery. In addition, the emissions from the construction project are of limited duration of a few months.

Therefore, the impacts on climate and bioclimatic characteristics from the construction of the project under consideration are expected to be negative, but very minor, local, short-term and reversible. Impacts on global climate are negligible.

The project has been assessed for its vulnerability to natural disasters, which are of course also a result of climate change. The design of the project has taken into account the project's risk and has resulted in the placement of the A/C plazas outside areas of potential flooding. Adequate foundations and structural adequacy of the A/Cs against static and seismic loads have been carried out (at the preliminary design level, while at the final design level it will be carried out before the building permit is issued).At the same time, the roadway has been designed with provision for the construction of 28 culverts at the crossing of the road by half-gravels to ensure unobstructed passage of stormwater, both during construction and operation. Therefore, the project has been designed with adaptability to climate change during construction and operation.

During operation, there is no negative impact on the atmosphere as there are no gas emissions. On the contrary, there are significant indirect positive impacts from the gradual replacement of the NPP due to the electricity generation from the project and thus a significant reduction of GHGs from this replacement.

In particular, the operation of the wind farm of this study is projected to produce 102 GWh/year, energy that if produced by a conventional plant would cause emissions of the greenhouse gases CH_4 and CO_2 , which are the main greenhouse pollutants. The emissions of air pollutants from a conventional lignite and natural gas-fired plant for the above energy are shown in the table below (EPA, 2008 and EPA,2009. Emission factors for greenhouse gas inventories):

Emissions of gaseous pollutants avoided by the operation of the project

	CO_2	CH_4	NO_2
	sound	sound	sound
Lignite	34.000	3,81	0,57
Natural gas	18.465	0,34	0,03

It is therefore clear that there will be significant benefits to global climate and air quality from the operation of this project. At the same time, there are no emissions of air pollutants locally in the project area, so there is no local air quality impact.

There will therefore be clearly large positive impacts on climate change mitigation (in proportion of course to the project's share of global electricity generation).

Regarding noise, where negative impacts are likely to occur, the main issue is during the construction phase, with the main sources of noise from a wind farm being:

- machinery used on the construction site, whether mobile or stationary, such as excavation or soil loosening machinery, loading of excavated material, spreading and compaction of materials, punching machines and aggregate and concrete production machinery.
- any use of explosives to loosen soils if they are rocky or very cohesive. Blasting causes a loud bang, but also vibration of the ground. No explosives will be used on the project under consideration.
- the movement of heavy vehicles transporting excavation materials to the disposal sites, aggregates from quarries, ready-mixed concrete or asphalt concrete from the production plants and any other material needed for the construction of the project as well as the components of the A/C.

As discussed in the Noise Impacts and Emissions Chapter 6, no significant impacts are anticipated from construction. Besides, even minor nuisances will be temporary and fully reversible after construction.During operation, the chapter on noise impacts during operation as well as chapter 6 demonstrates that noise impacts from the operation of the A/C blades are negligible. In terms of noise, in any case, there is no question of adaptation to climate change or mitigation when noise emissions are negligible, as in the present project.

5.2.3.4 National Strategy for Biodiversity (Government Decree 40332/2014 (Government Gazette 2383/B/08-09-2014)

By means of Decision No. 40332/2014 (Government Gazette 2383/B/08-09-2014) "Approval of the National Strategy for Biodiversity for the years 2014-2029 and five-year Action Plan", the National Strategy for 15 years and the five-year Action Plan for Biodiversity were approved. The purpose of the Biodiversity Strategy is to halt the loss of biodiversity and the degradation of ecosystem functions in Greece by 2026, to restore them where necessary and feasible, to promote biodiversity as a national asset, and to intensify Greece's contribution to preventing biodiversity loss worldwide.

The time horizon of the National Strategy is the fifteen-year period 2014 - 2029, but at the same time the foundations are laid and the conditions are created for actions beyond this horizon. The strategy is composed of 13 general objectives, which are further broken down into specific objectives in the 1^{o} five-year Action Programme.

Image from 5.2-7: The 13 Strategic Objectives for Biodiversity (YPEN, 2014)

According to the National Strategy and Action Plan for Biodiversity, with regard to the adaptation of spatial planning for biodiversity conservation, the following is stated: *"Biodiversity conservation is a cross-sectoral and multi-level issue and, in order to be achieved, it should be addressed holistically in the context of all individual thematic policies.* ***Spatial planning and urban development policy coordinate the expression of all activities in the area and can therefore make a decisive contribution to the protection of the natural environment****, the correct siting of activities, the non-fragmentation of habitats and thus the conservation of biodiversity, both in the countryside and in urban areas.*

Biodiversity conservation is a cross-sectoral and multi-layered issue and, to be achieved, it must be addressed holistically in the context of all individual thematic policies. Despite their great usefulness, the strategic guidelines of the above-mentioned Plans are not sufficient to avoid local pressures, both within the boundaries of the Protected Areas and within the boundaries where settlements exist. It is therefore necessary to have and improve land use plans at local level, as expressed through the local spatial plans of the municipalities (General Urban Plans (GSP) and Open City Spatial and Housing Organisation Plans (OSP)). Thus, the 5ος General Objective *"Strengthening the Synergy between Main Sectoral Policies and Biodiversity Conservation - Establishing Incentives"* aims to integrate the biodiversity dimension into individual sectoral policies, such as infrastructure, residential and industrial development, tourism, the primary sector (agriculture, livestock, fisheries, forestry), the renewable energy sector, mining and the collection of biological and other natural resources and is specified in Specific Objective 5.1 - 5.8:

5.1 More effective integration of biodiversity conservation objectives at all levels of spatial planning.

5.2 Minimising the impact of major infrastructure projects.

5.3 Ensuring compatibility of residential and industrial development activities (including conventional energy production).

5.4 Ensuring compatibility of tourism activities.

5.5 Ensuring the compatibility of agricultural, livestock, forestry, fisheries and aquaculture activities.

5.6 Ensuring the compatibility of renewable energy projects and activities.

5.7 Ensuring compatibility of mining activities.

5.8 Ensuring compatibility with other uses of natural resources (hunting, gathering of species, recreational fishing, etc.).

At the global level, the Millennium Assessment[13] identifies the main immediate causes of biodiversity loss and, with regard to climate change, identifies it as the most uncertain but also the most difficult to reverse. Thus, General Objective 12 *'Social participation in the conservation of biodiversity'* aims, with specific objective 12 *'Promoting corporate responsibility for the protection of biodiversity', to encourage low-impact activities with significant beneficial effects on biodiversity and avoid those with negative effects, in the design and consideration of investment projects by enterprises; - to assess the direct and indirect impact of each enterprise's activities on biodiversity,*

[13] Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-being: Current State and Trends, Volume 1, Island Press, Chapter 4.Biological Diversity, pp.96-99

using as best practice the methodological approach of 'Life Cycle Assessment', including the recording of the relevant footprint of each enterprise's supply chain, where feasible and applicable. It is evident that the project, being a low-impact and renewable electricity generation activity, contributes to the reduction of carbon dioxide emissions and is therefore in line with General Objective 12.

In conclusion, the project takes into account the Objectives and Actions proposed by this national strategy for the conservation of biodiversity, landscape diversity, and elements of the countryside.

5.2.4 Organised activity receptors

Quarry areas

In the wider study area, but outside the project area, according to the digital data of the General Directorate of Mineral Raw Materials of the General Secretariat of Energy and Climate Change of the Ministry of Environment, the following quarry areas are identified:

- 2 Quarries of aggregates at a distance of >19.2 km (D.E. Sostou, Municipality of Iasmos),
- 4 Quarries of Industrial Minerals at a distance of >26.7 km (one in the Municipality of Komotini, two in the Municipality of Aigirou and one in the Municipality of Sidirochori, Municipality of Komotini).

According to Article 48 of Law 4512/2018 on the "Arrangements for the implementation of the Structural Reforms of the Economic Adjustment Programme and other provisions" (Government Gazette 5/A/2018), the minimum distance from the mechanical installations of RES projects is set at 500 m.Furthermore, the minimum distance from the boundaries of the quarry area, when it comes to wind turbine pylons, is set at 150 m.

In conclusion, it appears that the considered LCPFE is fully compatible and does not have a minimal impact on the above uses.

Industrial areas

No industrial areas are identified in the study area. At a distance of >24 km, the BIFE Komotini is located (determination of building conditions by Government Gazette 81/D/2002 and Government Gazette 345/AAP/2008).

5.3 CONCLUSIONS

According to the above, **the project under consideration satisfies the guidelines, priorities and options of the Strategic and Regulatory Spatial Planning at both National and Regional level, while it is compatible and in compliance with the institutional spatial and urban planning commitments at local level,** as reflected in the existing and institutional land use of the project study area. In addition, it is fully compatible with the provisions of the specific plans.

Taking into account the optimal energy efficiency of the installation, the reversibility of the environmental impacts (natural, man-made), the set of references of the Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources (KYA 49828/2008-FEK 2464/B/2008) and Law 3851/2010 (Government Gazette 85/A/2010), which set specific rules for the siting and integration of wind installations in the landscape, document the compliance with all the terms and conditions set by the strategic spatial planning for the selection of the proposed solution for the siting, construction and operation of the wind farm.

CHAPTER 6: DETAILED DESCRIPTION

DESIGN OF THE PROJECT

Contents of the Chapter

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Schemes

6 DETAILED DESCRIPTION OF THE PROJECT DESIGN

This chapter contains the detailed description of the project:

44 MW ASPEE at the location 'Polemmistis', in the Municipal Units of Komotini and Organi,

Municipalities of Komotini and Arrianon, Regional Unit of Rodopi,

Region of Eastern Macedonia and Thrace.

A wind farm is an infrastructure project that aims to generate electricity from the renewable source of wind. The power plants are wind turbines, which convert the energy of the wind into electricity.

The project under study has been designed according to the following principles:

(a) the energy efficiency shall be at a satisfactory level,

(b) its construction requires the least possible intervention and has the least possible impact on the environment; and

(c) its operation has the least possible impact on avifauna

In the context of the integrated analysis of the project, the following sections provide a detailed description of the infrastructure works and technical characteristics of the A/P and its connection to the N.S.M.E.E.

The proposed power generation facility will have a total installed capacity of 44 MW and will include fifteen (11) VESTAS V-150 type gensets, with a nominal capacity of 4.00 MW each, in forested areas mainly and in small parts of private agricultural land at the Greek-Bulgarian border, ~7 km north of the settlement of 'Drymi'.

Each wind turbine consists of a 125 m high metal tower, on top of which the wind turbine's spindle rests. The main equipment of the wind turbine is mounted on the nacelle, consisting of the main shaft on which the hub and the rotor of the 150 m diameter wind turbine, the speed multiplier and the generator are mounted. The total height of the wind turbine (tower, nacelle, rotor) is 200 m. Further details of the components of each wind turbine are given in the manufacturer's technical brochure attached in the Annex.

The A/Cs are arranged at an appropriate distance from each other, which is greater than the minimum distance equal to 2.5 times the diameter of the A/C blade (2.5 x 150 = 375 m), in order to avoid aerodynamic shading and high wind turbulence and to optimise their energy efficiency, reducing their wear and tear and increasing the

the lifetime of the installation and less than the maximum equal to 5 times the diameter of the impeller of the A/C (5 x 150 = 750m)

The following data were taken into account for the **placement of the A/Gs:**

- Terrain topography and possible presence of local obstacles/ anomalies,
- Prevailing wind directions, mean and median wind speed,
- Soil morphology and foundation suitability A/C,
- Restrictions in the relevant legislation on keeping distances from roads, settlements and other places of use.

The project under study is developed within a polygon of 3760.964 acres, for which the issuance of the amended Producer's Certificate by RAE is expected (the original issued Producer's Certificate is attached to the Annex to the Documents).The interventions concern:

- Access road deck improvement
- Deck improvement and construction of a short length of new internal road network
- Excavation of foundations for A/C
- Excavation of Low/Medium Voltage and Low Voltage and Low Voltage wiring channels parallel to the internal roads,
- Landscaping of squares around the locations of the A/Gs,
- Backfilling/landscaping,
- Excavation of MT cabling channel up to the existing voltage boosting substation 'Flamburo'

The existing road will be used to access the project, then new road sections will be built or existing road sections of the local network will be improved to connect the A/C. The length of the road network that will be required is 11,182.63m.

The topography of the proposed project is presented in detail on the Plans herein.

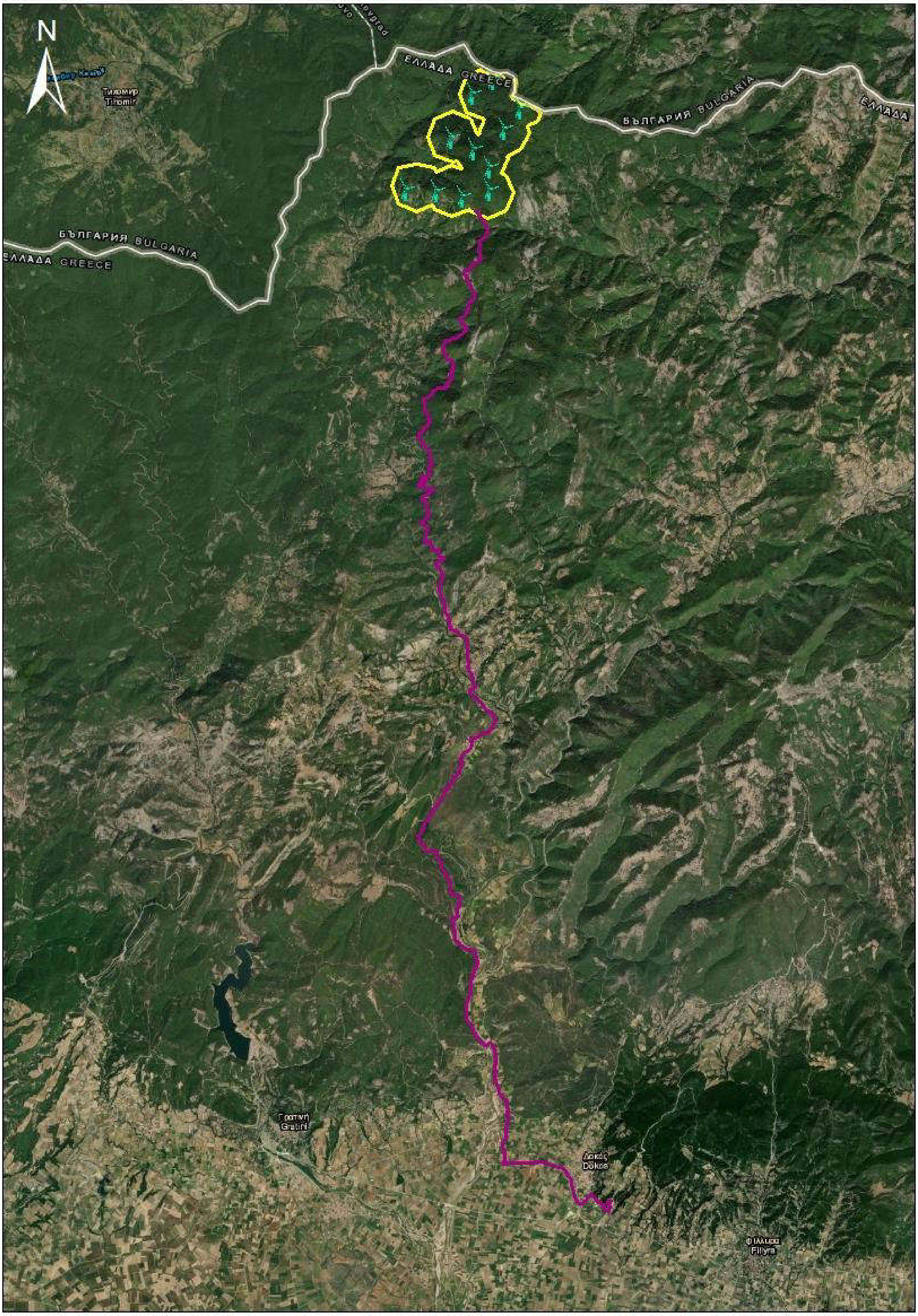


Figure 6.1- 1: Project location

(the polygon is shown in yellow, the Medium Voltage line and the Voltage Booster Substation in purple)

6.1 DETAILED DESCRIPTION OF THE PROJECT

6.1.1 Wind turbines

Wind turbines are devices that harness the energy provided by the wind. Compared to conventional methods of generating electricity, wind turbine technology is competitive, especially when environmental and social benefits are taken into account. Wind turbine technology is relatively simple. It does not consist of complex systems and bulky electrical and mechanical installations like a conventional power plant and does not require constant supervision by human resources.

The project under study consists of 11 gensets of indicative type VESTAS V-150, with a power of 4.0 MW each. Each wind turbine consists of a 125 m high metal tower on top of which the turbine's spindle is mounted. The main equipment of the wind turbine is mounted on the nacelle, consisting of the main shaft on which the hub and the rotor of the wind turbine, the speed multiplier and the generator are mounted. The rotor has a diameter of 150m and consists of three blades.

The wind turbine pylon is steel, cylindrical with a slight taper. The pylon is closed to the external environment. Access to the interior is through a metal door located at the base of the tower. The pylon has a metal staircase inside which allows access to the wind turbine shaft. It is internally divided in height by metallic platforms, which serve to ensure the safety of maintenance personnel.

The wind turbine fuselage consists of a steel frame and the housing which is made of polyester material. The fuselage is closed to the outside environment and is mounted on the wind turbine tower by means of a crown-coil system so as to allow the fuselage to rotate 360 degrees relative to the wind turbine tower.

Access to the shell is achieved from inside the tower through a metal staircase. In addition, at the base of the fuselage and outside the wind turbine tower there is a hatch and lifting and lowering equipment for the transport of tools and spare parts. This hatch can also be used as an escape hatch in case of emergency.

At the base of the wind turbine and inside the tower is the central electrical panel and the wind turbine controller through which the connection of the wind turbine to the power grid and the control of all the functions of the wind turbine are made respectively.

All connections of the electrical panel, both primary and secondary, are properly protected in accordance with the applicable regulations, in particular by using fuses and automatic circuit breakers, which protect the installation both in case of overload and in case of short circuit.

The kinetic energy of the wind is converted through the rotor of the wind turbine into mechanical work, which in turn is converted into electricity through the wind turbine's electrical generator.

The wind turbine control system controls a set of parameters and ensures the safe and uninterrupted operation of the system.

Each genset is equipped with a two-phase asynchronous generator. The generator is connected to the grid via a Grid Streamer which allows it to operate at variable speeds. The converter also controls the frequency as well as the quality of the power generated. The wind turbine has a lightning protection system (with protection level LPL1) to protect the entire wind turbine and all its subsystems. The Genset shall have a grounding system that connects all its metal parts to the grounding system of the Genset. The grounding system shall consist of a grounding conductor installed in the ground and vertical electrodes (grounding rods) placed at selected points.

6.1.2 Wind farm siting

The wind farm under study is developed in a polygon on the Greek-Bulgarian border.

The 11 wind turbines that will form the Wind Farm will be placed at the locations with coordinates presented in Error! Reference source not found.. and are delimited within the polygon of Error! Reference source not found.. The coordinates of characteristic points of the MT grid are presented in Error! Reference source not found.. (see General Project Layout - T01).

Table 6.1- 1: Geographical coordinates of the A/C positions (ΕΓΣΑ 87 - WGS 84)

A/A	ΕΓSA '87		WGS '84	
	X	Y	λ	φ
A/C 1	630595,345	4572505,875	25,56156865	41,29598652
A/C 2	631145,480	4572498,203	25,56813529	41,29582813
A/C 3	631611,673	4572399,368	25,57367994	41,29486222
A/C 4	632086,755	4572507,258	25,57937545	41,29575600
A/C 5	631401,593	4573456,765	25,57140032	41,30441762
A/C 6	631803,477	4573236,410	25,57615139	41,30236786
A/C 7	632092,086	4572914,405	25,57952756	41,29942119
A/C 8	632351,354	4573615,171	25,5827758	41,30568854
A/C 9	631782,911	4574235,508	25,57612249	41,31136737
A/C 10	632147,963	4574494,530	25,58053834	41,31363988

A/C 11	632648,666	4573973,357	25,58640421	41,30886485

Table 6.1- 2: Geographical coordinates of polygons of the ASPHE Installation (ΕΓSA '87)

Coordinates of Polygon vertices (A/C 1 - A/C 11)		
A/A	**X**	**Y**
A1	630340,39	4572569,003
A2	630474,242	4572892,15
A3	630800,301	4572950,714
A4	631120,538	4572892,15
A5	631150,436	4572819,97
A6	631435,524	4572938,057
A7	631600,897	4572869,557
A8	631533,783	4573031,583
A9	631454,494	4572998,741
A10	631131,346	4573132,593
A11	630997,494	4573455,741
A12	631131,346	4573778,888
A13	631454,494	4573912,741
A14	631777,641	4573778,888
A15	631897,236	4573490,161
A16	631924,723	4573501,547
A17	631909,262	4573538,872
A18	632007,618	4573776,326
A19	631697,178	4573904,914
A20	631563,326	4574228,062
A21	631697,178	4574551,21
A22	631963,948	4574661,71
A23	631995,53	4574635,541
A24	632095,357	4574592,211
A25	632278,661	4574553,648
A26	632323,445	4574559,506
A27	632343,474	4574551,21
A28	632403,43	4574406,464
A29	632579,587	4574479,266
A30	632573,746	4574317,073
A31	632561,039	4574245,57
A32	632494,721	4574175,972
A33	632532,548	4574129,074
A34	632632,824	4574099,366
A35	632675,722	4574045,398
A36	632832,335	4574008,214
A37	633041,031	4573890,63
A38	632971,879	4573727,924
A39	632778,187	4573647,694
A40	632823,262	4573538,872

A41	632675,457	4573225,351
A42	632418,065	4573103,33
A43	632433,526	4573066,004
A44	632323,157	4572799,551
A45	632403,339	4572766,338
A46	632537,192	4572443,19
A47	632403,339	4572120,042
A48	632080,293	4571994,779
A49	631757,044	4572120,042
A50	631743,894	4572151,788
A51	631435,524	4572024,057
A52	631112,376	4572157,909
A53	631082,478	4572230,09
A54	630797,39	4572112,003
A55	630474,242	4572245,855
A1	630340,39	4572569,003

Table 6.1- 3: Geographical coordinates of characteristic points of the MT network route

A/N	x	y	φ	λ
1	631846	4572132	41.29241939	25.57642858
2	631954	4572001	41.29122631	25.57769559
3	632078	4571790	41.28930399	25.57912728
4	632007	4571636	41.28792353	25.57824651
5	631894	4571192	41.28394942	25.5768029
6	631662	4571029	41.28252179	25.57399848
7	631715	4570903	41.28137636	25.574602
8	631841	4570603	41.27865034	25.5760368
9	631695	4570041	41.27361895	25.57417295
10	631272	4569624	41.26993343	25.56904041
11	631362	4568971	41.26403924	25.56996399
12	631048	4568349	41.25848358	25.56608892
13	630909	4567916	41.25460716	25.56433606
14	630839	4567174	41.24794355	25.56333738
15	630910	4566934	41.24576978	25.56413488
16	631001	4566415	41.24107628	25.56511209
17	631297	4565873	41.23614715	25.56852912
18	631276	4565546	41.2332108	25.56820114
19	631680	4564465	41.22340746	25.57278538
20	631757	4563485	41.21457373	25.57349569
21	632207	4562971	41.20987205	25.57874898
22	631592	4562269	41.20365368	25.57126091
23	630828	4560806	41.1906026	25.56185039
24	631524	4559410	41.17791708	25.56983984
25	631886	4558577	41.17035976	25.57397204

26	632037	4557108	41.15710561	25.57545999
27	632131	4557161	41.15757042	25.57658849
28	632438	4555964	41.14674202	25.57998724
29	632351	4554984	41.13792633	25.57873637
30	633416	4554921	41.13718847	25.59141467
31	633710	4554263	41.13121189	25.59477442
32	633923	4554441	41.13277785	25.59734285
33	634159	4554248	41.13100575	25.60010899
34	634240	4554136	41.12998473	25.60105518

6.2 READ MORE DESCRIPTION ASSISTANTS AND SUPPORTING /INSTALLATION AND WORKS TEAMS

6.2.1 Electrical Interconnection Projects

The gensets of the PDO under study will be interconnected to the underground medium voltage line through autonomous step-up transformers (step-down transformers). The transformers are to be installed inside the gensets at the base of the pylons for their uninterrupted and safer maintenance and operation. From the main switchboard of the gensets, the M.T. cables will run underground, following the layout of the internal roads.

In the design of the considered ASDP, the construction of a control house is not foreseen.

6.2.1.1 MT Interface Line

For the transmission of the energy produced by the wind turbines of the wind farm under consideration to the Voltage Raising Substation, the construction of a 20kV medium voltage interconnection line is required. The total length of the interconnection line will be 25.15 km, which will run underground along the existing rural-forestry and rural roads.

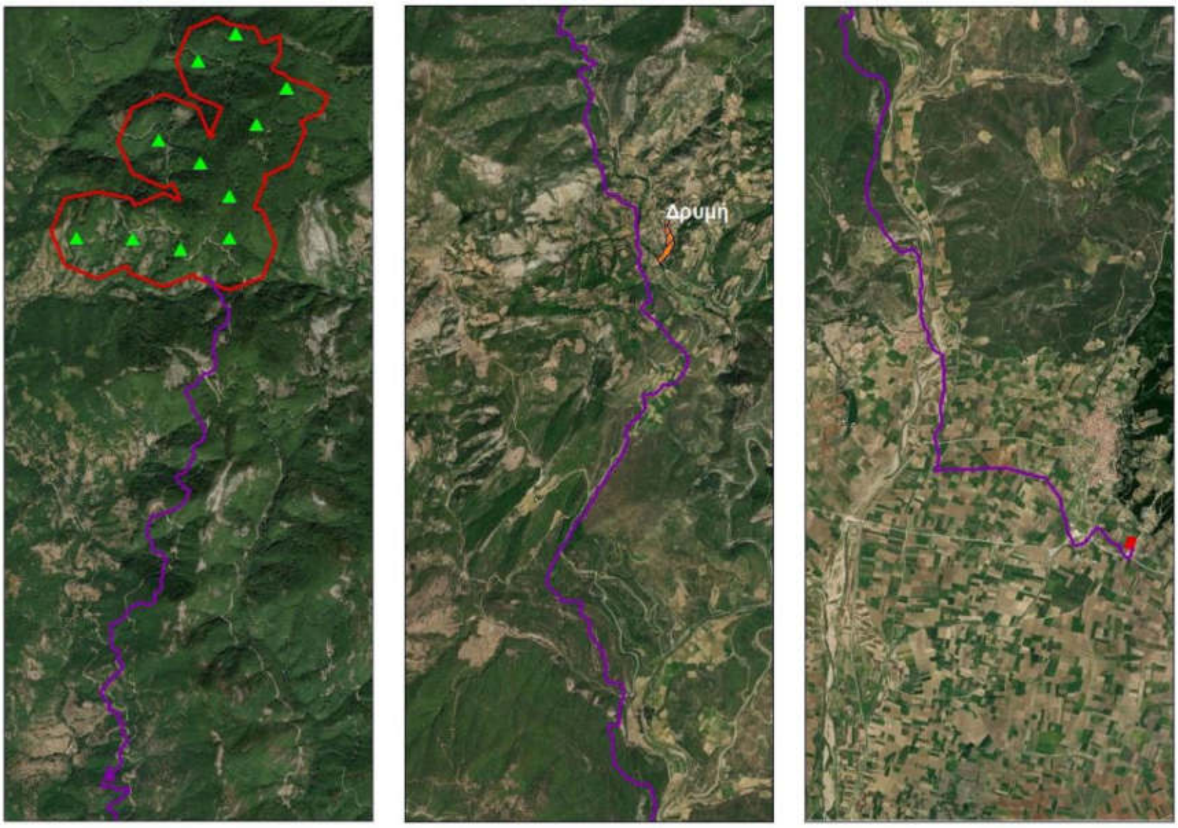


Figure 6.2- 1: MT Interconnector Route

6.2.1.2 Cable and Conduit Grounding Trench

The MT cables for the interconnection of the ASPEE up to the existing 33/150kV 'Flamburo' substation will be routed in an underground trench. The underground line will be constructed along the existing rural-woodland and rural road network. For this purpose, a trench will be excavated with dimensions of 0.80 m x 1.10 m (WxH), in accordance with the PPC's STANDARD CONSTRUCTION MANUAL (STCM) and the needs of the project. In the length where the joint routing of two circuits is required, the width of the hook will be 1.20m. The communication cable will be routed in the same hook, while the channel of the internal network of the AP will also be traversed by a grounding conductor, which will be connected to the grounding system of the A/Cs. Sand, marking tape, excavation products or gravel will be used to cover the cables where required (Error! Reference source not found.**)**.

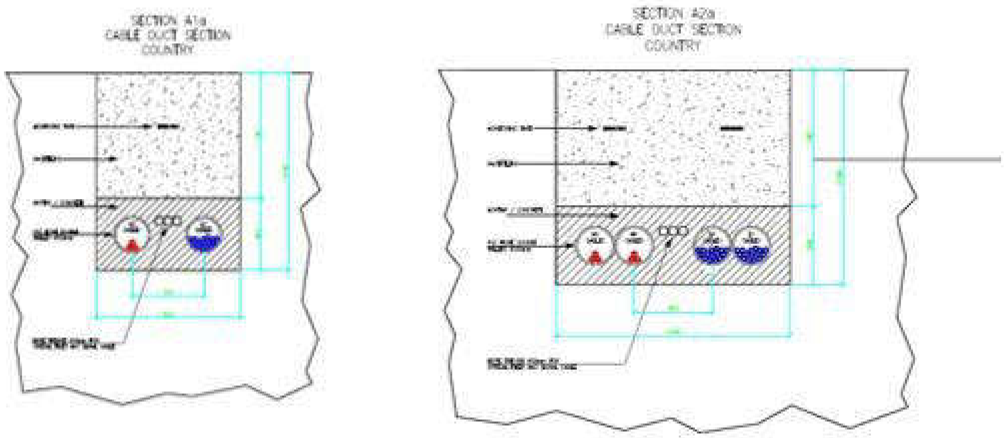


Figure 6.2- 2: Typical cross-section of single and double line cable duct construction

The trenches where the interconnection cables will be installed will be opened during the earthworks phase and will contain (except for MT cables) the following categories of cables:

- Communication cables
- Earthing conductor

6.2.2 Voltage boosting substation

The Medium Voltage interconnection line will end at the existing 20/150kV "Flamburo" Voltage Raising Substation (VS), which is connected to the 150kV/2B GM "Orestiada - Kehros - Kerveros - Iasmos".

In order to connect the project under consideration to the substation in question, some extension works are required. The extension works required for the connection to the substation "Flambouros" include, indicatively, extension of 150kV yokes and installation of two complete 150kV gates for the connection of 150kV overhead transmission lines. The above equipment is indicative and will be finalised, as well as the final location of the PS and the final route of the new transmission line, during the Tender of Connection Conditions phase. In case of any variations from what is proposed by the EIS, an Amendment File will be prepared to harmonize the EIS with the proposal of the ADMIE.

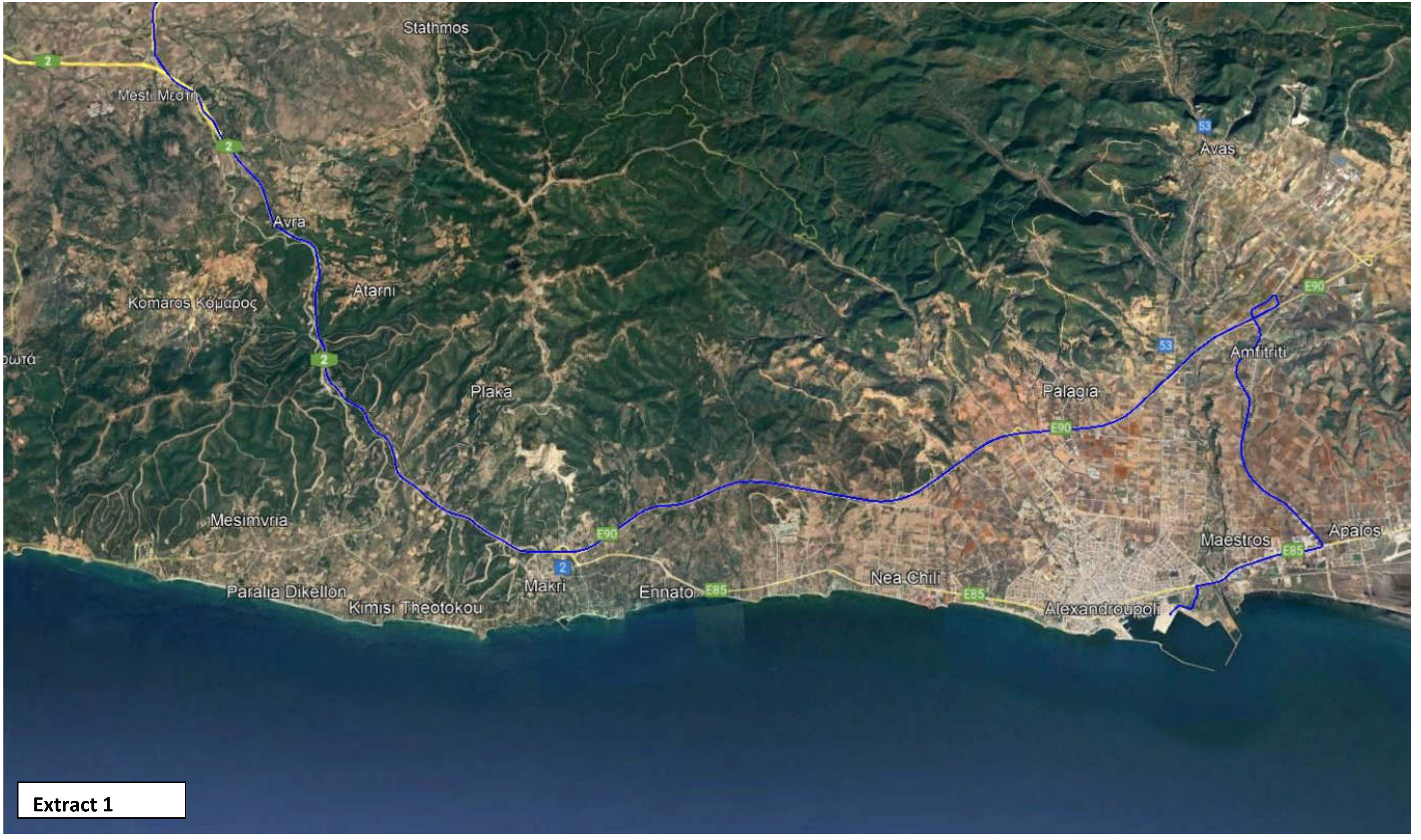
6.2.3 Connections to the Road Network - Transportation of equipment to the installation sites of the Gensets

6.2.3.1 General

Wind farms require special transport solutions, according to the specifications of the wind farm manufacturer, in order to avoid any damage during transport. The design of new roads and the testing of existing roads was carried out for the worst-case scenario, i.e. the transport of the blades of the wind turbines in terms of maximum length, the pylons in terms of maximum width and the fuselage in terms of maximum weight and height.

The port of Alexandroupolis is the closest port to the A/P. As a special purpose port (commercial), it is suitable as it offers the appropriate facilities for the approach of suitable transport and storage facilities. Furthermore, the road connection from the port to the main roads in the area is direct.

Specifically, the transport of the project equipment will start from the port of Alexandroupolis and will follow a route from Republic Avenue to the National Road Alexandroupolis - Synoron. After 6.6 km it will enter the Egnatia Odos and follow a 30 km route up to the junction at the height of the settlement of Mestis Komotini. It then enters the Provincial Road Komotini - Alexandroupolis where it follows a 25 km route up to the junction at the height of Anthohori. It enters the local road of Anthochorio and follows a 7 km northward route until the junction at the settlement of Gratini in Komotini, where it enters the Provincial Road of Komotini - Bulgarian Borders. It travels a distance of 14 km and then enters the Local Road around the settlement of Drimi where it continues north for a further 11 km until it reaches the starting point of the access road works.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Paralia Dikellon
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Kimisi Theotokou
Alexandroupoli
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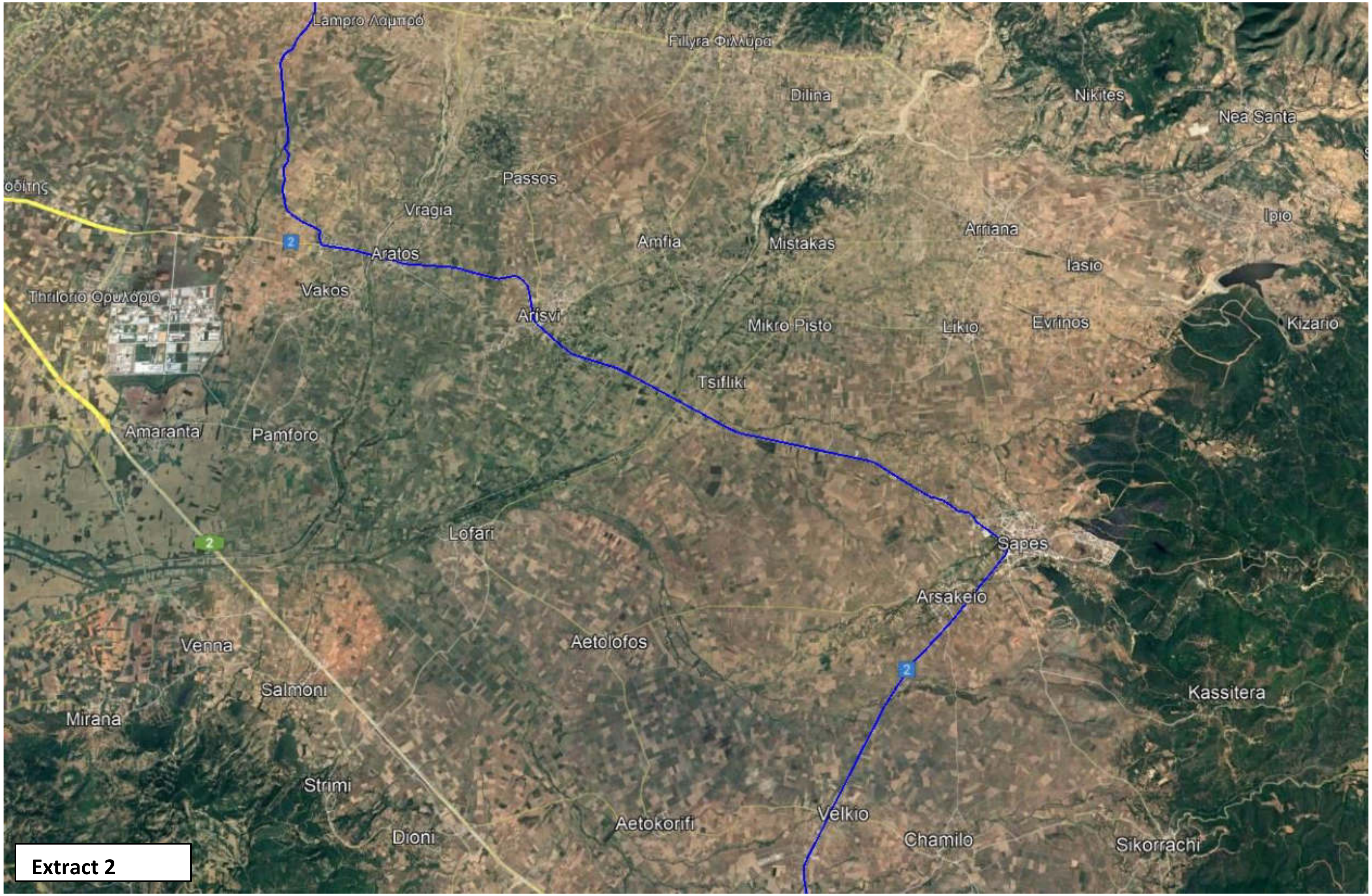
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Mikro Pisto
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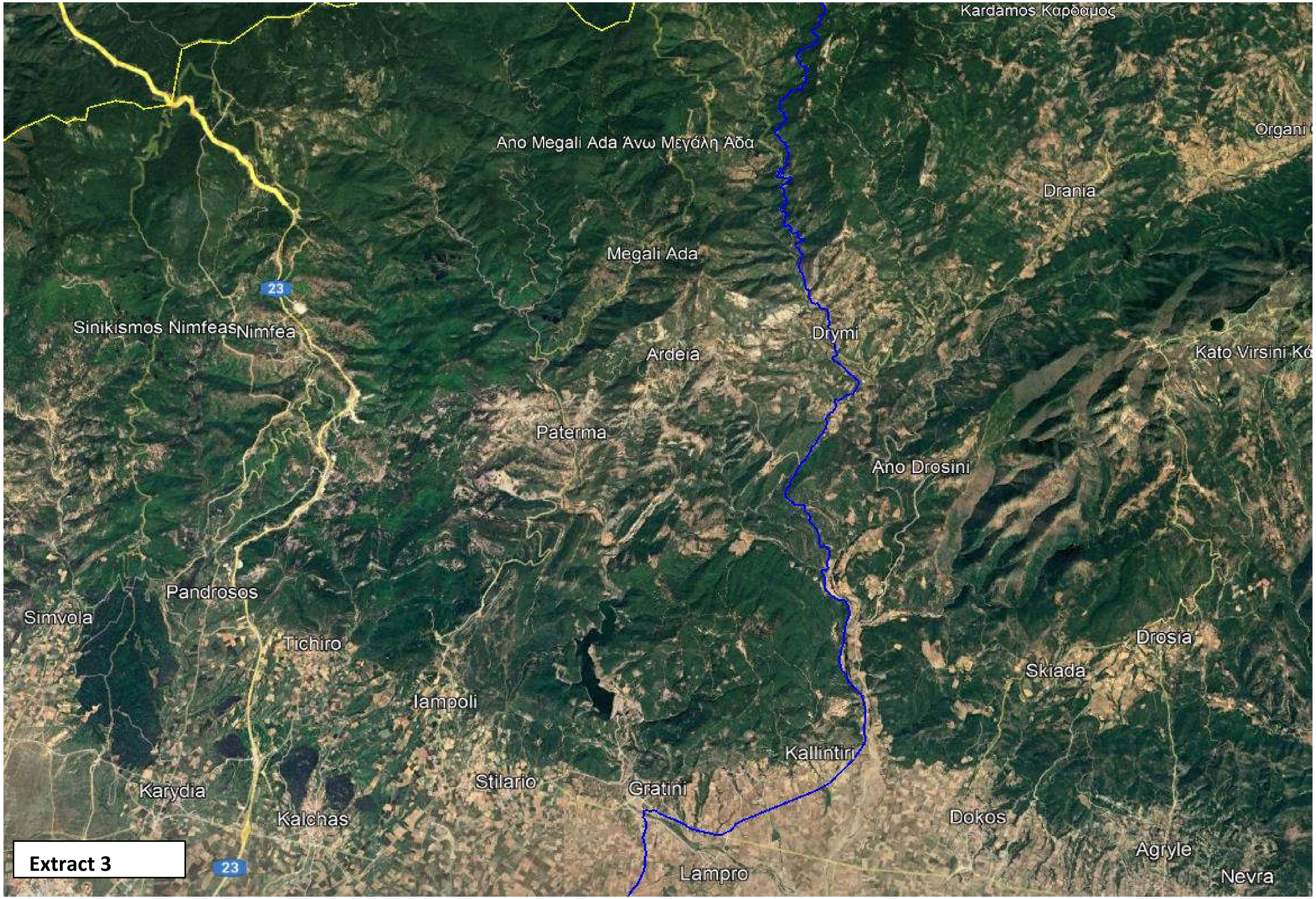
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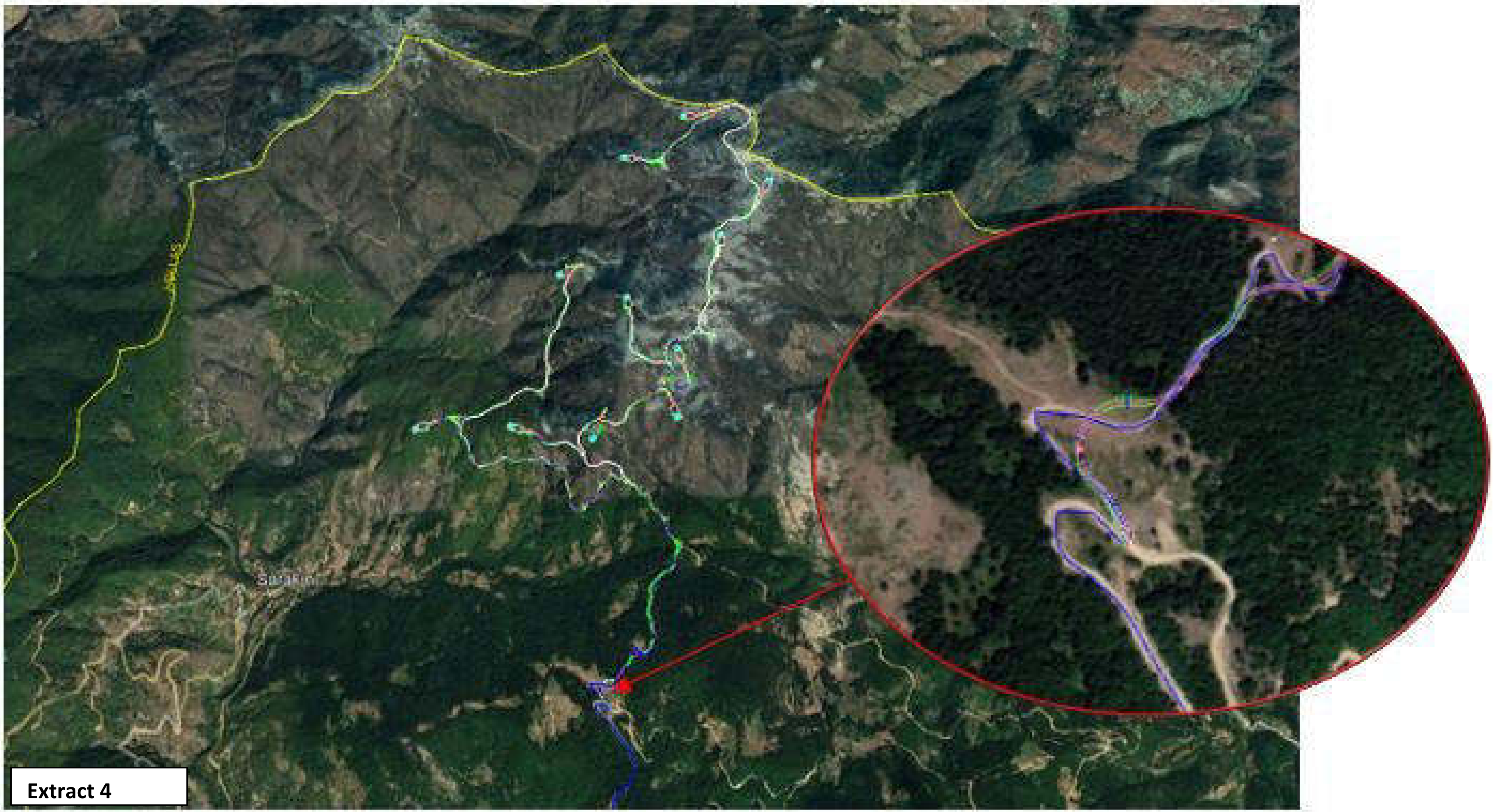


Figure 6.2- 3: Route to be followed by the transport vehicles for the transport of the equipment of the ESA under consideration (Start: Extract 1 - End: Extract 4)

Access to the A/P will generally be via the existing road network in the area. However, where this is not sufficient, improvements to existing roads and/or the construction of new roads will be carried out.

The geometric elements of the roads must ensure the passage of the vehicles that will transport the wind turbine components, but at the same time the required strength to withstand the weight of the wind turbine components.

Both the installation of the A/Cs and the access roads and internal roads are located in agricultural and forest areas. The terrain has very low gradients and the longitudinal gradients of the roads are also very low and do not cause any problems for the movement of transport vehicles. When designing the roads, an effort was made to use existing roads as far as possible to minimise interference with farmland or woodland.

6.2.3.2 Geometric elements of roads - standard cross-section

The existing road will be used for the approach to the project, then new road sections will be built or existing road sections of the local network will be improved to connect the A/C. The length of the road network that will be required is **11,182.63m.**

The geometric elements of the roads should be such as to allow the passage of vehicles carrying the components of the wind turbines selected for installation. The choice of the transport vehicle depends on the dimensions of the wind turbine components and the way in which they are to be transported. The critical dimension is the length of the blades. If the wing is transported in a horizontal position , without the blade lifter device , then the length of the tractor is of the order of 65.0 m.

The geometric requirements of the access roads for the transport of the elements of the specific A/C are as follows:

- The minimum width of the roads within the installation polygons of the A/C is 4.0m., with a minimum free width from any kind of obstacles on either side of 0.50m. In this study the width of the roads within the polygons is 5.0m.
- For transport routes outside the installation polygons, i.e. access routes, the minimum required width of the routes is 5.0 m with a clearance of 0.80 m on either side of the access routes.

- *Maximum longitudinal slope 14%.* As mentioned, the terrain is mountainous-mountainous, but the slopes do not exceed the maximum permissible number.
- *Minimum radius of curvature.* The radii depend on the length of the vehicle. As it was mentioned that since no blade lifter is used for this particular vessel the length of the tractor will be in the order of 65.0m. The present study contains a variety of horizontal radii of curvature (large and small), so as not to require major interventions on the road surface, protecting the environment as much as possible. The minimum the horizontal curve used has a radius of 35.0 m.
- The strength of the road surface shall be such that it can withstand a minimum axle load of 12 tonnes.
- Where the roads meet half canyons, culverts will be constructed so that stormwater runoff is unobstructed.

In terms of pavement condition, access roads are divided into three categories.

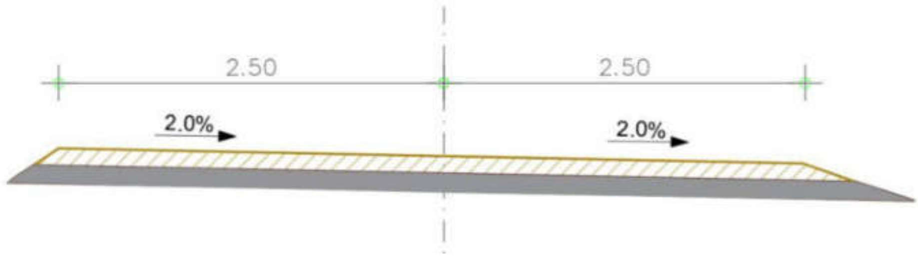
- Existing roads with full pavement.

These are the roads of the National - Provincial or Municipal road network, which also serve the traffic of heavy vehicles. The pavement of these roads does not require any additional reinforcement in order to accommodate the loads of the transport vehicle.

- Existing roads without complete pavement.

These are agricultural or forest roads which are usually paved with one or more layers of aggregate (torrent or quarry material). These roads are also used by heavy agricultural vehicles, but it is not certain that their strength will be such that they will be able to withstand the specific load. After inspection of some sections, upgrading work will be required. It is estimated that by laying another 10cm thick layer of 10cm thick crushed material of PTP O150 well compacted, these sections will be able to meet the loads of the transport vehicle.

ΤΥΠΙΚΗ ΔΙΑΤΟΜΗ ΑΝΑΒΑΘΜΙΣΗΣ ΥΦΙΣΤΑΜΕΝΗΣ ΟΔΟΥ



- Opening of new roads

The length of new openings is generally short. The construction of the new roads is proposed to be made with: one layer of 10 cm thick average crushed material of PTP O150 and one layer of 10 cm thick of PTP O155 (Technical Specification 05-03-03-00). In order to determine the thickness of the pavement more accurately, soil bearing capacity tests will be carried out at the specified locations.

The following table shows the limiting values of each road, i.e. the length, the minimum horizontal radius, the maximum longitudinal gradient (see plan "Horizons - O.01,O.02,O.03,O.04")

Road sections

a/a	Street	Length	Min R horizontal	Max s
		m	m	%
1	L01	3211,48	35	14,00
2	L02	1408,34	50	14,00
3	L03	577,96	70	13,04
4	L04	133,47	100	14,00
5	R01	717,29	50	14,00
6	R02	3330,29	50	14,00
7	R03	58,22	40	8,50
8	R04	109,24	50	10,50
9	R05	244,80	50	14,00
10	R06	478,55	50	14,00
11	R07	117,00	100	14,00
12	R08	98,36	100	12,18
13	B01	135,99	50	7,30
14	B02	81,59	50	7,50
15	B03	80,00	-	2,50
16	B05	37,87	50	9,00

17	B06	63,98	35	0,00
18	B07	97,32	50	6,50
19	B08	116,17	50	1,72
20	B09	84,71	50	5,00
Total		11182,63		

The project consists of the following road sections, where the following applies to each road:

Road L01 is the main road in the north-western part of the project, where it starts at the existing road and ends at the square of A/C 1. The longitudinal gradient of the road is steep in sections with a maximum gradient of 14 %. The total length of the road is 3211.48 m. Transport vehicles will move in the right of way.

L02 starts on L01 and ends at the square of A/F 5. The longitudinal gradient of the road is steep in parts with a maximum gradient of 14,0 %. The total length of the road is 1408,34 m. Transport vehicles will move in the right direction.

The **L03** road starts at R02 and ends at the square of A/C 9. The longitudinal gradient of the road is steep in parts with a maximum gradient of 13,04 %. The total length of the road is 577,96 m. The transport vehicles will move in the right direction.

Road L04 is a road section for reversing vehicles, starting and ending at Road L01 . The longitudinal gradient of the road is steep with a maximum gradient of 14.0 %. The total length of the road is 133.47 m.

The **R01** road starts at L01 and ends at the square of A/C 2. The longitudinal gradient of the road is steep in sections with a maximum gradient of 14.0%. The total length of the road is 717.29m. Transport vehicles will move in the correct direction.

R02 is the main road in the north-eastern section, starting from R01 and ending at the square of A/F 10. The longitudinal gradient of the road is steep in parts with a maximum gradient of 14.0%. The total length of the road is 3330.29m. Transport vehicles will move in the correct direction.

Road R03 is a reversing road, starting from R02 and ending at the extension of A/C 3 Square. The longitudinal gradient of the road is moderate with a maximum gradient of 8.50%. The total length of the road is 58.22m.

Road R04 starts from R02 and ends at the square of A/C 4. The longitudinal gradient of the road is moderate with a maximum gradient of 10.50%. The total length of the road is 109.24m. The transport vehicles will move in the correct direction.

The **R05 road** starts from the R02 road and ends at the square of A/C 7. The longitudinal gradient of the road is steep in parts with a maximum gradient of 14.0%. The total length of the road is 244.80 m. Transport vehicles will move in the correct direction.

The **R06 road** starts from the R02 road and ends at the square of A/G 6. The longitudinal gradient of the road is steep in sections with a maximum gradient of 14.0%. The total length of the road is 478.55m. Transport vehicles will move in the correct direction.

The **R07 road** starts from the R02 road and ends at the square of A/C 8. The longitudinal gradient of the road is steep with a maximum gradient of 14.0%. The total length of the road is 117.00 m. The transport vehicles will move in the correct direction.

The **R08 road** starts from the R02 road and ends at the square of A/C 11. The longitudinal gradient of the road is steep with a maximum gradient of 12,18 %. The total length of the road is 98,36 m. The transport vehicles will move in the right direction.

Road B01 is a reversing road section, starting from Road R02 and ending at Road B02. The longitudinal gradient of the road is moderate with a maximum gradient of 7,30 %. The total length of the road is 135,99 m.

Road B02 is a reversing road section starting from Road R02 and ending at Road B01. The longitudinal gradient of the road is moderate with a maximum gradient of 7,50 %. The total length of the road is 81,59 m.

Street B03 is the extension of the A/C 8 square for the crane setup. The longitudinal gradient of the road is gentle with a maximum gradient of 2.50 %. The total length of the road is 80.00 m.

Road B05 is a road section for the reversal of vehicles in the A/F 5 square, starting on L02 and ending in the A/F 5 square. The longitudinal gradient of the road is moderate with a maximum gradient of 9,00 %. The total length of the road is 37,87 m.

Road B06 is a road section for the reversal of vehicles from A/C 5 Square, starting from the extension of A/C 5 Square and ending at L02. The longitudinal gradient of the road is gentle with a maximum gradient of 0.00%. The total length of the road is 63.98 m.

Road B07 is a reversing road, starting from the extension of A/C 3 Square and ending at R02. The longitudinal gradient of the road is moderate with a maximum gradient of 6.50%. The total length of the road is 97.32 m.

Street **B08** is a turnaround road, starting at L03 and ending at B09. The longitudinal gradient of the road is gentle with a maximum gradient of 1.72%. The total length of the road is 116.17 m.

Road B09 is a reversing roadway, starting at B08 and ending at L03. The longitudinal gradient of the road is moderate with a maximum gradient of 5.00%. The total length of the road is 84.71 m.

In general, the new roads follow the optimal route in relation to the terrain. The sequence of straight line - arc - straight line is followed. The radii of the arcs shall be suitable to allow the roads to be used by long vehicles carrying the pylons and blades of the wind turbines to be installed in the OP. Where necessary, widening has been applied to the inside of the curves with a small radius. The detailed elevations i.e. polygonal vertices and radii applied for each road are shown in the tables below (see plan
"Horizons - O.01,O.02,O.03,O.04").

L01

Top	X	Y	R (m)
K1	631716,057	4570903,408	0
K2	631712,253	4570924,403	50
K3	631686,172	4570960,370	50
K4	631548,755	4571061,709	50
K5	631747,593	4571055,718	50
K6	631772,489	4571089,948	50
K7	631784,696	4571119,512	50
K8	631813,229	4571139,255	50
K9	631830,994	4571193,602	50
K10	631907,032	4571186,739	50
K11	631957,458	4571278,651	80
K12	631940,785	4571327,694	70
K13	631940,272	4571364,444	80
K14	631916,840	4571418,732	50
K15	631936,959	4571498,803	50
K16	631933,455	4571566,271	50
K17	632010,418	4571639,216	50
K18	632063,399	4571653,388	50
K19	632064,551	4571720,561	100
K20	632097,969	4571797,266	90
K21	632023,954	4571868,685	50
K22	632010,059	4571944,852	50
K23	631977,903	4571978,009	50
K24	631942,930	4572014,559	50
K25	631926,092	4572074,111	50
K26	631876,792	4572088,460	50
K27	631855,269	4572129,386	50
K28	631774,739	4572163,682	50
K29	631721,069	4572219,836	35
K30	631691,248	4572166,305	50
K31	631652,818	4572142,713	50
K32	631651,192	4572088,974	50
K33	631609,971	4572048,242	100
K34	631586,821	4572034,640	100
K35	631464,626	4571923,882	50
K36	631491,605	4572096,796	50
K37	631473,898	4572128,130	100
K38	631463,305	4572188,670	150
K39	631464,254	4572263,637	50
K40	631374,561	4572268,754	50
K41	631341,678	4572323,391	50
K42	631262,870	4572305,026	50
K43	631225,808	4572312,153	50
K44	631182,026	4572299,114	50
K45	631100,354	4572329,724	50
K46	631055,868	4572289,586	50

K47	631015,690	4572295,204	50
K48	630953,902	4572267,905	50
K49	630910,325	4572350,404	50
K50	630910,034	4572399,223	50
K51	630886,405	4572442,587	50
K52	630854,927	4572469,017	50
K53	630850,553	4572523,587	50
K54	630786,846	4572574,512	50
K55	630732,103	4572554,129	0

L02

Top	X	Y	R (m)
K1	630853,256	4572489,866	0
K2	630847,559	4572560,939	50
K3	630963,850	4572582,736	50
K4	631031,600	4572630,340	100
K5	631129,204	4572668,816	50
K6	631142,416	4572712,449	50
K7	631229,648	4572759,922	50
K8	631339,204	4572699,108	50
K9	631335,000	4572800,000	50
K10	631343,658	4572885,848	50
K11	631330,000	4572920,000	50
K12	631328,643	4572983,041	100
K13	631355,714	4573098,032	50
K14	631400,700	4573126,664	50
K15	631401,615	4573167,168	50
K16	631464,758	4573296,305	50
K17	631421,723	4573365,874	70
K18	631484,069	4573489,327	50
K19	631500,829	4573496,492	0

L03

Top	X	Y	R (m)
K1	632377,976	4574532,169	0
K2	632349,468	4574512,198	250
K3	632282,229	4574461,186	70
K4	632231,757	4574450,217	70
K5	632168,037	4574366,740	70
K6	632120,028	4574340,454	200
K7	632092,642	4574323,337	100
K8	631983,665	4574197,011	75
K9	631925,232	4574207,694	0

L04

Top	X	Y	R (m)
K1	630891,783	4572569,228	0
K2	630873,578	4572565,816	100
K3	630793,445	4572576,970	100
K4	630760,303	4572564,629	0

R01

Top	X	Y	R (m)
K1	631843,295	4572137,178	0
K2	631835,162	4572145,352	50
K3	631783,128	4572180,009	50
K4	631762,259	4572246,991	50
K5	631675,932	4572274,774	65
K6	631594,852	4572216,333	50
K7	631551,703	4572316,189	100
K8	631509,726	4572358,346	200
K9	631463,127	4572393,354	50
K10	631429,698	4572390,000	50
K13	631352,856	4572381,644	80
K11	631295,272	4572445,174	50
K12	631282,157	4572449,331	0

R02

Top	X	Y	R (m)
K1	631566,426	4572287,276	0
K2	631565,725	4572318,975	50
K3	631503,691	4572410,508	70
K4	631617,750	4572501,636	100
K5	631675,034	4572501,657	50
K6	631764,262	4572452,891	50
K7	631822,458	4572576,227	70
K8	631980,337	4572671,712	50
K9	632055,948	4572728,322	100
K10	632060,988	4572810,545	60
K11	632018,073	4572863,609	50
K12	632042,328	4572970,289	65
K13	632149,979	4572976,922	75
K14	632215,116	4573036,492	75
K15	632220,276	4573102,572	75
K16	632288,009	4573211,265	100
K17	632266,905	4573285,390	100
K18	632286,267	4573382,289	100
K19	632286,318	4573421,217	100
K20	632312,232	4573478,962	100
K21	632328,240	4573555,501	65

K22	632290,564	4573645,275	50
K23	632355,032	4573669,082	50
K24	632403,978	4573728,753	60
K25	632518,435	4573713,814	95
K26	632591,595	4573932,358	60
K27	632516,370	4573996,766	100
K28	632510,824	4574066,305	100
K29	632357,388	4574321,134	60
K30	632504,254	4574366,963	100
K31	632584,079	4574461,495	65
K32	632468,030	4574554,858	65
K33	632251,630	4574500,336	0

R03

Top	X	Y	R (m)
K1	631673,300	4572542,942	0
K2	631659,926	4572509,914	40
K3	631691,193	4572492,825	0

R04

Top	X	Y	R (m)
K1	631968,890	4572664,789	0
K2	632021,185	4572696,417	50
K3	632048,913	4572619,541	0

R05

Top	X	Y	R (m)
K1	631999,599	4572686,134	0
K2	632025,077	4572705,209	50
K3	632200,550	4572611,372	55
K4	632139,660	4572777,412	0

R06

Top	X	Y	R (m)
K1	632058,779	4572774,516	0
K2	632063,437	4572850,499	50
K3	631965,454	4572815,144	60
K4	631829,492	4572887,326	50
K5	631832,869	4573087,819	50
K6	631831,513	4573094,125	0

R07

Top	X	Y	R (m)
K4	632290,030	4573426,839	0
K2	632322,627	4573461,159	100

K1	632339,896	4573550,767	0

R08

Top	X	Y	R (m)
K3	632539,483	4573778,437	0
K2	632566,651	4573810,303	100
K1	632591,972	4573860,925	0

B01

Top	X	Y	R (m)
K1	632174,987	4572999,793	0
K2	632193,264	4573016,508	50
K3	632306,197	4572996,069	0

B02

Top	X	Y	R (m)
K1	632217,421	4573066,014	0
K2	632213,273	4573012,886	50
K3	632257,735	4573004,839	0

B03

Top	X	Y	R (m)
K1	632347,346	4573549,792	0
K2	632336,489	4573470,533	0

B05

Top	X	Y	R (m)
K1	631451,868	4573425,566	0
K2	631460,837	4573443,325	50
K3	631455,153	4573462,391	0

B06

Top	X	Y	R (m)
K1	631485,377	4573497,499	0
K2	631449,287	4573482,070	35
K3	631436,647	4573524,475	0

B07

Top	X	Y	R (m)

K1	631627,371	4572498,432	0
K2	631659,208	4572508,487	50
K3	631684,654	4572570,415	0

B08

Top	X	Y	R (m)
K1	631962,832	4574203,928	0
K2	632007,020	4574195,688	50
K3	632046,816	4574133,729	0

B09

Top	X	Y	R (m)
K1	632027,271	4574164,160	0
K2	632018,324	4574209,858	50
K3	632027,061	4574247,315	0

As for the technical works that will need to be built, in places where the roads meet half-gravels, drains will be built so that rainwater runoff can be unobstructed. These are twenty-eight (28) culverts, the characteristics of which are shown in the table below (see plan 'Horizontal plan - O.01, O.02, O.03, O.04').

a/a	Culvert	Street	H.T.	Press	Dimensions
1	SOLL. OH.	R01	70	Tubular	Φ1000
2	SOLL. OH.	R01	640	Tubular	Φ1000
3	SOLL. OH.	R02	200	Tubular	Φ1000
4	SOLL. OH.	R02	350	Tubular	Φ1000
5	SOLL. OH.	R02	640	Tubular	Φ1000
6	SOLL. OH.	R02	930	Tubular	Φ1000
7	SOLL. OH.	R02	1160	Tubular	Φ1000
8	SOLL. OH.	R02	1460	Tubular	Φ1000
9	SOLL. OH.	R02	2340	Tubular	Φ1000
10	SOLL. OH.	R02	2960	Tubular	Φ1000
11	SOLL. OH.	R02	3160	Tubular	Φ1000
12	SOLL. OH.	R06	220	Tubular	Φ1000
13	SOLL. OH.	R06	460	Tubular	Φ1000
14	SOLL. OH.	L01	200	Tubular	Φ1000
15	SOLL. OH.	L01	660	Tubular	Φ1000
16	SOLL. OH.	L01	1140	Tubular	Φ1000

17	SOLL. OH.	L01	1480	Tubular	Φ1000
18	SOLL. OH.	L01	1650	Tubular	Φ1000
19	SOLL. OH.	L01	1980	Tubular	Φ1000
20	SOLL. OH.	L01	2320	Tubular	Φ1000
21	SOLL. OH.	L01	2860	Tubular	Φ1000
22	SOLL. OH.	L01	3000	Tubular	Φ1000
23	SOLL. OH.	L02	320	Tubular	Φ1000
24	SOLL. OH.	L02	580	Tubular	Φ1000
25	SOLL. OH.	L02	860	Tubular	Φ1000
26	SOLL. OH.	L03	197	Tubular	Φ1000
27	SOLL. OH.	L03	287	Tubular	Φ1000
28	SOLL. OH.	L03	480	Tubular	Φ1000

The locations of the roads and culverts are shown on the "Grading" plans O.01, O.02, O.03, O.04, attached as an appendix to this study.

6.2.3.3 Description of the connection of the polygon of the installation of the Gensets with the external road network

The connection of the polygon with the external road network is made using the existing rural and forestry network.

The existing rural-forestry network is fully utilised and the required new widenings are small in length and are mainly carried out to create suitable turning and turning curves for vehicles.

The existing rural-forestry network is connected to the provincial road network. The connection point is in the western part of the settlement of Drimi.

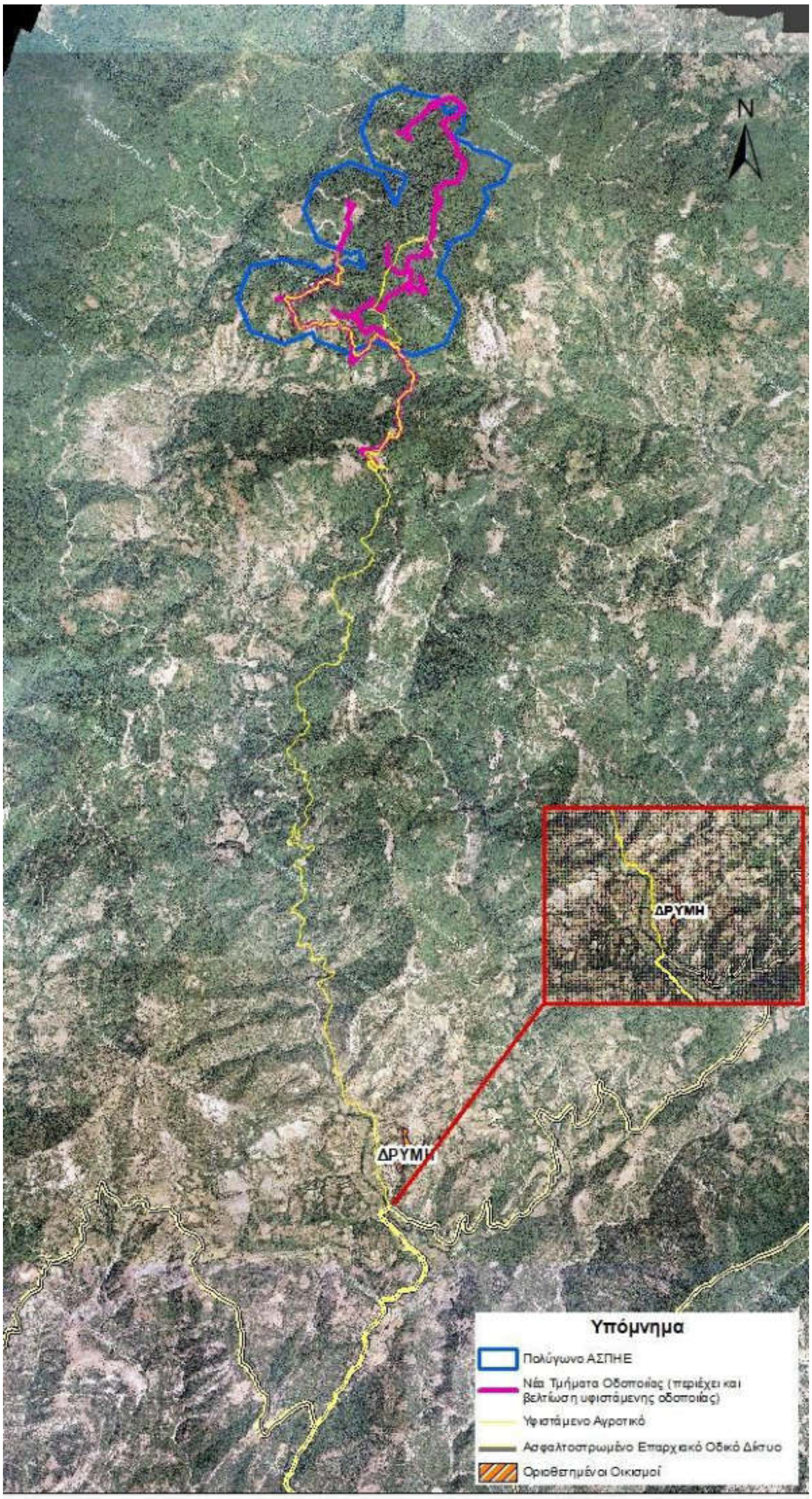


Figure 6.2- 4: Access road network to the ESDP under study

6.2.3.4 Configuration of the installation site of the A/Gs

The space required for the installation of the A/C is divided into two categories.

- Permanent occupation .

This is the area required for the foundation of the A/C plus a free safety lane around the foundation, the installation area of the assembly crane, which must remain free after the crane has been removed for future repairs or maintenance, and the area occupied by the access road.

- Temporary occupation.

  These are the spaces required for the temporary storage of the A/C components i.e. the blades, pylon sections, etc.

The exact determination of the dimensions of the spaces is not possible at this stage of the design, because it depends to a large extent on the method of transport and assembly of the A/C components. It may be possible to transfer certain elements (e.g. the pylon sections) in sections and assemble them, followed by the transfer of the blades, which will be placed in the space occupied by the pylon elements. However, it may be possible to transport and deposit the whole of the elements, followed by assembly.

In general, however, the required spaces for the specific A/Cs are as follows.

- Foundation. The space occupied by the foundation and the safety walkway around it is a square with a side of approximately 25.0 m.
- Assembly crane area with increased strength flooring. It depends on the type of crane , but a typical dimension is a square with a side of 20,0 m.
- Place of deposition of the pillar elements. It is a function of the number of parts into which the pylon is divided. A rectangle of dimensions 30x35 m. in most of the cases covers the deposition needs.
- Space for depositing the wings. Calculated rectangle of dimensions 85x15 m.
- Free lane for crane assembly. Usually parallel to the access road, it is an obstacle-free area 10 m wide and more than 150 m long.
- Access road zone. In this case, existing forest roads are used to the maximum extent possible for access to the A/C, as well as new road markings.

The square footage for these A/Cs is therefore taken as the sum of the individual areas, i.e. approximately 4-5 acres (except for A/C 8 which is estimated at approximately 3.3 acres, as shown in Table 6.3-1.

6.3 TOTAL ESTIMATE OF THE SURFACE AREA OCCUPIED BY THE PROJECT

The project under study is developed within a polygon licensed by RAE. For ease of description and understanding of the occupation of the project below, we define it as:

Access zone: this is the zone that defines the area where surface clearing of vegetation for the opening of access roads will take place and includes the area of trenches/fills.

A/C installation squares: they have a certain area for each A/C according to the guidelines of the construction company and the local soil morphology, where surface cleaning is carried out for the erection of the wind turbines. The area of the plazas for the specific A/Cs is estimated at approximately 4-5 acres per A/C, except for A/C 8 which is estimated at approximately 3.3 acres.

Area of intervention: The area of intervention is the sum of the access area and the A/C installation areas and is calculated in the following table.

The area of occupation of the A/C squares is shown in the table below:

Table 6.3- 1: Square occupation area

a/a	A/C	Total Occupied Area
		m2
1	A/C 01	4.913,78
2	A/C 02	5.288,11
3	A/C 03	4.354,47
4	A/C 04	4.373,09
5	A/C 05	4.609,81
6	A/C 06	4.991,82
7	A/C 07	4.847,01
8	A/C 08	3.334,24
9	A/C 09	5.041,59
10	A/C 10	4.207,36
11	A/C 11	4.334,60
	Groups	**50.295,88**

The area occupied by the streets is shown in the table below:

Table 6.3- 2: Area of road occupation

a/a	Street	Total Occupied Area	Surface of existing local road Network	New Occupation Surface
		m2	m2	m2
1	L01	35.355,65	22.313,58	13.042,07
2	L02	15.708,74	4.993,82	10.714,92
3	L03	6.470,87	0,00	6.470,87
4	L04	1.149,27	369,00	780,27
5	R01	7.530,49	128,46	7.402,03
6	R02	33.285,78	49,32	33.236,46
7	R03	703,87	0,00	703,87
8	R04	1.525,53	0,00	1.525,53
9	R05	2.562,49	0,00	2.562,49
10	R06	4.506,08	23,60	4.482,48
11	R07	1.318,89	0,00	1.318,89
12	R08	787,00	0,00	787,00
13	B01	758,37	0,00	758,37
14	B02	733,20	0,00	733,20
15	B03	785,26	0,00	785,26
16	B05	309,00	0,00	309,00
17	B06	963,24	0,00	963,24
18	B07	931,07	0,00	931,07
19	B08	1.905,63	0,00	1.905,63
20	B09	973,30	0,00	973,30
	Groups	**118.263,73**	**27.877,78**	**90.385,95**

Therefore, the total area occupied by the project (including the existing roads) is 50.295,88+118.263,73=168.559,61 m2 , while the area occupied by the new surfaces of the project as a whole (without the existing roads with their cross-section) is 50.295,88+90.385,95=140**.682 m^2 .**

The following table presents the total occupied area of the project under study, as obtained from detailed area measurement for both the wind turbines and the access road works. The next table shows the encroachment of the projects on forested land for which encroachment approval is required. The areas belong to the AD and DA codes, while no intervention is identified on areas with a DA code.

For the accompanying medium-voltage interconnection projects within forested areas, if they run underground and along existing roads, no intervention approval is required, but only notification of the relevant forestry authority, in accordance with Article 4, paragraph 6 of Law 4951/2022.

Table 6.3- 3: Intervention on land subject to forestry legislation (for AD and DA codes)

Project Department		Surface Intervention (m²)
Roads	**Length (m)**	
Improvement	3.664	18.320
New opening	7.033,63	35.168,15
Construction squares		50.295,88
Total	**10.967,63**	**103.784,03**

All the works are reflected in the draft General Project Schedule - T01 which is attached to the annex of this study.

6.4 CONSTRUCTION PHASE

6.4.1 Work schedule

According to the project design at this stage, the construction of the project will have a total duration of 16 months. The construction phase of the project includes the following stages:

- Opening of new roads and improvement of existing access roads
- Installation of A/C (landscaping, foundation, erection)
- Test period of operation

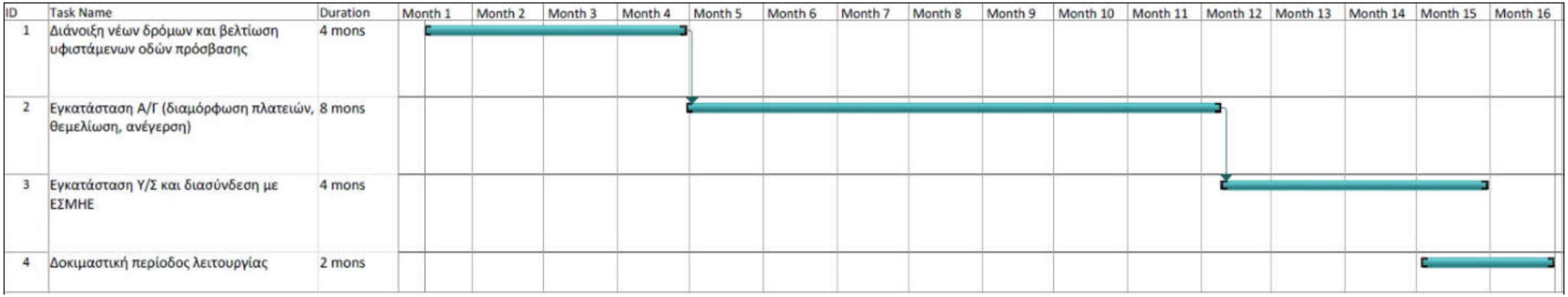


Figure 6.4- 1: Estimated duration of project construction

6.4.2 Construction works

6.4.2.1 Opening of access roads and access roads - External and internal road construction of installation sites

The road works concern access to the wind farm site and, in particular, access to each of the wind turbine sites, in order to provide safe access for trucks, cars, cranes and motorized equipment required during transport, erection of the equipment during the construction phase and during the maintenance of the wind farm during the operation phase.

As mentioned in the previous paragraph, due to the fact that the area where the A/Cs are located is predominantly forested land with existing forest roads, except for some road sections on private land, the road works required are small in scale. The works that will be required can be summarised as follows:

- Cleaning of the surface soil layer to a thickness of 15-20cm.
- Laying of paving materials in a thickness of 10 to 30 cm.
- Agglomeration of paving materials

6.4.2.2 Wind Turbine Installation

The following sub-projects are required for the installation of the A/Cs:

- Landscaping of squares A/G
- Foundation
- Transportation and erection

6.4.2.2.1 Landscaping of A/C squares

The installation square, with an average area of 4,572 sq.m., will be formed at the location of each A/C.The square will be used both for the temporary deposition of the individual parts of the A/C (pillars, fuselage, fins) and as a place for the assembly and support of the crane with which the A/C will be erected.

Any irregularities in the ground will be remedied by backfilling and appropriate compaction to achieve a relatively flat surface.

In the study of the A/C squares it was considered that:

- ✓ The part of the street in front of the square will also be used during the construction
- ✓ The heavy and small volume parts of the A/C (Nacelle, Hub) will be stored in the square

- ✓ Clearing of surface vegetation to a thickness of 20cm will be required
- ✓ There will be synchronisation during erection between erectors and conveyors.
- ✓ Due to the large construction loads, the use of a large crane (500 t) is required, which requires a specially designed assembly - disassembly lane, which has been provided in each square.
- ✓ It is envisaged that transport vehicles will have the ability to stop or return within the plaza area, where appropriate.
- ✓ The locations of the squares are almost flat so no significant earthworks will be required

6.4.2.2.2 Foundation of A/C

The base - foundation of the wind turbine pylon is of circular plan in the shape of a flattened cone... Then a suitable system of anchor bolts and iron reinforcement will be installed. The excavation products will be used after concreting for backfilling the foundations. The concrete will be of high quality, type C25/30.

The products of the excavation will remain a short distance from the foundation and will be used after the excavation of the foundation for backfilling.

6.4.2.2.3 Transport and erection of equipment

The main parts of a wind turbine to be built are:

- Pillar, conical
- Fuselage, in which all the mechanisms of electricity generation are contained
- an impeller, consisting of the hub to which the three blades are attached

All the necessary preparations (site layout, foundation construction), as well as the necessary preparation of the auxiliary material will have already been made at the installation site, so that the construction can start immediately and during the arrival of the equipment by road at the installation site.

The erection process consists of the following stages:

- Assembly of the blades on the hub
- Deposition of the shell near the foundation area
- Erection of the first section (base) of the pylon
- Preparation of the second piece of each pillar and its erection
- Erection-connection of the fuselage
- Assembling the impeller to the ground
- Erection-attachment of the impeller

For the correct and safe execution of the construction works, a crane of appropriate lifting capacity (up to 500 tons) and a smaller crane of up to 80 tons for secondary works will be used. The crane can successfully lift all the main parts of the wind turbine, which will be transported to the erection sites by road. The erection crew will consist of three (3) experienced technicians and two (2) support staff.

6.4.2.3 Interconnection with the Electric Power Transmission System

For the electrical interconnection of the wind turbine, an underground network will be constructed from which the Medium Voltage (MV) cables, the low voltage cables and the grounding network will be routed. From the gensets the underground cable will leave and connect to the MT panels.

The cable channel will be parallel to the internal roads of the wind farm and approximately 1-2 meters away from them where possible, thus avoiding additional change of the ground surface. The width of the channel will be approximately 0.8 metres, while the depth of the excavation will be approximately 1 metre, as required by the electrical regulations for Medium Voltage cabling.

The construction work of the wiring channels includes the backfilling of the channels with two layers of 20 cm of suitable sand or suitable fine-grained soil with good conductivity for the protection of the wiring and the improvement of the grounding.

After the completion of the cable laying works, the channels will be backfilled and compacted with excavation products cleaned of stones up to the level of the natural ground. Part of the excavated material will be deposited on one side of the channel and close to it for easy reuse for backfilling in the next stage, i.e. after the laying of the cables

6.4.2.4 Voltage boosting S/S

The design and development of the considered UPS, does not foresee the construction of a new voltage boosting substation. The ASPHE will be connected to the existing substation 'Flamburo' at 20/150 KV in the location 'Flamburo', in the Municipality of Arrianon, P.E. Rodopi.

6.4.3 Supporting facilities (borrowing rooms - storage rooms - construction sites)

Construction sites will be established at each A/C site that is constructed. The construction sites will be temporary and within the A/C installation areas, where the machinery and the necessary personnel will be located.

A construction crew will be present during the shaping of each platform, as well as during the assembly and erection of each A/C, as required by law and the manufacturer. The main operations envisaged include cleaning of the intervention surface, earthworks for the foundation of the A/C. The earthworks will be carried out in such a way as to achieve immediate reuse of the excavated material in the configuration areas.

Within the installation squares and the polygon of the PS, there will be temporary storage bins for the management of the sedimentation. As regards road paving, it is planned to use the materials produced by the excavation work, provided that they are deemed suitable for the needs of the project and after the removal of unsuitable products from the excavation mix.

A mobile crusher will be used to reuse a quantity of excavated material to create aggregate for road paving.

6.4.4 Necessary construction materials

For the construction of the A/C under study and the accompanying works, the main materials to be used are presented in the following paragraphs. The materials listed above will be procured commercially and transported on site to the project.

6.4.4.1 Quantities of concrete

Concrete for the foundations of the A/C will be sourced from licensed concrete manufacturing plants. For the foundations of the wind turbines, reinforced concrete is required to anchor the pylons, with a total volume of approximately 66,000 m^3 .

6.4.4.2 Quantities of aggregates (road paving and cable duct)

In the new road openings, with a total length of 11,182 m, a 0.10 m thick sub-base layer and a 0.10 m thick base layer are constructed.The total volume of the crushed material is:

(5,40*0,10+5,0*0,10)*11.182,63 =11 .630,0 k.m.

We estimate that along 50 % of the existing rural-forest roads in use, which have a total length of 3,690 m, the construction of another 0.10 m thick pavement layer will be required:

50%*3.960*3.960*5,0*0,10 =990 ,0 k.m.

The total volume of broken paving material is therefore in the order of 12.620 m^3.

Furthermore, the trench where the cables for the interconnection of the ASPEO with the Voltage Raising Substation will be partially filled with quarry sand. The quantity of sand is estimated at 4.024 m^3 (trench width: 25.150 m x trench width: 0.40cm or 0.70cm as appropriate x sand layer thickness: 40cm).

6.4.4.3 Water needs

Living arrangements for workers. The water requirements for the living quarters of workers on the construction sites during the construction phases of the project are estimated at 15 persons x 20 Lt/worker/day = 0.3m^3 /day for the peak day. This quantity will be met with quota quality water from licensed water carriers and bottled water suppliers.

Material leakage. During the construction phases, quantities of water will be required for the wetting of materials at the construction sites and in the occupation zones of the works in order to control the release of dust from earthen surfaces and materials. Considering the humid climate in the project area and the small size of the earthworks, these quantities are estimated to be very small and will certainly not result in significant impacts to the water resources of the area and will be covered by licensed water carriers.

6.4.5 Energy needs

Electricity requirements during construction will be met by either site power or a generator.

6.4.6 Waste water discharges

Urban wastewater. During the construction phase of the project, urban wastewater is expected to be generated from the living quarters of workers at the construction sites. It is estimated that the maximum urban wastewater generation will be equal to the drinking water consumption of the workers as calculated earlier i.e. 0.3 m^3 /day peak. For the convenience of the staff, it is proposed to install chemical latrines within the construction sites which will be regularly transported and evacuated to the nearest Wastewater Treatment Plant under the responsibility of the project proponent.

Waste from the maintenance of machinery, vehicles and E/M equipment: Although the maintenance of machinery will be carried out off-site in licensed workshops, however, during the construction phase of the works, waste may be generated from site machinery and vehicles, mainly from any leaks from them and from the site's electrical/electronic equipment (transformers, converters, capacitors, filters, etc.). This waste mainly concerns hazardous waste oils and liquid fuels, which are classified under the codes ECW (Error! Reference source not found.).

Waste will be collected in special watertight containers that will be stored in a rain-protected area with a watertight floor within the site and then collected by licensed collectors-transporters, who will ultimately dispose of it through approved alternative management systems at appropriate facilities for further management. To deal with accidental pollution or spills, the site will be equipped with appropriate cleanup-absorbent materials, which will be readily available in the event a spill is identified as discussed in Chapter 10 herein.

Table 6.4- 1: ECW codes for waste that may be generated by the maintenance of construction machinery and E/M equipment during the construction phase of the project.

ECA code	Category of waste
13 02	**Waste gearbox and lubrication engine oils**
13 02 05*	non-chlorinated engine, gearbox and mineral-based lubricating oils
13 02 06*	synthetic engine, gearbox and lubricating oils; and
13 02 08*	Other engine, gearbox and lubricating oils
13 03	**Waste insulation and heat transfer oils**
13 03 06*	Chlorinated mineral-based insulating or heat transmission oils
13 03 07*	non-chlorinated mineral-based insulating and heat transmission oils
13 03 08*	synthetic insulating and heat transmission oils
13 03 09*	directly biodegradable insulation and heat transfer oils
13 03 10*	Other insulating and heat transmission oils
13 07	**Liquid fuel waste**
13 07 01*	diesel fuel and diesel fuel
13 07 02*	petrol
13 07 03*	other fuels (including blends)
16 01	**Waste from vehicle maintenance**
16 01 13*	brake fluids

Source: European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Commission Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC.

6.4.7 Surplus or waste materials or solid waste

6.4.7.1 Municipal Solid Waste (MSW)

During the construction phase of the projects, municipal solid waste (MSW) is expected to be generated from workers living on the construction sites. This waste is classified under the ESW codes of Error! Reference source not found... The maximum daily MSW generation during project construction (100% site occupancy) is estimated at a maximum of 15 persons x 0.4 kg / person / day = 6 kg/day peak. This quantity will be collected in bins to be placed within the site. From these bins they will be collected under the responsibility of the project operator and disposed of in the nearest municipal bins or recycling bins to the project, from where they will be collected by the collection network of the Municipality or the collection bodies of the recyclable materials.

Table 6.4- 2: HCV codes of the MSW expected to be generated during the construction phase of the project

ECA code	Category of waste
20 01	**Separately collected parts of household waste**
20 01 01	papers and cardboard
20 01 02	glasses
20 01 08	biodegradable kitchen and leisure waste
20 01 38	wood
20 01 39	plastics
20 01 40	metals
15 01	**Waste from packaging**
15 01 01	Paper and paperboard packaging
15 01 02	Plastic packaging
15 01 06	Mixed packing
15 01 07	Glass packaging

Source: Annex I of the HAC 36259/1757/E103/2010 & European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC of the Committee of the C.C.

6.4.7.2 Excavation, construction and demolition waste (AECW)

During the construction of a project, waste may be generated from all types of earthworks and relates to the excess of excavated material after some of it has been reused for the needs of the project. The CSR codes of the MSW that can be generated are presented in Table 6.4.4. This waste is managed in appropriate MSW facilities, following a contract between the project promoter and a MSW PPA.

From all the works of drilling of the project road and the underground cable trench, as well as the foundations of the A/C of the A/P, the result is the earthworks, as shown in Error! Reference source not found..

Table 6.4- 3: Aggregated table of landfills

a/a	Street	Length (m)	Trench (m)^3	Backfill (m)^3	Vegetable Lands (m)^3	Paving (m)^3
1	L01	3+211,48	26815	25475	10955	3473
2	L02	1+408,34	18553	11217	4948	1523
3	L03	0+577,96	9822	9587	2245	626
4	L04	0+133,47	401	1739	463	143
5	R01	0+717,29	14999	1573	2332	782
6	R02	3+330,29	29943	19886	10462	3681
7	R03	0+058,22	444	856	235	63
8	R04	0+109,24	281	3124	510	154
9	R05	0+244,80	3530	2667	856	265
10	R06	0+478,55	7651	3484	1487	520

11	R07	0+117,00	3425	928	415	127
12	R08	0+098,36	110	636	307	132
13	B01	0+135,99	28	1286	391	145
14	B02	0+081,59	215	461	213	87
15	B03	0+080,00	1212	337	256	103
16	B05	0+037,87	1826	0	122	42
17	B06	0+063,98	0	2192	303	68
18	B07	0+097,32	0	3434	414	103
19	B08	0+116,17	229	6721	705	124
20	B09	0+084,71	125	1391	337	91
21	WT01		9297	5736	1428	781
22	WT02		4250	4107	1566	781
23	WT03		2939	8164	1557	781
24	WT04		16561	264	1302	717
25	WT05		7242	3812	1519	781
26	WT06		4637	4023	1474	745
27	WT07		4760	4162	1430	756
28	WT08		4091	876	992	587
29	WT09		6138	2033	1439	781
30	WT10		3171	2679	1206	679
31	WT11		4313	1484	1180	686
Sum		**11182,63**	**187008**	**134334**	**53049**	**20327**
Proximity			**42**	**16**	**1**	**23**
Total			**187050**	**134350**	**53050**	**20350**
Balance			**32350**			

Based on the above table, from the total of the project's road opening works and the landscaping of the A/C squares, **187,050 m³** of excavated earth and semi-buried material products are obtained, of which **154,700 m³** will be used as backfill materials. The remaining quantity amounts to **32,350 m³** and will be managed as MSW by a lender if not reused in the project.

It is noted that the plant land will be reused in the project for planting needs and slope lining.

The road paving will require 20,350 m3 of crushed material, which will be taken from the excess of the excavations after using the mobile crusher.

Table 6.4- 4: ESU codes of excavation waste that can be generated during the construction phase of a project such as the one under study

ECA code	Category of waste
17 05	**Dirt, stones and rubble from excavations**
17 05 04	soils and stones
17 05 06	excavation rubble

Source: Annex I of the HAC 36259/1757/E103/2010 & European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Commission Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC

6.4.8 Air pollutant emissions

Expected impacts to the air environment from the project during the construction phase include the following:

- Dust from the management of materials and earthworks (excavation work, loading and unloading of soil and aggregates, etc.) and the construction of new works
- Dust from vehicle traffic on unpaved roads
- Exhaust fumes from the movement of construction machinery on site
- Exhaust fumes from vehicles transporting construction materials to and from the construction site.

6.4.8.1 Dust emissions

During project construction, emissions and ultimately dust concentrations in the project area will increase due to the following activities or factors:

• Movement of vehicles. Dust release is caused by the application of mechanical force (vehicle weight) on loose soil resulting in dusting and scaling on the surface of the materials. According to the U.S. Environmental Protection Agency (USEPA), dust emissions from vehicle traffic depend on:

The average speed of vehicles The traffic

load

The average weight of vehicles

The average number of vehicle wheels The

percentage of sludge in the soil

• Wind drift of dust particles. The worst case for dust generation is the prevalence of strong winds in dry conditions. According to the USEPA, dust emissions from wind action depend primarily on the number of days when wind speed exceeds 5 m/sec and other factors, such as the number of days with precipitation (greater than 0.25 mm) during which no dust emissions are considered to be emitted.

- Earthworks, soil management. The addition of aggregates to a pile or their transport from a pile, as well as their continuous deposition, are sources of dust generation. The emissions generated in this case depend mainly on:

- The percentage of sludge in the soil
- The average wind speed
- The fall height
- The moisture content in the material

Due to the humid climate in the project area even during the summer period and the increased soil moisture, combined with the very small amount of excavation and earthworks in general, no significant dust emission is expected. In addition, the paving materials to be used are of large diameter and therefore do not favour their suspension and transport over long distances. In addition, the application of the measure of wetting at the earthworks sites during the dry season will ensure to the maximum extent possible that no appreciable quantities of dust are generated. It is also worth noting that the nearest settlement to the work sites is Sarakini, which is more than 1000m away and has an altitude difference (from the settlement to the work sites) of approximately 180m.

However, it is appropriate to calculate the expected dust emissions (PM_{10}). The worst case is the settlement mentioned above (i.e. Sarakini), which is relatively closer to the work sites than the others. Also, of the construction phases, the phase of road improvement and construction is the most unfavourable in relation to the construction of the LNG plants, as it is closer to the settlement.

The methodology used and the values of the coefficients are taken from EPA's Compilation of Air Pollutant Emission Factors (AP-42).

Work to improve or construct new roadways and plazas shall include surface soil clearing, aggregate hauling, aggregate placement and compaction. Because the terrain is mountainous with significant slopes, it is estimated that in one day (10 hours of work) a 5 m wide dirt road can be fully improved/constructed over a 100 m length in one day (10 hours of work). This implies transporting 100 m of aggregate[3] i.e. 6.5 trips or 0.75 trips per hour of a 30 tonne truck. It also requires the operation of a loader for 6 hours, an earth shaper for 5 hours and a road roller for 4 hours.

Table 6.4- 5: Table of basic machinery

Description	Number of machines	Model
Land shaper	1	CAT 12Or similar
Four-axle truck	2	MAN TGS 41.440 or similar
Loader	1	LIEBHERR 564 or similar
Road roller	1	Volvo SD115 or similar

1. For the loading and unloading of bulk materials:

$$E = \kappa \times 0{,}0016*(U/2{,}2)^{1{,}3}/(M/2)^{1{,}4}$$

Where: E = Emission factor PM10, kg/t of transported material

k = 0,35, aerodynamic diameter multiplier for PM 10 particles U = Average wind speed, m/s

M = Moisture content, (%)

2. For condensation:

$$Er = 0.75x(0.45x\ s^{1.5}/(M^{1.4}))$$

Where:

Er = PM10 emission rate, kg/hr s =

Percentage of sludge in soil

M = Moisture percentage,

3. For the road opening:

$$Er = 0.75x(0.051\ x\ s^{2}*0.282)$$

Where:

Er = PM10 emission rate, kg/km

s = average vehicle speed

4. For the movement of machinery on construction roads (earth roads):

$$E = 0.282x1.5\ (s/12)^{0.9}\ (W/3)^{0.45}$$

Where:

E = PM10 emission rate, kg/km s =

Percentage of sludge on the road

W = Average weight of heavy vehicles

Table 6.4- 6: Daily PM10 dust emissions from construction/improvement works on roads and squares

CONSTRUCTION WORKS	WORK DATA		PM10	UNIT OF MEASURE MENT	OBSERVATIONS
Loading of dumps on a truck	quantity landfill (ton) =	440	0.0812	kg	Loader operation
	k=	0.35			
	wind speed (m/s) =	5.3			
	soil moisture percentage =	10			
Pavement compaction	machinery operating hours =	5	0.0200	kg	roller operation
	percentage of sludge in soil =	2			
	soil moisture percentage =	50			
Pavement paving	total travelled length (km) =	0.2	0.1747	kg	grader function
	average speed (mi/hr) =	9			
Moving machinery on construction sites roads	average distance travelled (km) =	2	3.7189	kg	Movement of any vehicle on the construction sites roads
	percentage of sludge in soil =	20			
	Average vehicle weight (tn)	29			
TOTAL			3.99	kg	

For the conservative scenario of simultaneous operation of all machines in a day, about 4kg of dust in the form of PM10 is emitted.

Dust emissions from mobile crusher operation

Capacity calculation. The crusher will produce 20.000 m^3 . According to the schedule the crusher's operating time is 4 months or 4 x 25 = 100 days. So 20.000 m^3 /100 days = 200 m^3 /day are required.

For the production of 200 m^3 /day is required:

200 m^3 /day/1.71=116.95 m^3 /day of in situ rock.

To this quantity should be added 116.95 m^3 /day x 8.7% = 10.17 m^3 /day of in situ rock which is removed by the specifier.

Therefore for the production of 200 m^3 /day are required:

116.95 m^3 /day + 10.17 m^3 /day = 127.12 m^3 /day of in situ rock

Calculating dust emissions. Dust is generated by the operation of the crushers during the following phases:

- material falling into the feeder of the assembly
- breakage of the material
- dropping of material near the ends of the conveyor belts
- sifting mainly of fine fractions (sand)

According to literature data in a crusher, the amount of dust produced is equal to the amount of peppercorns, which is estimated to be 0.4% of the capacity of the plant.

The amount of powder produced is equal to:

$$200\ m^3/day \times 2\ tn/m^3 \times 0.4\% = 1.6\ tn/day$$

Considering that the working day is 8 hours, the dust emission is 55.56 gr/sec.

The above quantity is produced without taking into account the dust retention by the filter system that the unit is equipped with. Considering that the plant is equipped with bag filters whose efficiency is around 98%, the dust emissions amount to 1,11 gr/sec.

6.4.8.2 Exhaust gases from the manufacturing machinery

During the construction phase of the project, trucks and site machinery are expected to slightly pollute the air in the immediate project area with pollutants such as CO, NOx, SO_2 and smoke. The same construction scenario as before is considered here as the worst-case scenario.

The calculation of the pollutants emitted from the exhaust gases of the site machinery was carried out using the NONROAD_AIRPOL program in Excel spreadsheets. The methodology used by the program to estimate pollutants is based on the USEPA's NONROAD model methodology. Emission factors for pollutants (gr/kwh) were taken from the EU directive on diesel emissions from construction machinery and vehicles and, where not available, from USEPA literature. The factors correspond to Standard Stage II or III for machines in service after 2003.

EU Stage II/III Emission Standards for Nonroad Diesel Engines						
Cat.	net power	Date	CO	HC	NOx	PM
	kW		g/kWh	g/kWh	g/kWh	g/kWh
Stage II						
E	130 ≤ P ≤ 560	2002.01	3.5	1.0	6.0	0.2
F	75 ≤ P < 130	2003.01	5.0	1.0	6.0	0.3

The sulphur content of the fuel was assumed to be 0.2% by weight and the emission results are presented in the following table.

Table 6.4- 7: Air pollutant emissions during the construction/improvement phase of access roads and plazas

a/a	Machine description	Number of machines	Ageing factor	Partial operation coefficient	Operating time machine (h)	Maximum Daily Emission (kg)					
						HC	CO	NOx	PM10	CO2	SO2
1	Grader (14t)	1	0.30	0.60	5.0	**1.65**	**0.33**	**1.97**	**0.09**	**386.84**	**0.47**
2	Vibrating roller (9t)	1	0.25	0.68	4.0	**1.03**	**0.21**	**1.23**	**0.06**	**210.23**	**0.26**
3	Heavy truck 29 tn	2	0.35	0.39	6.0	**5.33**	**1.54**	**9.10**	**0.24**	**3287.91**	**4.03**
4	Tire loader (22t)	1	0.50	0.46	6.0	**1.80**	**0.52**	**3.07**	**0.09**	**801.46**	**0.98**
	TOTAL MAXIMUM DAILY EMISSIONS (kg/day)					**9.80**	**2.60**	**15.36**	**0.48**	**4686.44**	**5.74**

6.4.9 Noise and vibration emissions

6.4.9.1 Noise

Noise during the construction of a project comes from the operation of construction machinery. In this study, noise from construction operations is assessed according to ISO 9613-2 "Acoustics - Attenuation of Sound during Propagation Outdoors" and the assessment index will be LeqA. Due to the proximity of the settlement of Sarakini to the construction sites, a detailed noise calculation was performed at the closest residences for the worst case scenario of road construction/improvement.

For the calculation of the isothermal curves from the operation of the manufacturing machines, the software iNoise v2023 from DGMR Software was used. The software can simulate noise propagation from point, area and linear sources.

According to ISO 9613-2 the basic equation for calculating the noise level at a receiver is as follows:

$$\text{Noise Level Octave} = L_w - {}_{Ageo} - {}_{Aatm} - A_{gr} - {}_{Abar}$$

$_{LW}$ - Sound power of noise source

The noise level produced by a source is measured in dBA. The software has a large database of noise from various manufacturing machines for different functions. The noise levels in the database are derived from measurements within the European IMAGINE project.

$_{Ageo}$ - Geometric Amortization

The damping of the spherical propagation of a sound wave from a point source is proportional to the distance and is given by the equation $_{Aggeo} = 20 \times log(d) + 11$, where d is the distance from the source.

$_{Aatm}$ - Atmospheric Absorption

The propagation of sound through the atmosphere is damped by the conversion of sound energy into heat. This attenuation depends on the temperature and relative humidity of the air, and increases at higher frequencies. It is equal to the product of the distance from the source multiplied by the atmospheric absorption coefficient α (dB/m). The values of the coefficient α, as shown in the table below, correspond to an air temperature of 10 °C and a relative humidity of 70 %. These values are corrected for local climatic conditions.

Table 6.4- 8: Atmospheric damping coefficient as a function of sound frequency

	Central Frequency Octave (Hz)							
	63	125	250	500	1000	2000	4000	8000
Contributor Atmospheric Absorption (dB/m)	0.000122	0.000411	0.00104	0.00193	0.0037	0.00966	0.0328	0.117

A_{gr} - Effect of soil surface type

The effect of the type of ground surface concerns the reflection of sound waves on the ground and their contribution to the sound waves propagating directly from the source to the receiver. It depends on the height of the source and the receiver, but also on the variations in altitude between them. In this context, it is taken into account by means of the variable G, which ranges from 0 for 'hard surfaces' (such as cement, water, ice and generally non-porous surfaces) to 1 for porous surfaces (such as agricultural land).

A_{bar} - Amortization Due to Obstacles

Each obstacle between the noise source and the receiver reduces the volume of the sound depending on the relative height of each of them and the frequency of the sound. In this study, there are no obstacles between the construction sites and the receptor, such as tall buildings, forest with tall trees, etc.

More specifically, the following assumptions were made for the calculation of construction noise:

- The operating time of the site is 10 hours from 07.00-17.00
- It was considered, in the interests of safety, that the various construction operations are carried out simultaneously.
- It is assumed that in one day (10 hours of work) a 5 m wide dirt road can be fully improved/constructed over a length of 100 m. This implies transporting 100 m of aggregate[3] i.e. 6.5 trips or 0.75 trips per hour of a 30 tonne truck. It also requires the operation of a loader for 6 hours, an earth shaper for 5 hours and a road roller for 4 hours. The productive hours of operation of the machines range from 5 to 7 hours
- The simulation of the linear sources was done by discretization into individual sections of 5-15m length

The following table shows the results of noise calculations at the nearest receptors, at two different heights: 1.8m and 4m from the ground, corresponding to the ground floor and the 1º floor of a house. As can be seen, the noise level at the nearest houses in the nearest settlement (Sarakini) is less than 60 dBA even for the most conservative a scenario of simultaneous operation of several machines. 65 dBA is exceeded only at the operating positions of the machines. Noise levels are even lower in the other settlements (Drymi, Ardea, Ano Drosini)

Table 6.4- 9: Noise levels at the receptors of the Sarakini settlement during the phase construction/improvement of access roads and squares (the receiver has been placed in the house nearest to the project)

Recipient	X	Y	H m	Lp (dBA)
H1	630238.549	4571889.288	1.8	58.4
			4	58.5

6.4.9.2 Vibrations

Vibrations during the construction phase are expected mainly during the compaction phase of the pavement layers.

The threshold of vibration perception for humans is usually in the PPV (peak particle velocity) range from 0.14 mm/s to 0.3 mm/s. Vibrations above these values may cause discomfort or interfere with work activities (BS5228-2:2009).

The relationship for calculating the maximum particle velocity from roller operation and assessing vibration effects used by BS5228-2:2009+A1:2014 is:

$$v_{\mathrm{res}} = k_s \sqrt{n_d} \left[\frac{A}{x + L_d} \right]^{1.5}$$

where Vres is the particle velocity (mm/s), Ks is a coefficient, $_{nd}$ is the number of vibrating drums, Ld is the drum width, A is the height of the drum oscillation (mm) and x is the distance of the receiver from the roller.

For the specific roller to be used, A = 1.2mm Ld = 2.13 m $_{nd}$ = 1. The coefficient Ks is given by the following values:

$k_s = 75$ (50%)
$k_s = 143$ (33.3%)
$k_s = 276$ (5%)

For a probability of exceeding the estimated value of 5% (high reliability of the estimate) and assuming a distance of 60 m to a hypothetical receptor, the particle velocity v = 0.74 mm/s, while for a distance of 1,000 m it is 0.011 mm/s.

The speed at 60 m is already below the 1 mm/s limit set by BS5228-2:2009+A1:2014 and the 1.5 mm/s limit set by Eurocode 3 for a working time of 6-26 days for disturbance to humans. It is also well below the limit of 20 mm/s set by

BS5228-2 for protection of residential buildings. Obviously the speed at the nearest settlement of Saracen (greater than 1,000m distance) is negligible.

6.4.10 Electromagnetic radiation emissions

No electromagnetic radiation emissions are expected during the construction of the project, as no fixed installations or machinery that will continuously emit radiation will be used.

6.5 PHASE OF OPERATION

6.5.1 Detailed Description of the Project Operation and Management

Once all the aforementioned works have been carried out and before the final connection of the station to the network, the test period of operation of the station (1.5 - 2 months) will be preceded by a trial operation period in order to improve any failures concerning the electrical and mechanical equipment used, in order to ensure the smooth and uninterrupted operation of the station.

The wind farm will then operate as an independent power producer and will be interconnected with the National Electricity Transmission System of ADMIE.

All maintenance work on the park will be carried out in accordance with the technical manuals provided by the contractor. In addition, the availability of a complete range of spare parts has been taken into account in order to avoid any delays in the repair of breakdowns. Trained personnel will work at the AP and each year the installation will be inspected by the manufacturer's personnel to confirm that the equipment is well maintained and for technical support issues.

6.5.1.1 Main operating characteristics of wind turbines

The A/C control system takes measurements from all elements such as wind direction and speed and adjusts the operation of the A/C accordingly by adjusting the rotation speed of the rotor.

The pre-wind system of the A/C is in operation continuously. The wind indicator continuously records the wind direction at hub height. If the orientation of the fuselage (average minute value) deviates from the wind direction by more than a certain angle, the upwind motors are activated to change the orientation of the fuselage. The movement of the spindle is checked and its complete rotations are recorded in order to avoid twisting of the cables.

In case the average wind speed reaches 25m/s then the turbine will stop. The turbine will only start again if the average wind speed remains at 24m/s for a certain period of time.

6.5.1.2 Starting procedure

The wind turbine is in start-up position when:

- The main switch is on

- The control panel is open
- The start/stop switch is in the start position
- The control system does not detect an error

The wind turbine will start generating when for three consecutive minutes, the average wind speed exceeds the starting speed (3m/s). When the rotor reaches the minimum rotation speed then the wind turbine will supply power to the grid.

6.5.1.3 SCADA System and Communication Network A/P

The wind farm will install a complete Supervisory Control, Monitoring and Measurement System (SCADA - supervisory control and data acquisition), which will include a central computer, printer, modem, interface etc., peripheral units with processor (RTU) in each A/C and each meteorological mast) and the necessary specialized software for the operation of the control and measurement system.

6.5.2 Material, Energy and Water Inputs

6.5.2.1 Water needs

No water consumption activity is included during the operational phase of the project. For staff needs, the quantities required are certainly small, considering the small number of employees, and will be covered by bottled water suppliers.

6.5.2.2 Energy needs

The use of electricity is required for the starting needs of the A/C and the operation of the auxiliary equipment. The power supply for the gensets is provided by means of the fields and the M.T. cables, which in normal operation carry the energy produced.

6.5.3 Solid Waste Outflow

The only source of municipal waste generation is the facility's maintenance staff. This waste will be collected in small bins or containers at selected locations on the facility and will be transported by the developer to the nearest municipal bins, where it will be picked up by the City's waste collection vehicles. In addition, solid waste will be generated from the packaging of spare parts, which will be collected in line with staff waste and disposed of in the recycling bins of the municipality (Error! Reference source not found.). The above waste will be removed from the A/P premises at regular intervals.

Other solid waste resulting from the maintenance of electrical and mechanical equipment will be removed immediately under the responsibility of the maintenance technicians.

Table 6.5- 1: CSW codes of the MSW expected to be generated during the operational phase of the project

ECA code	Category of waste
20 01	**Separately collected parts of household waste**
20 01 01	papers and cardboard
20 01 02	glasses
20 01 08	biodegradable kitchen and leisure waste
20 01 39	plastics
20 01 40	metals
15 01	**Waste from packaging**
15 01 01	Paper and paperboard packaging
15 01 02	Plastic packaging
15 01 06	Mixed packing
15 01 07	Glass packaging

Source: European Waste List (EWC) according to the Annex to Decision 2000/532/EC, as amended by Commission Decisions 2001/118/EC, 2001/119/EC and 2001/573/EC.

For the safe management of any hazardous waste, the project operator must deliver it to a licensed collector-transporter for disposal in an appropriate facility for further treatment, recovery or disposal, or to approved alternative management systems for such waste under the conditions laid down in the relevant provisions. The delivery and legal possession of the hazardous waste shall be evidenced by the Identification Form which shall accompany the hazardous waste. Upon transfer of the identification form, the responsibility of the previous holder (of the hazardous waste) ceases and the new holder becomes responsible. The final holder (management body or alternative management system) is responsible for the various procedures for the proper management of the waste, including regeneration, re-refining, recycling, decontamination, burial, etc.

For the temporary storage of hazardous waste on the project site until collection, either UN-compliant packaging (for solid waste) or tanks enclosed by a leakage collection system (for liquid waste) should be used. The collection containers must be in an area with appropriate signage and adequate ventilation and lighting. They must also be located in such a place and in such a way that they do not interfere with other activities of the installation.

6.5.4 Liquid Waste Discharges

During the operation of the project, urban wastewater is generated by workers during maintenance, repairs and monitoring of the plant. The quantities of wastewater are very small and fully manageable with the installation of chemical toilets. Wastewater from the chemical toilets will be collected by a licensed company.

6.5.5 Emissions of Air Pollutants

The development of wind farms for electricity generation (replacing conventional power plants) is in line with the modern model of sustainable development of the power sector which requires the zeroing, where possible, of emissions of pollutants into the environment while maximising the conservation of natural energy resources. By its very nature, the project will not emit any gaseous pollutants into the atmosphere during its operation, but will instead contribute to their reduction, since the production of energy from fossil resources would be accompanied by emissions of gaseous pollutants. Based on the project design, it is expected to operate approximately 2500 hours per year at its nominal capacity. This implies an energy production of about 102 GWh per year. The operation of the proposed project would therefore avoid the release of greenhouse pollutants into the atmosphere, which annually for the same energy produced would reach the following values:

	CO2	CH4	N2O
	sound	sound	sound
Lignite	34.000	3,81	0,57
Natural gas	42.089	0,34	0,03

6.5.6 Noise and Vibration Emissions

6.5.6.1 General

The power of the emitted noise is a function of the rotational speed of the rotor and therefore the wind speed. The proposed project includes 11 wind turbines of the indicative type VESTAS V-150, with a nominal power of 4.0 MW each, and with sound power level as a function of wind speed as shown below, according to the technical specifications of the wind turbine manufacturer.

Wind speed [m/s]	3	4	5	6	7	8	9	10	11	12	Up to cut-out
AM-1	92.0	92.0	94.5	98.4	101.8	104.7	106.0	106.0	106.0	106.0	106.0

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW] (10 Hz to 10 kHz)

The methodology applied to estimate the noise levels from the operation of the studied wind turbine is based on the Danish model for calculating noise from wind turbines (Danish 2007). The model is based on the hemispherical propagation of sound over a flat reflecting surface. The model also takes atmospheric absorption into account, but does not take into account the morphology of the area. Thus the calculated noise levels refer to a flat surface at a height of 1.50 m above the reference plane. The noise level Lp at a distance R from the source, which in this case is the rotor
of the A/C is given by the relation:

$$L_p = L_W - 10\log_{10}\left(2\pi R^2\right) - \alpha R$$

where α is the attenuation factor of the sound wave due to atmospheric absorption with a value α = 0,005 dB/m when the "Danish Method" is applied to compensate for the fact that the attenuation of noise from the ground is not taken into account and Lw is the sound power level emitted by the wind turbine.

6.5.6.2 Isothermal Curves

In the context of the environmental licensing of the Wind Farm and in order to assess the potential noise impacts in the immediate area of the above Wind Farm, in order to verify whether the limits of the legislation are respected, the isothermal curves from the operation of the project were calculated. The calculation is based on the methodology based on the wind turbine noise calculation model "Description of noise Propagation Model specified by Danish Statury order on noise from windmills (Nr 304, dated 14 May 1991)", using the WIND FARM RELEASE model. The result of the calculations is the generation and visualization of the isothermal curves, as well as the calculation of the noise level specifically for the nearest house to the project.

The isothermal curves with a 2.5 dB(A) equidistance are presented in Error! Reference source not found... As the simulation results show, the value of the LP index at the nearest house to the project under permit is in the range of 42 dBA, i.e. below the 45 dBA limit. In addition, the noise levels in the surrounding settlements are also very low. No settlements are identified within the 45 dBA limit. This noise level is the maximum noise level, as it relates to wind speeds at rotor height greater than 9 m/s. These speeds are expected to occur less than 19% of the year based on the wind design data for the project.

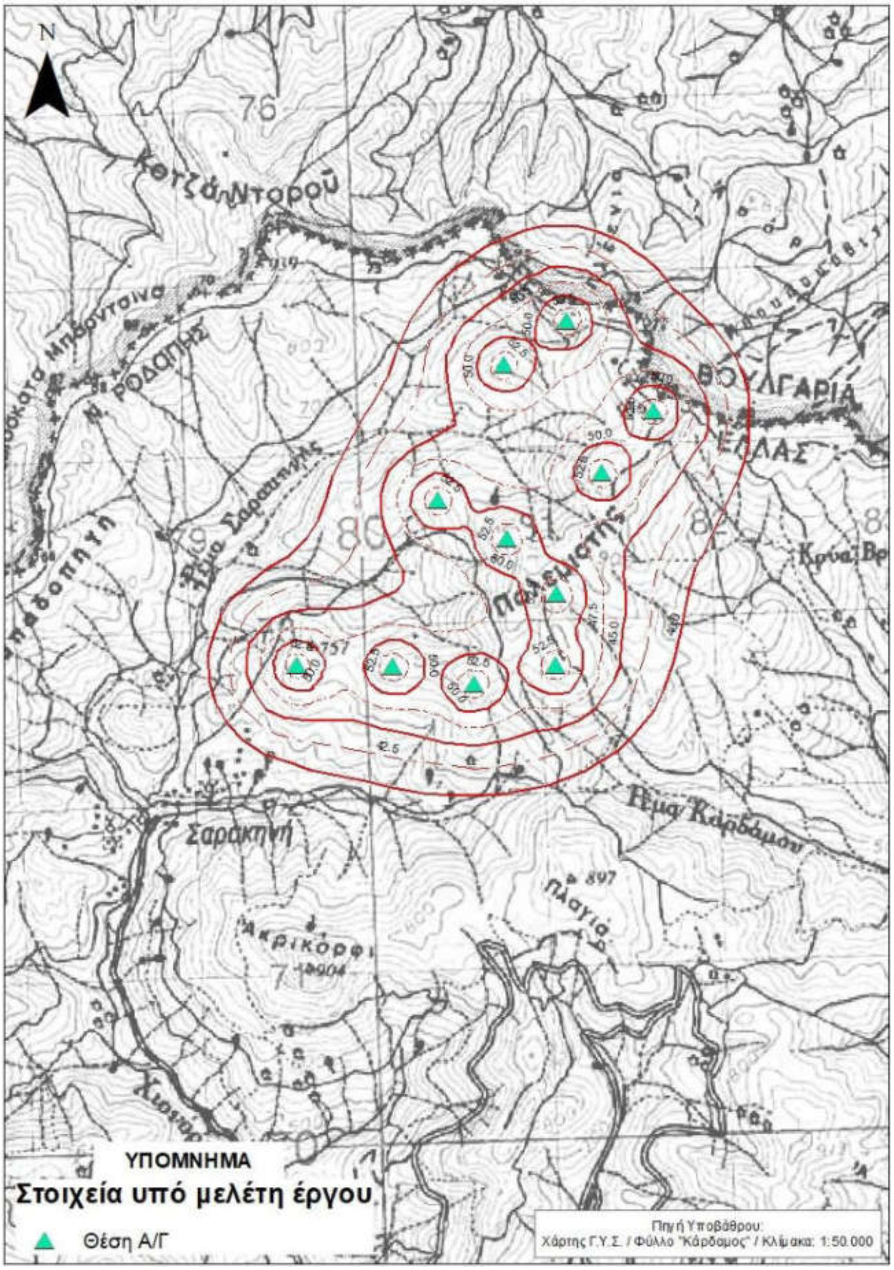


Figure 6.5- 1: Equilibrium curves from the operation of the project (u=9m/s).

6.5.7 Electromagnetic radiation emissions

The generation and transmission of electricity in the form of alternating current involves the creation of electromagnetic fields. The intensity of the magnetic field is proportional to the intensity of the current, while that of the electric field is proportional to the voltage of the current, respectively, and the intensity of both decreases rapidly as the distance from the source increases.

Based on international experience, the following equipment components are considered as potential sources of electromagnetic fields of a wind farm:

- Generators of wind turbines
- Generator transformers
- High-voltage underground conductors
- Voltage boosting substation

The only subsystems of the wind turbine that could potentially emit low-level electromagnetic radiation are the generator and the medium-voltage transformer.

The electromagnetic field of the generator is extremely weak and limited to a very small distance around its shell, which is placed at least 100 metres above the ground. For this reason, there is no real issue of exposure to electromagnetic radiation even at the base of the turbine.

The medium voltage transformers are located within the fuselage at the top of the A/V support pillar and their field will be significantly limited due to the conductive material of the pillar and the installation height. Also, the fact that the generator windings are installed in a confined space (short distance between them) and surrounded by a shell made of conductive metallic material implies that the electric field formed has zero intensity.

The generated electricity will be transmitted through an underground network of pipelines to the Voltage Booster Station 'Flamburo' also through an underground transmission line. The fields generated by the conductors are mainly magnetic as the electric fields cancel each other out due to the fact that the phase conductors are adjacent to the underground facility, unlike the overhead facility. The field strength at the surface depends on the depth at which the conductors are installed. As the depth increases, the weaker the magnetic field generated at the surface becomes. Moreover, this is a medium voltage line, so the current intensity is lower than that of HV transmission lines, for which again the magnetic field intensity is much lower than the safety limits of the legislation, based on measurements by ADMIE and the Greek Atomic Energy Commission.

In conclusion, it is estimated that the strength of the electromagnetic fields at the site from the operation of the project will not exceed that found in a typical domestic environment and therefore the effects on workers and the surrounding population are expected to be minimal, and much lower than the reference levels (maximum permissible exposure limits) set out in No. 3060/(ΦΟΡ)/238/2002 (Government Gazette 512/B/25-04-2002) K.Y.A. "Measures to protect the public from the operation of low frequency electromagnetic field emission devices" as supplemented-corrected by Government Gazette 759/B/19-06-2002.

6.6 SUSPENSION OF OPERATION - RESTORATION

Estimation of shutdown time or conditions

The production of wind energy is subject to all the provisions of the legislation in force concerning the obligations of undertakings concerning the restoration of the site where they are installed and the management of the materials remaining after their closure. In addition, the specific energy legislation and the spatial planning framework for RES contain additional provisions to ensure these obligations. The substance of these provisions is also incorporated in the decisions approving environmental conditions for wind farms.

The imposition of such conditions is provided for in Article 26 of the Special Spatial Framework for RES (KYA 49828/2008) which stipulates that: "*The holders of permits for the operation of electricity generation installations from RES are obliged, before the installation ceases to operate in any way, to restore, at their own expense and in accordance with the approved environmental conditions, the relevant sites, ensuring in particular the dismantling and safe removal of the installations, the restoration of native vegetation and the general restoration of the site to its previous state, provided that this is technically feasible*".

Similarly, in the Law on SIAs (Article 8, para. 7 of Law 3468/2006, as amended by Article 3(2) of Law 3851/2010): '*After the end of the operation of a RES or CHP plant, the operator of the plant is obliged to dismantle the above-ground equipment and to restore, as far as possible, the interventions in accordance with the conditions laid down in the N.P.O. decision.* ......"."

According to the legislation in force, the wind farm operating licence is issued for a period of 25 years and can be renewed for an equal period of time. It should be noted that before the operating licence is granted, a temporary connection of the park for trial operation is required, upon application to the competent operator. Once a 15-day uninterrupted operation has been achieved, the manager issues a certificate of successful completion of the tests (Ministerial Decree 13310/2007, Government Gazette 1153/B/2007, Article 14). The producer then proceeds to obtain the operating licence from the authority that issued the project's installation licence. Therefore, the estimated decommissioning time of the project is not expected to be less than 20 years from the date of obtaining the operating permit.

The definitive cessation of a RES-EHP can be caused either by the expiry and non-renewal of the production licence or by the need to upgrade the generating units. After the definitive cessation of operation of the project under study, the electromechanical equipment will be removed and the site will be returned to its original condition as far as possible.

Usually, new, more modern and more productive wind turbines are installed in the same area, so that the production of clean energy can continue using the existing infrastructure (e.g. grid).

Removal of permanent structures, removal of equipment and materials and ways to dispose of them.

After the cessation of the operation of the project under study, all measures must be taken to ensure the safe dismantling of the main and individual items of equipment (generators, electrical and electromechanical equipment such as voltage inverters, transformers, power electronics, cables, etc.), as well as the final dismantling of the medium-voltage interconnection network. The above decommissioning works shall be managed in accordance with the legal regulations in force at the time of the dismantling of the installations. The dismantling of the gensets will be carried out in a similar way to their erection, i.e. by partial dismantling using a crane.

Figure 6.6- 1: Dismantling of a G/G pillar (PPC renewable project)

The materials of the old wind turbines will be recycled or managed by specialised companies accredited for this purpose in accordance with current legislation.

Figure 6.6- 2: Transport of dismantled parts of electrical/electronic equipment (PPC renewable project)

Figure 6.6- 3: Restoration of the A/G square (PPC renewable project)

Figure 6.6- 4: Restoration of the A/G square and return to agricultural use (PPC renewable project)

Management of wind turbines after shutdown

In principle, A/Cs now have an economic lifetime of 25 years, while there are A/Cs that reach 30 years of operation after a 20-year audit. There are already G/Gs in Evia and Thrace which continue to operate efficiently after having completed 20 years of operation.

A wind turbine consists of the foundation, the pylon, the generator and the blades. At the end of its life cycle, the wind turbine is dismantled and its individual materials are managed. The recycling rate of a wind turbine is already significant and is constantly increasing, as it is the subject of extensive research by manufacturers and other stakeholders.

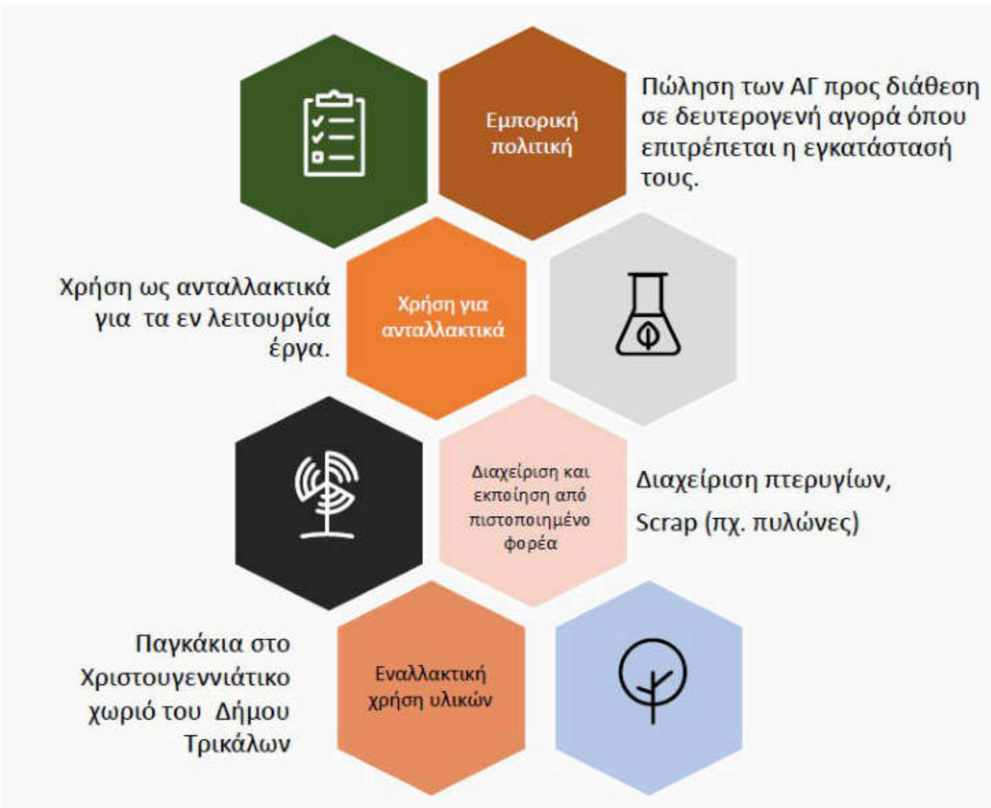


Figure 6.6- 5: Options for the management of dismantled A/R materials (PPC Renewables, 2022)

6.7 EXCEPTIONAL CIRCUMSTANCES AND RISKS TO THE ENVIRONMENT

The project under study, due to its nature, is not associated with a major environmental accident with irreversible, long-term and widespread negative impacts on the natural and man-made environment, society and health. The nature of the project, its design and construction method make it robust and minimally accident-prone. However, like all construction projects and power generation facilities, it carries the risk of accidents that may result in impacts on the environment.

Potential accidents can be categorised according to their cause into three categories: human error, material failure and natural causes. They can also be categorized according to the operation phase of the project into four groups: transportation phase, installation phase, maintenance phase and operation phase (Asian S., et al. 2017). According to the analysis of accidents from the work of Asian S., et al. 2017, the following conclusions can be drawn:

- Accidents during the transport phase mainly result from human error.
- Accidents during the operation phase are mainly due to natural causes, mainly strong winds and lightning.
- The majority of accidents occur during the operational phase.
- Accidents that occur in wind farms mainly affect the farm itself and the energy transmission system, rather than the environment and people.
- Accidents during construction are mainly due to equipment and human error.
- Accidents during the maintenance phase are mainly due to human error.
- More deaths/injuries occur from accidents during construction and maintenance and mainly affect workers.

As can be seen from the above, accidents during the transportation, installation and maintenance of A/C are mainly due to human factors and can therefore be prevented by applying stricter work protocols and safety measures. Also in these phases, the effects of accidents concern the equipment and the workforce itself, with no significant impact on the wider environment.

Accidents during the operation phase are mainly caused by fire and collapse of the A/Cs. The main causes are strong winds and lightning. Nowadays, the lightning protection systems of Gensets have evolved considerably, resulting in less vulnerability to lightning. Apart from this, however, a fire in a GVW is contained and limited to the GVW fuselage, with very little risk of spreading to neighbouring land. Furthermore, due to the limited fuel and height from the ground, it can extinguish itself in a few hours and the dispersion of smoke has little chance of affecting neighbouring settlements.

Accidents caused by strong winds only occur if the rotor braking system fails for some reason. Every glider is equipped with a braking system of the rotor in case of strong winds. Under normal conditions this system detects wind speeds above 25 m/s and intervenes to brake the rotation of the rotor. In the event of a failure of this system, the rotor rotates at very high speed, causing the rotor to oscillate and subsequently breaking off part of the blades or even the pylon.

The collapse of an A/C from such a cause has a low probability of occurrence, and even if it does occur, the impact on the environment is localised. Moreover, the impact is limited to property damage rather than loss of life, as in gale-force wind conditions people and animals are in sheltered areas and not in the outdoor environment.

6.8 VERIFICATION OF THE NEED FOR STREAM DELIMITATION

According to Annex II "Basic specifications for Environmental Impact Assessments (EIA) of projects and activities of Category A" of Law 4014/2011, the contents of section 6.8, among other things, state that "*In the case of a project or activity whose construction affects the bed (narrow or wide) of a watercourse, a proposal for the delimitation of the watercourse based on the information in the delimitation file is provided, while in the case that the project/activity includes the settlement of a section, it is described in this chapter. Excludes projects that cross the watercourse.*

Due to the mountainous terrain, there are some natural water runoff formations (i.e. half-gaps) in the area of the project site.

The project under consideration is a project which is excluded from the proposal for delimitation and settlement because the works planned to be carried out (road works and not the locations of the AGs) cross the half-openings in the area.

According to the Road Study (attached in the Annex), there are no major projects but only some culverts. Specifically, twenty-eight (28) culverts are to be constructed, tubular with a dimension of F1000 each.

CHAPTER 7: ALTERNATIVE SOLUTIONS

Contents of the Chapter

Images from

7 ALTERNATIVE SOLUTIONS

7.1 SUSTAINABLE ALTERNATIVE SOLUTIONS

7.1.1 General

This section presents the viable alternatives considered for the project. These alternatives are A1, A2 and A3, as well as the no-action alternative A0 which involves not implementing the proposed project.

The alternatives considered vary in terms of location, size and design and the technology used.

Subsequently, the next section evaluates the alternatives considered and justifies the final selected alternative based on its impacts on the natural and man-made environment.

The alternatives, which are analysed below, include: the zero solution (A0), the A1 solution, which concerns the location of the project in another area (i.e. it differs in terms of the location of the project), the A2 solution, which concerns the installation of RES of the same capacity as the installation of a photovoltaic power plant (i.e. it differs in terms of the technology applied), as well as the A3 solution, which constitutes the proposed solution.

7.1.2 Zero Solution A0

In the case of the zero option, the non-implementation of the proposed projects is considered.

The 'no action' option, i.e. no project implementation, implies that the study area remains undisturbed. Although in principle it would appear that there would be no impact on the natural and man-made environment with the zero option, there would in fact be negative impacts, as discussed below in section 7.2.1 of this chapter.

7.1.3 Alternative A1

During the design phase of the project, other locations in addition to the proposed site were considered. The locations had to be compatible for the siting of wind farms, i.e. to respect the distances from settlements and archaeological sites, roads, etc., while at the same time they had to allow the development of wind farms of the same capacity and therefore the same number of wind turbines, with the same annual energy production and therefore approximately the same wind potential. Such sites in general in the Rhodope P.E. are few, however one candidate site that was investigated is located outside and to the west of the GR008 "Valley

Filliouris and Eastern Rhodope", as well as outside the Natura area. The location, as shown in the image below, differs in terms of wind potential with the location of the proposed A3 solution and is outside incompatible areas.

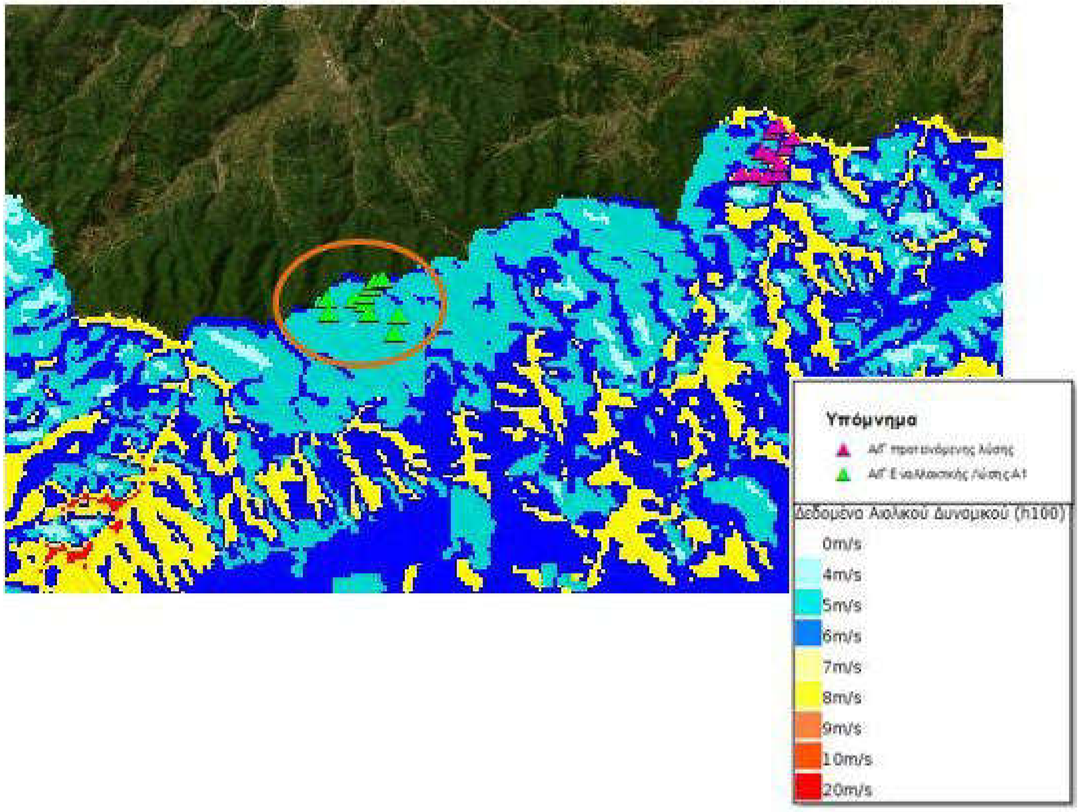


Figure 7.1-1: Alternative A1

7.1.4 Alternative A2

Alternative A2 considers the implementation of a different RES technology. In this context, the installation of a Photovoltaic Power Plant with an equivalent installed capacity to the proposed CCGT, i.e. 44 MW, was considered. This project, based on the solar radiation in the wider area has a specific energy output of 1.40 MWh/kWp and its installation would require a polygon of total area of about 260 acres. Although the area of the proposed LSEP is not incompatible with the installation of a PV plant, the slopes prevailing in this area do not allow for the installation of a PV farm. Option A2 is located within three polygons, approximately 3.1km southwest of the Upper Drosini' settlement, on agricultural land, where the slopes allow for the installation of a PV plant.

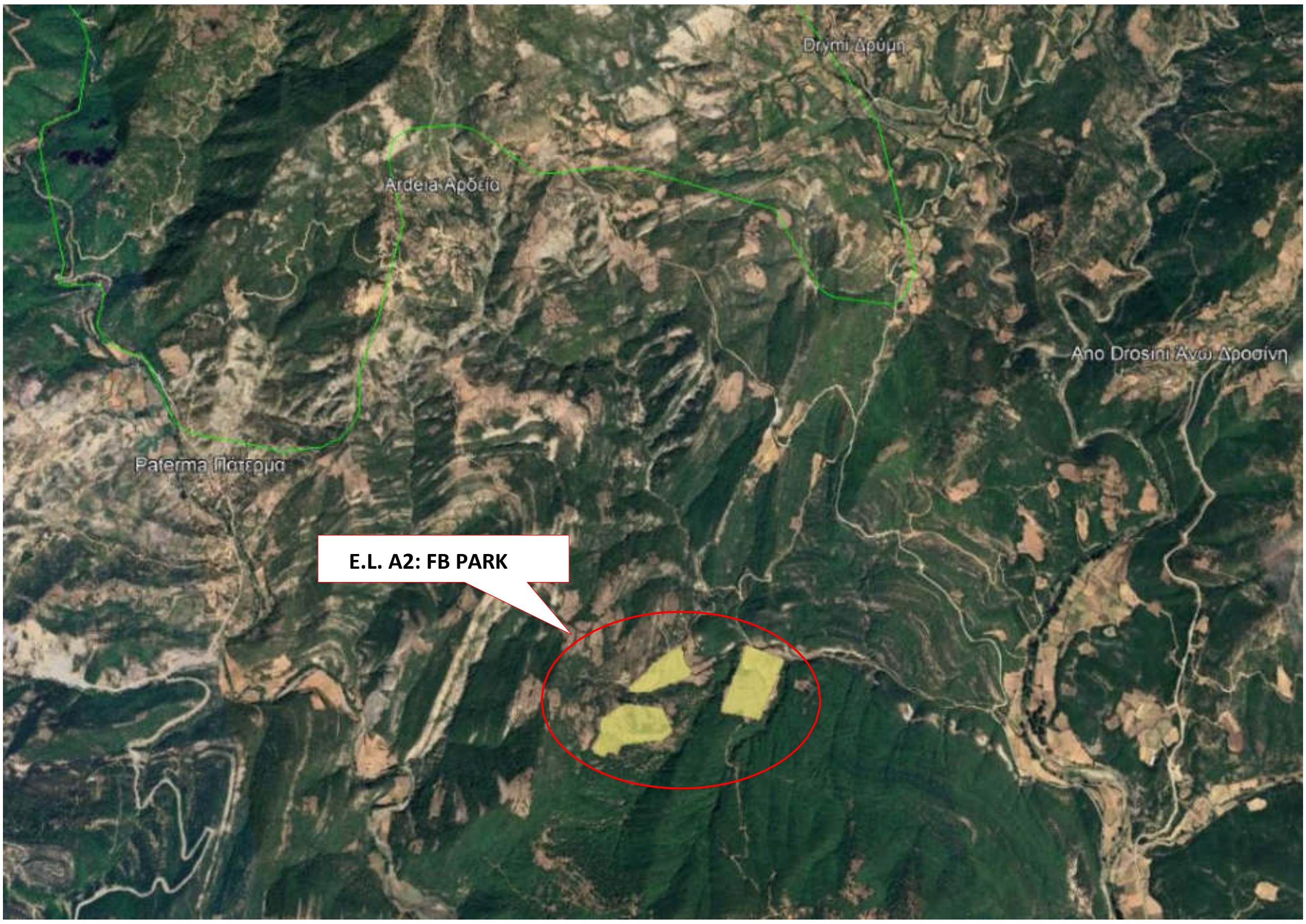


Figure 7.1-2: Alternative A2

7.1.5 Alternative A3 (proposed)

Solution A3 is the proposed solution which has been described in detail in chapter 6.

7.2 ASSESSMENT AND JUSTIFICATION OF THE FINAL CHOICE

In the following paragraphs, the alternatives (including the zero option) are comparatively assessed in terms of their impacts on the environment.

7.2.1 Comparison of Zero Solution A0 and Main Solution

Although, as mentioned above, it seems that the zero solution is the best solution, since it implies essentially zero interventions in the area, a closer analysis shows that the solution A0 brings about significant permanent and irreversible indirect impacts on the environment at a supra-regional level, in contrast not only with the proposed Solution A3, but also with all other solutions.

The "zero" a l t e r n a t i v e , i.e. not implementing the project, apart from not fulfilling the objectives of the operator, implies the loss of clean energy production, which in order to be produced conventionally would require the consumption of a significant amount of solid (lignite) or gas (natural gas) fossil fuels, which has known environmental consequences. It would, therefore, mean undoing the important environmental benefits of developing the proposed CCGT, as the operation of the proposed project would avoid the release into the atmosphere of greenhouse contributing pollutants, which annually for the same energy produced would reach the following values (EPA, 2008 and EPA,2009):

	CO2	CH4	N2O
	sound	sound	sound
Lignite	34,000.00	3.81	0.57
Natural gas	42,089.6	0.34	0.03

The zero option therefore worsens air quality in areas of electricity generation from conventional fuels (e.g. areas where NPPs operate) and exacerbates climate change, compared to alternatives A1 to A3.

In addition, the option of the zero Option A0 would deprive the country's electricity system of 102 GWh per year, as shown by the calculations of the project's energy potential (deducting losses). Considering that for 2017 the country's total electricity consumption was 51.9 TWh (Source: Energy Institute of South East Europe, 2019), it implies that the project alone can provide 0.2% of the country's electricity consumption. Therefore, the zero option also brings significant impacts on the man-made environment, as it deprives the energy system of important energy resources, while acting as a brake on development projects that require electricity to be implemented.

Furthermore, it is noted that the negative impacts from the construction of the projects under options A1 to A3 are short-term, localised and can be prevented or counteracted by taking appropriate measures. The loss of benefits from the operation of the project will be permanent and irreversible, causing more significant impacts on the environment.

7.2.2 Comparison between Alternative A1 and the Main Solution

As presented in paragraph 7.1.3, as Alternative A1, the possibility of locating the project in another area of the Rhodope P.E., outside and to the west of the GR008 SPA "Valley of Filliouris and Eastern Rhodope" was investigated.

By initially searching for compatible sites, as defined in the Special Framework for Spatial Planning and Sustainable Development (SPSPD) for Renewable Energy Sources, incompatible uses were identified and the required distances were observed[1] .

Evaluating options A1 and A3 from an environmental point of view, it appears that option A1 will result in a greater intensity and extent of impacts due to the larger scale of works required at the location in question. The site has a more pronounced topography, lack of roads (compared to the proposed solution), therefore the access road works will be larger with greater impacts than solution A3. Due to the reduced wind potential, compared to the main solution, electricity generation, with the same installed capacity, will also be reduced. In addition, the view of more significant environmental impacts of A1 is reinforced by the planned projects related to the MT transmission line. The substation to which the STP of the A1 solution is to be connected remains the same as in the proposed solution (i.e. the existing Flamburo substation), because it is the nearest substation for RES projects in the area. Therefore, it is a longer transmission line (in the proposed solution it is about 25km), possibly including the construction of possible overhead network sections, which pose a threat to the avifauna in the area.

[1] ANNEX II 'Distances of wind installations from adjacent land uses, activities and technical infrastructure networks'. of the OPCCD for RES

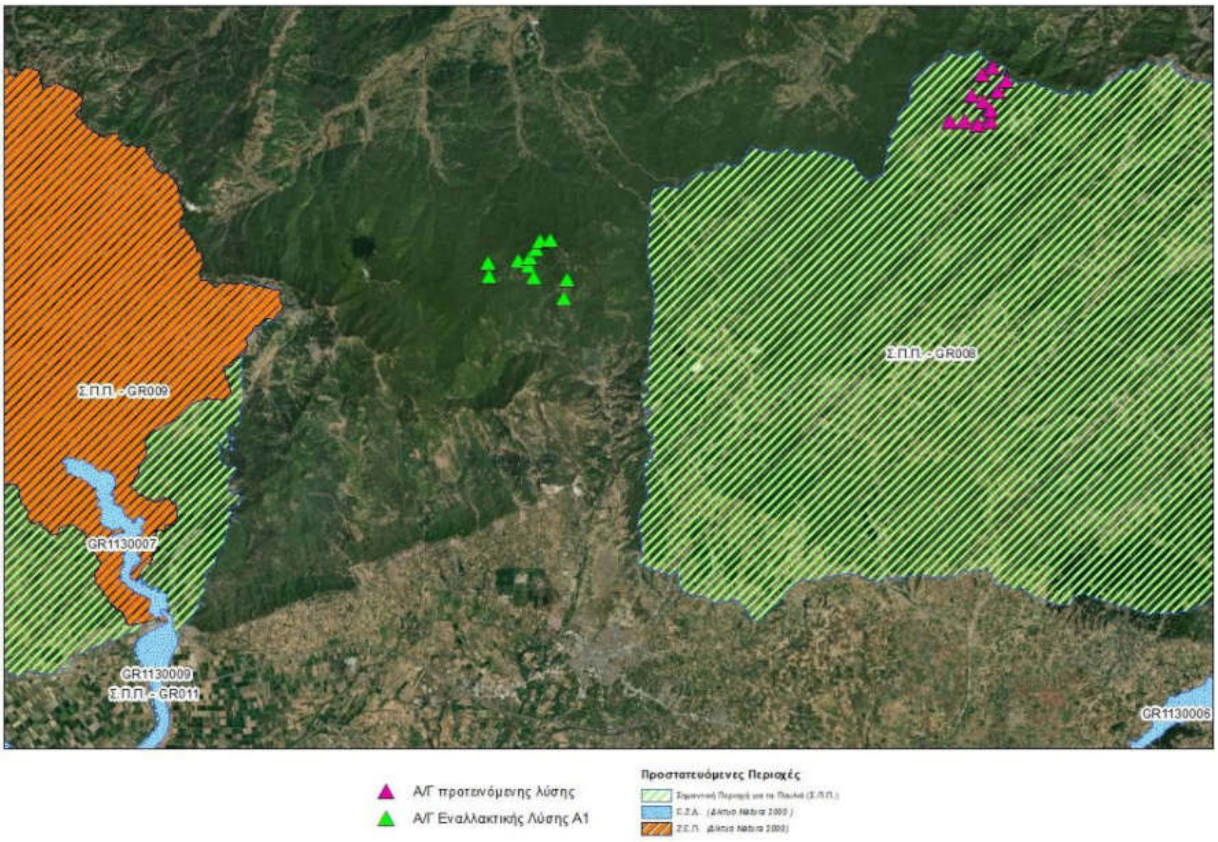


Figure 7.2-1: Areas of environmental interest in relation to the location of Alternative A1 and Main Option A3

In conclusion, the installation of the project under Option A1 will have significantly greater impacts on the morphological characteristics of the area, on the habitats of mammals and agro-pastoral bird species, as well as predators (the overhead transmission lines) and on the anthropogenic environment through the reduction of arable land. The above reasons justify the rejection of Option A1.

7.2.3 Comparison between Alternative A2 and the Main Solution

The installation of a 44MW Photovoltaic Power Plant, as mentioned above, would require an area of approximately 260 hectares and is clearly considered less favourable, both during construction and operation of the project, as it is more than five times the area of interventions than the proposed solution which requires less than 55 hectares. In addition, the annual energy produced by Alternative A3 is estimated at 61.5 GWh, about half that of the proposed solution (102 GWh). Thus, so far it appears that Alternative A3 requires a larger area of intervention to produce less energy.

In addition, in order to find a compatible large area for the installation of the PV plant, far from land of high productivity, the area proposed for the installation of solution A2 is located outside the Natura 2000 area, but within the Important Bird Area (IBA) "Valley of Filliouris and Eastern Rhodope" with code GR008.

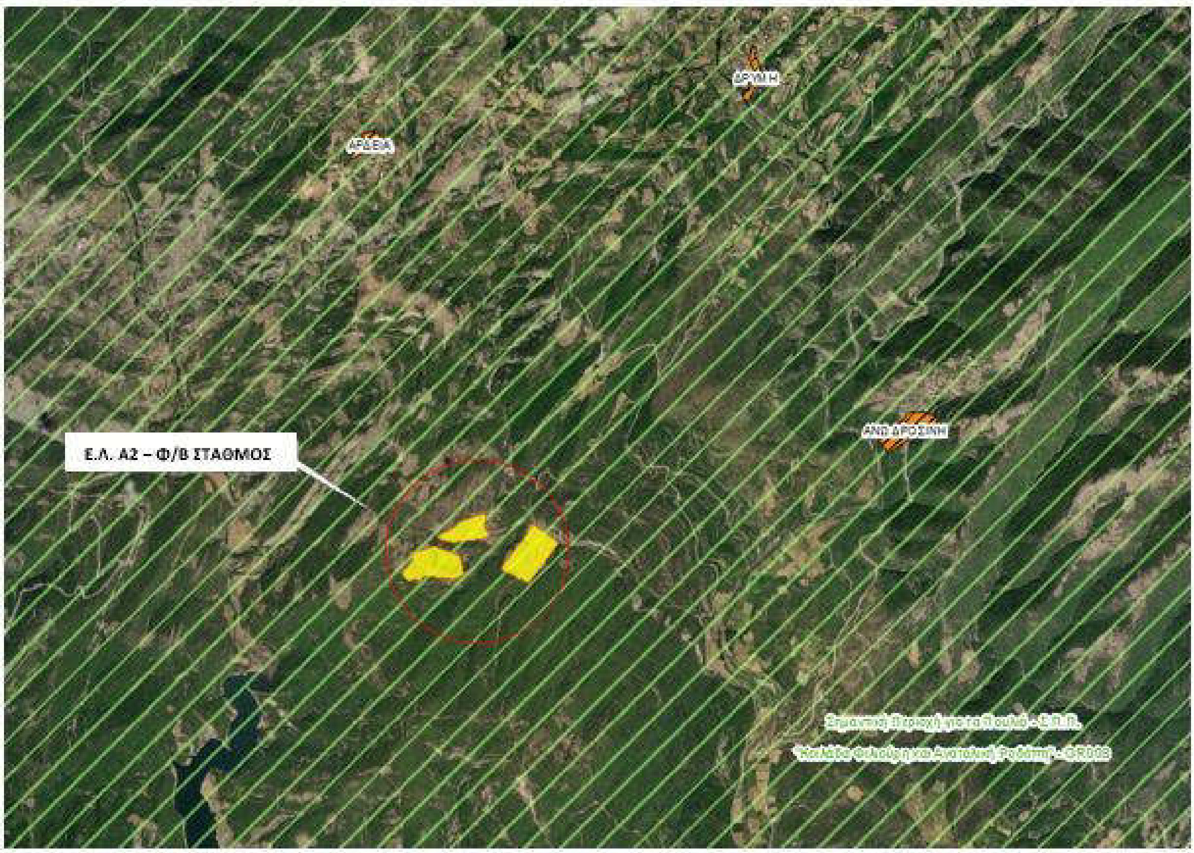


Figure 7.2-2: Location of solution A2 PV station

The creation of a PV park with such a large area, close to a large water system (i.e. Artificial Lake of Gratini) and even in an area that hosts and protects ornithofauna and especially migratory birds, poses the risk of the "Lake effect" phenomenon. This phenomenon occurs in the case of large PV stations located in areas used by migratory birds and due to the large size and colour of the PV panels, they fool the birdlife by simulating a "lake", leading birds to descend either to rest or to feed. The direct impact, although with a low probability of occurrence, is impact with the panels, while there are indirect impacts such as fatigue from the attempt to land and take off, resulting in prey for other animals or humans, or even failure to reach the final destination.

Option A3 also has a more adverse impact on the man-made environment as it reduces the land available for cultivation.

Overall, the environmental impacts of Option A3 are considered to be worse than those of Option A3.

7.2.4 Assessment of the Main Solution A3

As discussed in Chapter 9 of this study, no significant impacts are expected from the construction and operation of Solution A3 on the man-made and natural environment, and can largely be addressed through mitigation measures. It also results in significant impacts at the supra-regional and national level through the generation of electricity from renewable sources and the consequent avoidance of the use of conventional fossil fuels, with the end result being a significant contribution to global efforts to reduce and address climate change. Although Solution A3 requires interventions in mainly forested areas with some parts of it being municipal, the total is negligible compared to the forested areas of the municipalities where it is located. In addition, it occupies a significantly smaller area than Alternative A2 and does not significantly modify existing land uses. Certainly, and special measures would need to be taken to prevent or address any significant impacts it may cause on the environment.

7.3 CONCLUSIONS

Following the above, the proposed solution A3, as designed and presented in Chapter 6, is the environmentally optimal solution for the implementation of the 44 MW RES-EPP and the achievement of the significant benefits for the natural and man-made environment (at local and national level) and the local community, with the least possible impacts, compared to alternatives A1 and A2 and the no solution. Option A3 is therefore the option of choice for environmental reasons and its impacts and protection measures are discussed in the following chapters.

CHAPTER 8: EXISTING SITUATION OF THE ENVIRONMENT

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8. EXISTING STATE OF THE ENVIRONMENT

8.1 STUDY AREA

The site of the wind farm is located in the area of the Municipal Units of Komotini of the Municipality of Komotini and Organi of the Municipality of Arrianon of the Prefecture of Rodopi. In addition, the existing substation "Flambouro" where the considered ASPHE will be connected is located in the Local Community of Dokou. The Medium Voltage interconnection network passes through the Local Communities of Kalhantos of the Municipality of Komotini, Municipality of Komotini, as well as the Local Communities of Drimi, Ano Drosini, Neo Kallintiriou and Dokou of the Municipality of Fillyra, Municipality of Arrianon. Regarding the access road, road works will be carried out mainly within the boundaries of the Local Community of Kalhantos, with some small sections falling within the Community of Organi, of the Municipality of Organi, of the Municipality of Arrianon.

The study area is defined as the area within a 1km radius from the boundaries of the ASPHE polygon and the 0.5km zone on either side of the access roads where road works will be carried out to access the project, as it is an A2 category project outside the city plan.

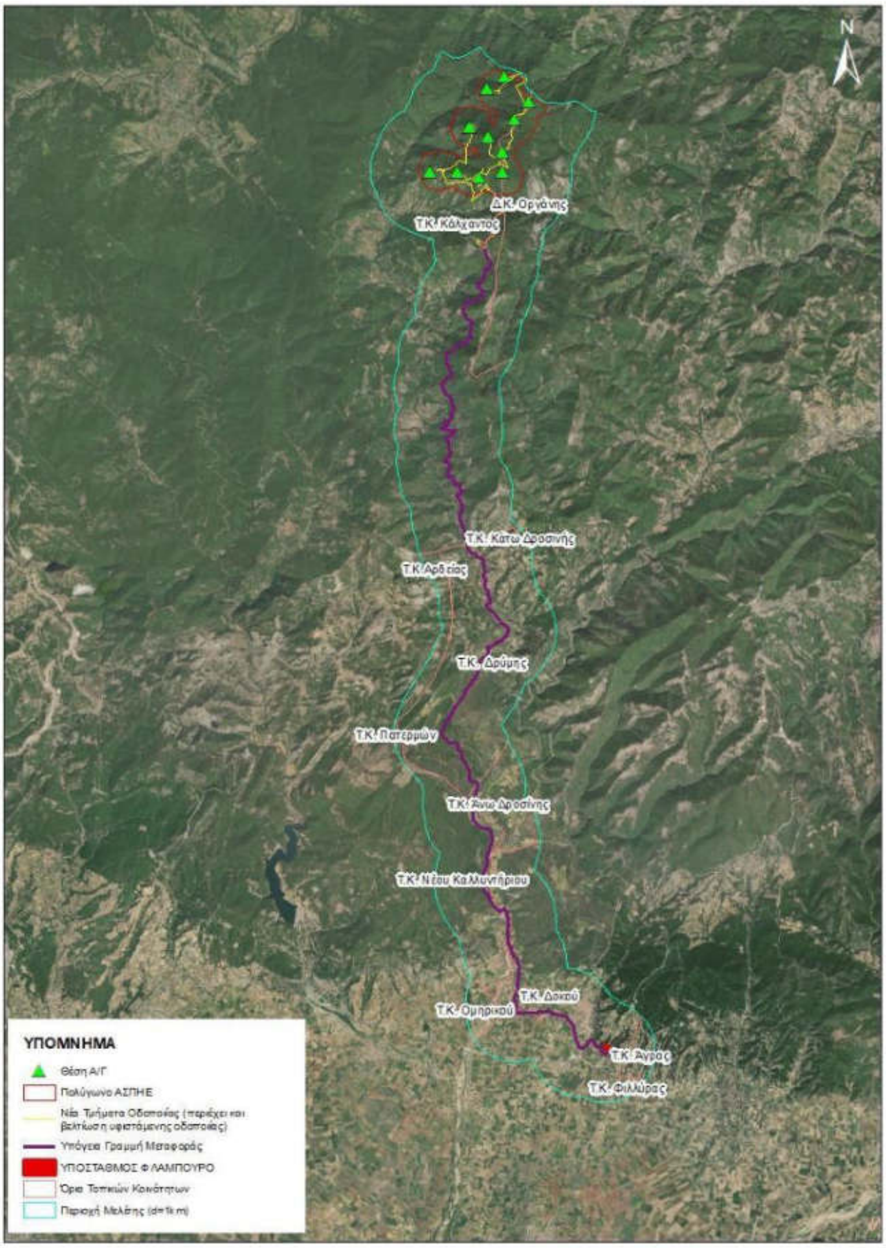

Figure 8.1- 1: Study Area Boundaries

8.2 CLIMATIC AND BIOCLIMATIC CHARACTERISTICS

The main factors that contribute to the climate of the study area, as described below, are: topography, distance from the sea, altitude, atmospheric systems and specific local conditions.

In general, in the wider study area the climate is mainly characterized as Mediterranean dry to humid in the coastal part and continental towards the inland and in the mountains. Rainfall occurs throughout the year, but is more limited during the summer months.

This section presents the available climatological data from the nearest Meteorological Station (M.S.) of Alexandroupolis (C. Length (Lon) 25,95 / C. Latitude (Lat) 40,86/ Height 4m) of the National Meteorological Service (EMY) for the period 1951-2010.

8.2.1 Climate data

Temperature

Table 0-1 and Figure 0-1 below present in detail the data for the temperature variation in the Alexandroupolis M.C.

Table 8.2- 1: Average minimum, average minimum, average average average and average maximum monthly temperature in Alexandroupolis M.C. for the period 1951-2010

Month	Average temperature (° C)	Middle Maximum temperature (° C)	Average minimum temperature (° C)
IAN	5.10	8.60	1.40
FEB	6.00	9.80	1.80
MAR	8.50	12.30	3.70
APR	13.30	17.30	7.20
MAI	18.60	22.60	11.50
JUN	23.40	27.40	15.50
JUL	26.20	30.50	18.00
AWG	25.80	30.70	18.00
SEP	21.20	26.20	14.40
OKT	15.80	20.40	10.50
NOE	10.90	14.90	6.70
ICJ	7.10	10.60	3.30
YEAR	**15.16**	**19.28**	**9.33**

Source: NATIONAL WEATHER SERVICE, 1951-2010

In the figure below, the light blue line represents the average maximum monthly temperature, the light blue line the average monthly temperature and the blue line the average minimum monthly temperature. The warmest month is August with an average maximum temperature of 30.7° C and the coldest month is January with an average minimum of 1.4 C. °

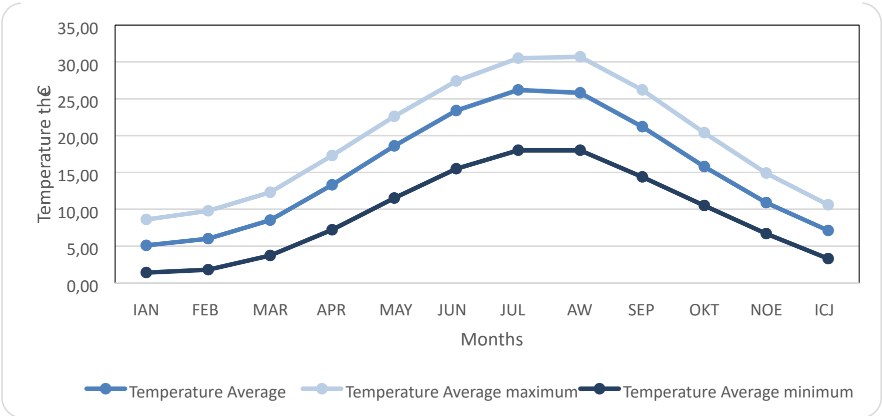

Figure 8.2- 1: Distribution of average monthly temperatures in Alexandroupolis M.S. for the period 1951-2010

Precipitation-Humidity

Table 0-2 presents in detail the data for precipitation and relative humidity in Alexandroupolis M.C.

Table 8.2- 2Average monthly rainfall (mm) and relative humidity in Alexandroupolis for the period 1951-2010

Month	Total Precipitation (mm)	Relative humidity (%)
IAN	63.30	76.60
FEB	56.30	74.50
MAR	48.60	72.80
APR	35.10	70.30
MAI	36.20	67.50
JUN	28.30	59.90
JUL	19.80	53.40
AWG	13.10	53.70
SEP	27.90	60.20
OKT	51.50	68.70

NOE	82.70	76.10
ICJ	82.70	77.60
YEAR	**545.5**	**67.6**

Source: NATIONAL WEATHER SERVICE, 1951-2010

According to Table 0-2, the average monthly precipitation ranges from 13.1mm in August to 82.7mm in November and December.

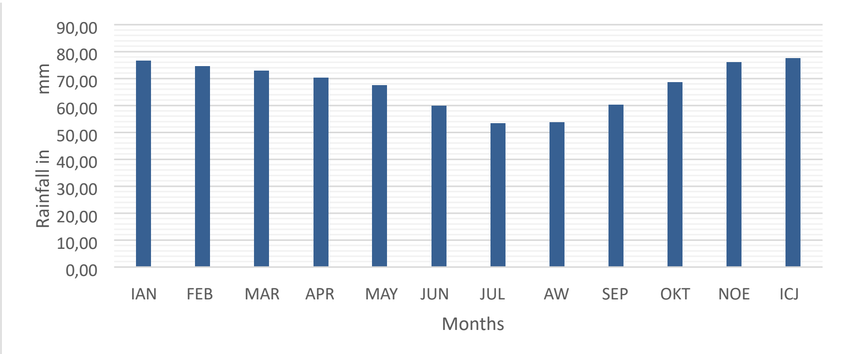

Figure 8.2- 2: Chart of monthly humidity level in Alexandroupolis M.S. for the period 1951-2010

Wind

The table below presents in detail the data for the wind speed per month in knots (kt), according to the available data for the Alexandroupolis M.S. for the years 1951-2010.

As can be seen, northeast and north winds prevail most months of the year with an average monthly intensity of 4.4 kt. In the summer months, SW and NE winds prevail with an average monthly intensity of 5.4 kt (June) to 6.7 kt (August).

Table 8.2- 3Wind data in Alexandroupolis for the period 1951-2010

Month	Average speed (knots)	Average monthly address
IAN	8	B
FEB	8.2	B
MAR	8	BA
APR	6.2	BA
MAI	5.4	BA
JUN	5.4	SW
JUL	6.6	BA

AWG	6.7	BA
SEP	6.5	BA
OKT	7.3	B
NOE	6.7	BA
ICJ	7.8	B

Source: NATIONAL WEATHER SERVICE, 1951-2010

8.2.2 Bioclimate

Emberger's ombrothermal coefficient

One of the most widely used methods of determining the bioclimate of a region for the Mediterranean region is the Emberger-Sauvage method. With this method, bioclimatic floors are defined, which correspond to the succession of bioclimates according to the variation in temperature and precipitation, either in altitude or in latitude. In particular, the altitudinal variation of these climatic elements is expressed in terms of the vegetation succession in height or otherwise the vegetation floors. On the vertical axis of an Emberger-Sauvage diagram, the rainfall coefficient Q_2 is represented, as shown in the equation below. The intercept of the diagram represents m in °C.

$$Q2 =(\frac{1000\times P}{\underline{M+m)}\quad 2\times}$$
$$(M\text{-}m)$$

Where **P** = annual rainfall in mm,

M = the average of the maximum temperatures of the warmest month in absolute degrees (°K, T °K = 273.2+θ °C) and **m** = the average of the minimum temperatures of the coldest month, also in absolute degrees.

Figure 0-1 shows Emberger's climatogram, as modified by Sauvage and on which the meteorological stations of Greece were placed by Mavromatis.

Mavromatis distinguishes:

1. 4 bioclimatic floors, "Dry", "Semi-dry", "Humid" and "Wet" and
2. 4 sub-zones based on the value of m (° C) into "warm winter" (m>7° C), "mild winter" (3<m<7° C), "cold winter" (0<m<3° C) and "severe winter" (-10< m<0° C).

According to the data of the NRM, as presented in the previous subsection, the Emberger omnothermal coefficient for the region is calculated as follows:

M = 303.7^{o} C, m = 274.4^{o} C, P = 545.5mm and therefore **Q_2 = 64.41.**

In general, the lower the Q_2 index, the drier the climate. Based on the values of Q_2 and the value of m Emberger draws the so-called climate diagrams. From the above it can be seen that the study area belongs to the <u>semi-arid bioclimatic floor with a warm winter subfloor (m > 7^{o} C)</u>, as shown in the extract from the Bioclimatic Floor Map for the area (**Error! Reference source not found.**).

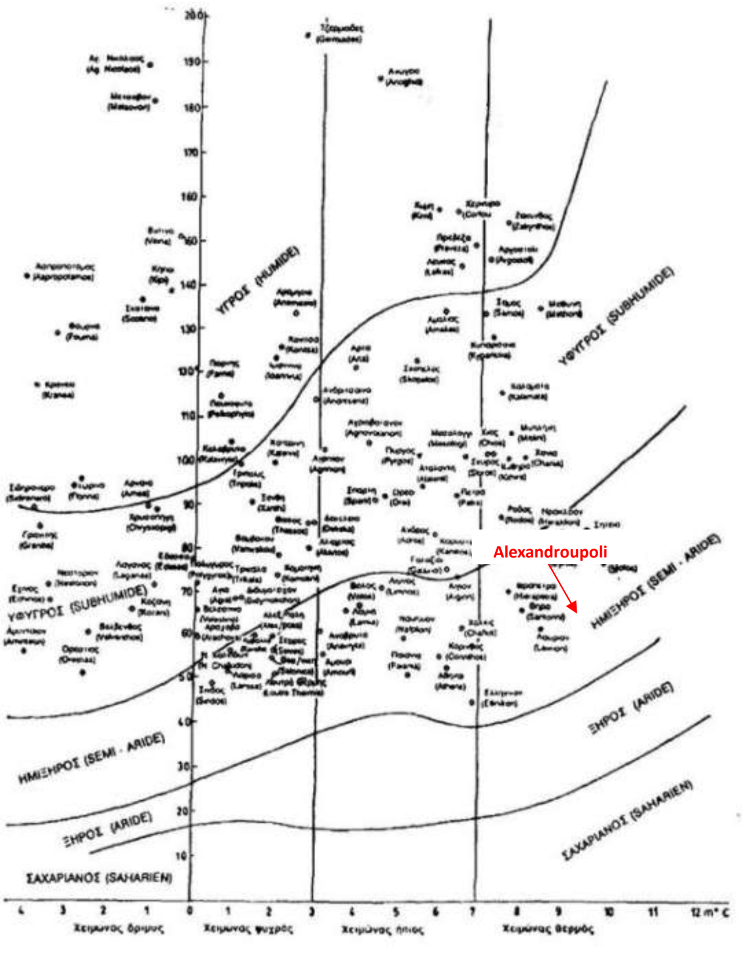

Figure 8.2- 1: Emberger Bioclimatic Diagram for Greece (Mavromatis, 1980)

Umbrothermal diagram Gaussen - Bagnouls

Gaussen and Bagnouls illustrate with a diagram called the rainfall diagram the month-by-month trend of the average monthly temperature T in° C and the average monthly rainfall P in mm. The area enclosed by the two curves between the two points of intersection (P = 2T) shows the duration and intensity of the dry season. If precipitation is considered as a gain in the water balance, then temperatures implicitly express losses from evaporation and transpiration.

The distinction according to the rainfall diagrams is more informative than the numerical indices and is more representative of the actual ecologically dry period, if factors such as soil reserves of available water, morphological and physical properties of the soil as well as its depth are taken into account.

A month is classified as dry when the total precipitation for that month is equal to or less than twice its mean temperature (P mm ≤ 2T° C). This relationship is purely empirical and has been adopted by UNESCO-FAO.

In the following **Error! Reference source not found. section** the rainfall and temperature diagram of the study area is presented based on the meteorological data of the Alexandroupolis M.S. for the period 1951-2010.

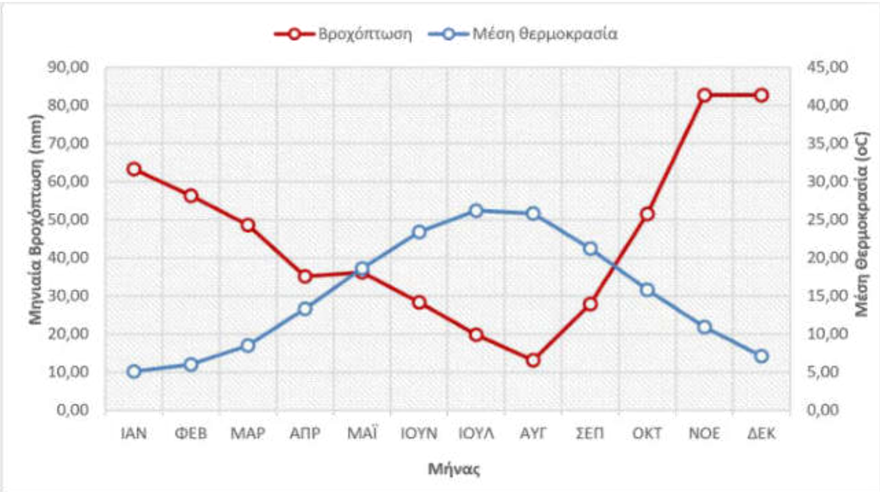

Figure 8.2- 3: Umbrothermal diagram of Alexandroupolis for the period 1951-2010

As can be seen from the rainfall diagram, the hydrological year is divided into a wet period, which starts at the end of September and ends around mid-May, and a dry period, which starts around mid-May and ends at the end of September.

LANG-GRACANIN climate analysis

The Lang's rainfall/temperature ratio (N/T) is one of the oldest numerical indicators for climate characterization. It is derived from the quotient of the mean inter-annual precipitation (N) in millimetres (mm), and the mean annual temperature (T) in degrees Celsius (° C). Table 0-4 provides correlated data of mean monthly temperatures and precipitation amounts for the Lang-Gracanin climate characterization based on the M.S. meteorological data.

Alexandroupolis for the period 1951-2010.

Table 8.2- 4: Lang-Gracanin climate characterization of the study area

Month	Average rainfall (mm)	Middle Temperature (° C)	LANG coefficient	GRACANIN characterization
January	63,30	3,5	15,0	Overeating
February	56,30	6,1	12,4	Liquid
March	48,60	4,2	8,6	Liquid
April	35,10	13,1	5,3	Humidity
May	36,20	13,7	3,6	Undersea
June	28,30	22,7	2,6	Dry
July	19,80	24,9	2,0	Dry
August	13,10	26,1	2,1	Dry
September	27,90	20,3	2,8	Dry
October	51,50	15	4,3	Undersea
November	82,70	12	7,0	Liquid
December	82,70	7,6	10,9	Liquid

In conclusion, based on the Lang coefficient, the climate in the study area is characterized on an annual basis by Gracanin as **Dry**.

8.3 MORPHOLOGICAL AND LANDSCAPE CHARACTERISTICS

The Region of Eastern Macedonia and Thrace extends to the south of the Rhodope Mountains, with hilly outcrops in places. There are also isolated mountains, such as Pangeo, and plains, mainly at the mouths of rivers such as Nestos and Evros, which originate in Bulgaria. The presence of the Vistonida lagoon is significant, important wetlands and lagoons are found in the Evros Delta and artificial lakes such as the Nestos River, the Thesaurus and Platanovrisi.

Regarding the region of Rodopi, it is worth noting that it is located in the centre of the Region of Eastern Macedonia and Thrace, while geographically it belongs to Thrace. The capital of the P.E. Rodopi is Komotini, which is also the seat of the Region.

Regarding the Municipality of Komotini, where part of the project falls, it is mainly characterized by lowland (50%) and less mountainous and semi-mountainous. The plain of Komotini with natural pastures is located in the central and southern part of the municipality, while mountainous areas are found in the northern part of the municipality. In the southern part of the municipality is the sea front of the municipality. The municipality has development prospects as it is a pole of concentration of services, but also of cultural and natural resources.

The Municipality of Arrianon, which borders in the west with the Municipality of Komotini, is mostly mountainous and semi-mountainous and has a rich natural environment. It does not appear to have been altered in terms of its physiognomy. The resident population is mainly engaged in animal husbandry and agriculture.

The slopes of the ground in the area of the installation of the A/Gs are gentle. The A/P installation site is an uncultivated area and is primarily public land in terms of ownership, except for certain portions that involve private land.

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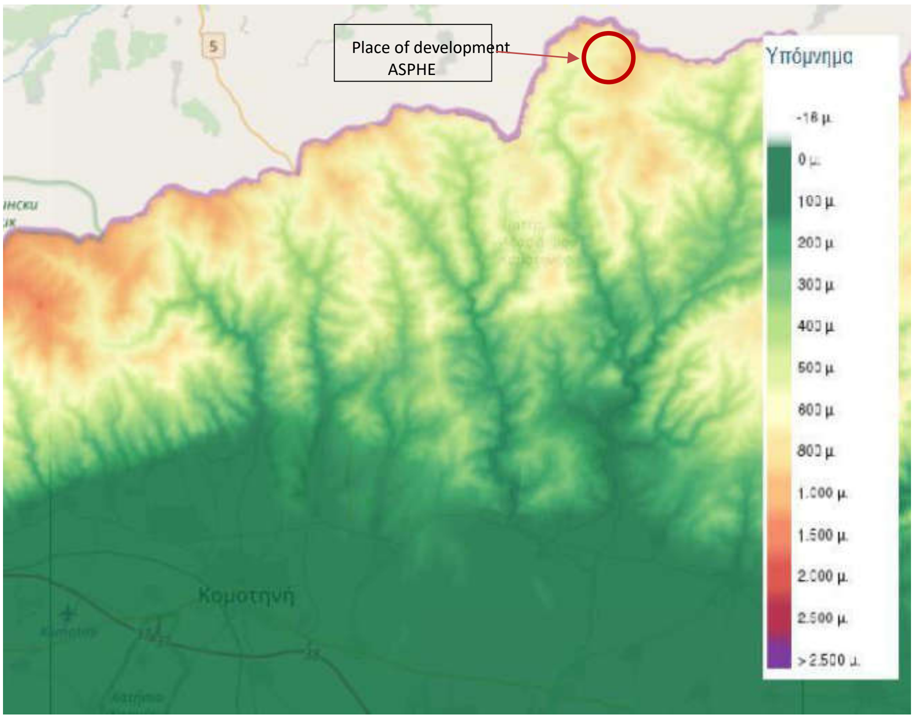


Figure 8.3- 1: Elevation zone map of the wider study area

(Source: Digital Elevation Model - https://mapsportal.ypen.gr/layers/geonode:eu_dem_v11_realvalues)

8.4 GEOLOGICAL, TECTONIC, SOIL AND HYDROGEOLOGICAL CHARACTERISTICS

8.4.1 Geological data

According to various available sources, the whole of the Region of Eastern Macedonia-Thrace, in terms of alpine-prealpine structure, belongs to the Rhodope zone, with a smaller part of it being occupied by rocks of the Periridopian mass. The main fault lines divide the Rodopi mass into two lithostratigraphic units: the upper tectonic unit (Sideronero unit) and the lower tectonic unit (Paggaio unit). The first of these includes rocks of a much higher degree of metamorphism (such as gneisses, migmatites, eclogite-morpholites and marbles). The protoliths of the metamorphic rocks of the Rhodope mass are considered to be of Palaeozoic age. Characteristic of the Rhodope massif are the large sedimentary basins of the Tertiary period which are (from east to west): the Strymon basin or
Serres, Philippi or Drama, Prinos, Nestos, Xanthi - Komotini, Kirki - Aisimi and Orestiada. Within these sedimentary basins are interbedded volcanic and volcaniclastic rocks.

The carbonate formations of this mass are Silurian-Devonian-Lithic limestone lenses, Lithiclastic marbles, Upper Paleozoic limestone and dolomite intercalations and Permian-Triassic limestones. In the Regional Unit of Evros, classic sediments of the molasse type (conglomerates, sandstones, marls and marly limestones) of Eocene-Oligocene age are found. Finally, it is stated that this region is of the greatest mineralogical interest in the country, as it has identified a large number of deposits or occurrences of various ore minerals (such as manganese, gold, zinc, lignite, etc.) and significant concentrations of industrial minerals (kaolin, zeolite, feldspar, uranium, etc.), extensive geothermal fields and important peat deposits. In addition, it is worth noting that oil and gas deposits have been identified in the Thracian Sea.

The study area falls, as shown in the figure below, in the Massas geotectonic zone of Rodopi. This zone includes crystalline and igneous rocks, while the lack of sedimentary rocks results in a relatively unclear stratigraphy. Furthermore, it is mainly composed of gneisses, marbles, shales, granites, granitic granodiorites, rhyolites, andesites and dacites, and has been affected by three fold tectonic phases. Ophiolites are also present in the area, as shown in Figure
0-1.

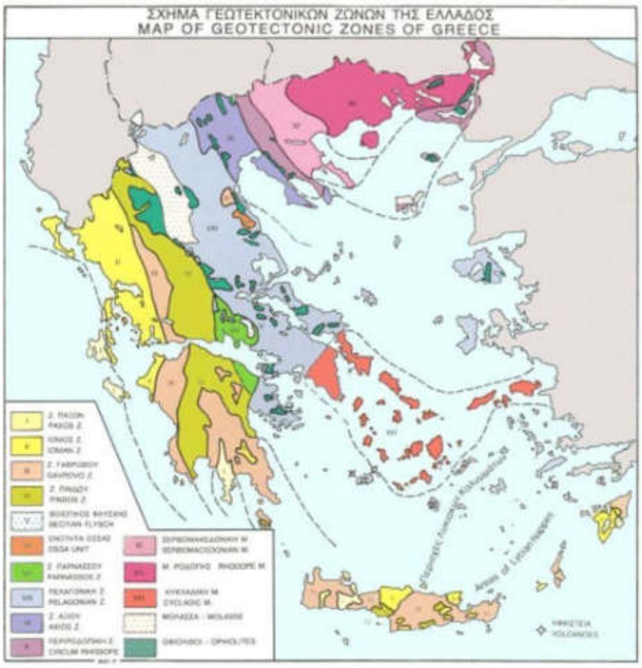


Figure 8.4- 1: Map of the country's geotectonic zones

In general, it is stated that in the whole of the Region of Eastern Macedonia and Thrace there is a rich deposit interest and various mineral deposits occur.

Below is an extract of the geological map of the I.G.M.E. for the wider area of the Region of Eastern Macedonia and Thrace. The project under consideration and its associated works are located in the Rhodope metamorphic rocks-masses in the Servomacedonian, Pelagonian Zone with amphibolites, gneisses and shales with marble interbeds.

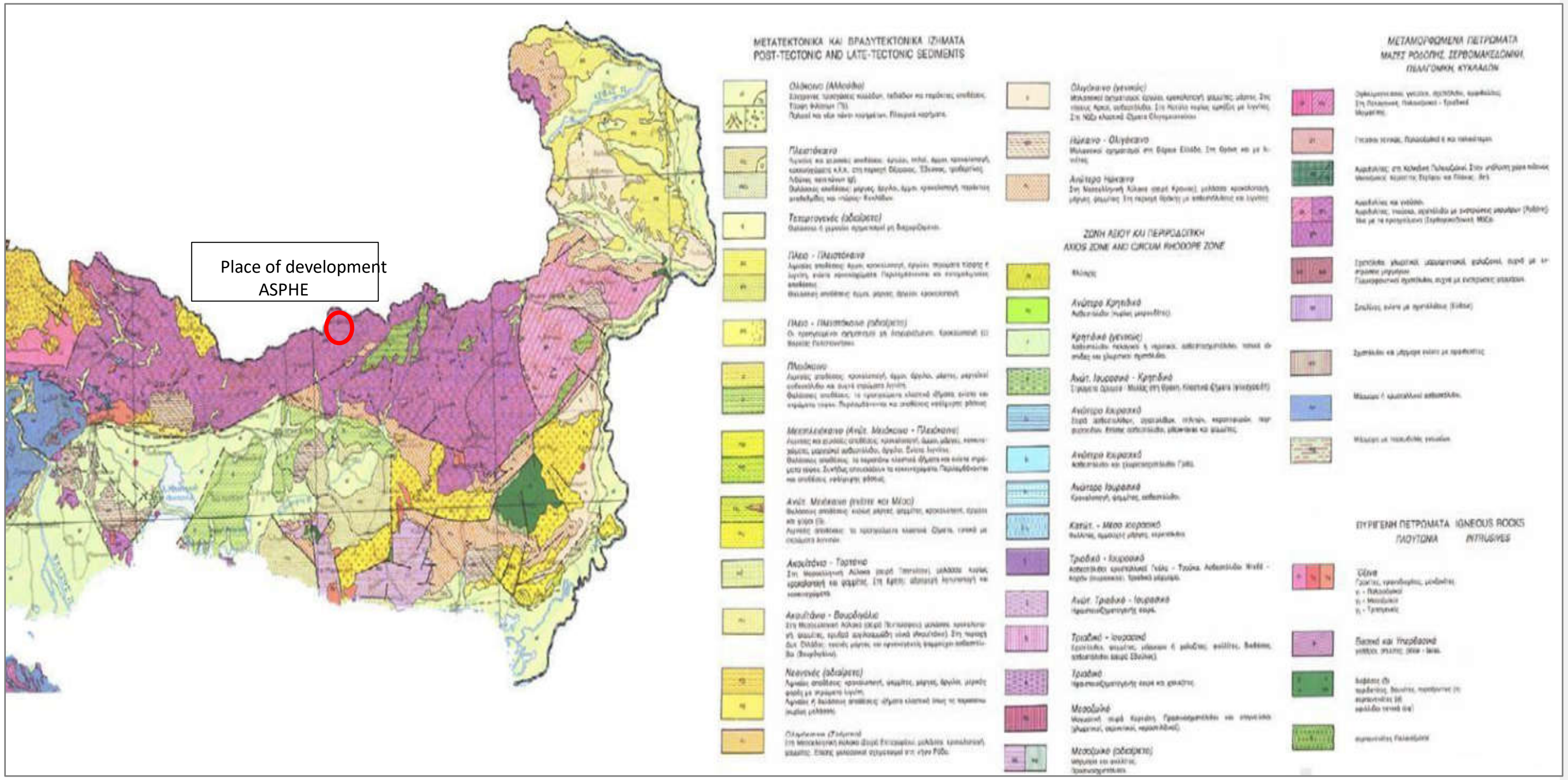


Figure 8.4- 1: Extract from the Geological Map of I.G.M.E.

Ch. 8 - Pg. 13

8.4.2 Soil characteristics

According to the available data from the country's map of soil compounds, Haplic Luvisol soils are present in the area of the project under consideration and in the wider region, characterised by a surface accumulation of black soil overlying a layer almost free of clay and iron-containing minerals. Since it has mixed mineralogy, high nutrient content and good soil drainage is achieved, making it suitable for agricultural development. This type of soil is formed in flat or gently sloping areas with low temperatures and a temperate to warm Mediterranean climate.

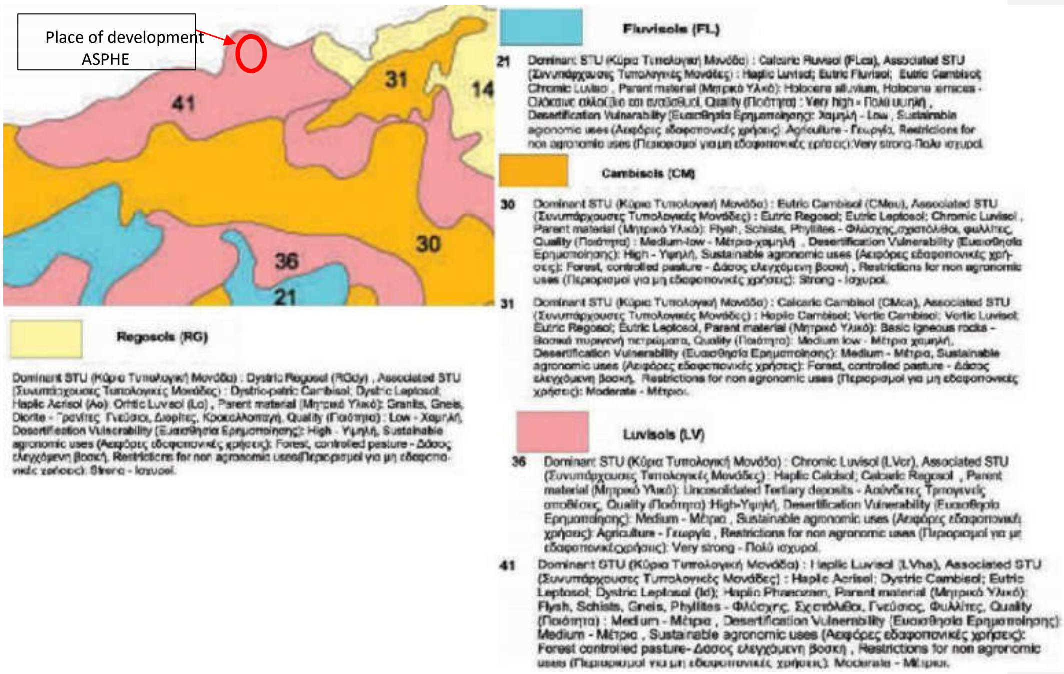


Figure 8.4- 2: Extract from the Map of the Soils of Greece

(Source: National Commission against Desertification)

In addition, according to the soil map of the most recent Flood Risk Management Plan, the study area falls within soils with an impervious layer or aquifer depth of 50-100cm and 10>Ks>1μm/sec and/or soils with a depth >100cm and 4>Ks>0.4μm/sec and/or soils with a percolation rate of 0.12 -0.4cm/h and/or soils with a mechanical composition of Sandy Clay Loam (SCL) or Sandy Clay Loam (SC), as indicated in the figure below.

Figure 8.4- 3: Extract from Soil Map

(Source: River Basin Flood Risk Management Plan for the Eastern Water Basin Districts of the Eastern Macedonia and Thrace, Thrace Water Region-GR12)

8.4.3 Hydrogeological characteristics

According to the current River Basin Management Plans, the region consists of two Water Divisions, the Watershed Management Plan for Eastern Macedonia and the Watershed Management Plan for Thrace.

The Thrace region (EL12) is defined north from the country's border with Bulgaria, east from the Greek border with Turkey to the Gulf of Ainos, west from the watersheds of the Nestos-Ochirou, Nestos-Strymonas, Nestos-Nea Karvali stream and the watershed of the coastal streams of Chrysoupolis to the Gulf of Kavala. The main rivers of the WR are the Nestos and Evros rivers, which are also transboundary rivers, the waters of which are shared with Bulgaria and Turkey. There is a single natural lake, Lake Ismarida (or Mitrikou), and five reservoirs are located in the WR. In addition, it should be noted that the Thrace WF includes important transitional waters, some of which are of trans-regional importance and protected by international conventions (e.g. the Evros Delta, Lake Vistonida).

The WF Thrace (EL12) consists of five river basins, those of the Nestos (EL1207), the Rams. Xanthi - Xerorema (EL1208), the Rams. Komotini-Loutroi Evros (EL1209), Evros (EL1210) and Thassos - Samothrace (EL1242). The LFA Rems. Komotini-Loutroi Evros, in which the project under consideration falls, has an area of 41.958.3 km^2 , an average altitude of 289m and a maximum of 1.459m. This LFA includes the sub-basins of the Lissou (or Filiouri) River and the Bosvozi River, as well as the important Lake Ismarida (Mitrikou). It also includes smaller watercourses which drain into the coastal areas in the south.

Impervious formations with little to very little water permeability consisting of metamorphic rocks occur in the project area. They include Jurassic schistoceratolitic formation with keratolites, sandstones, pebbles, pebbles, ophiolite crossings and lenses of the Pelagonian Zone, Jurassic phyllites and keratolites of the Axios and Peridotopian zones, metamorphic rocks of the Rhodope, Servomacedonian, Pelagonian and Cyclades zones and pre-Alpine series. Locally, limestones and marbles are intercalated, where karstic aquifers often develop.

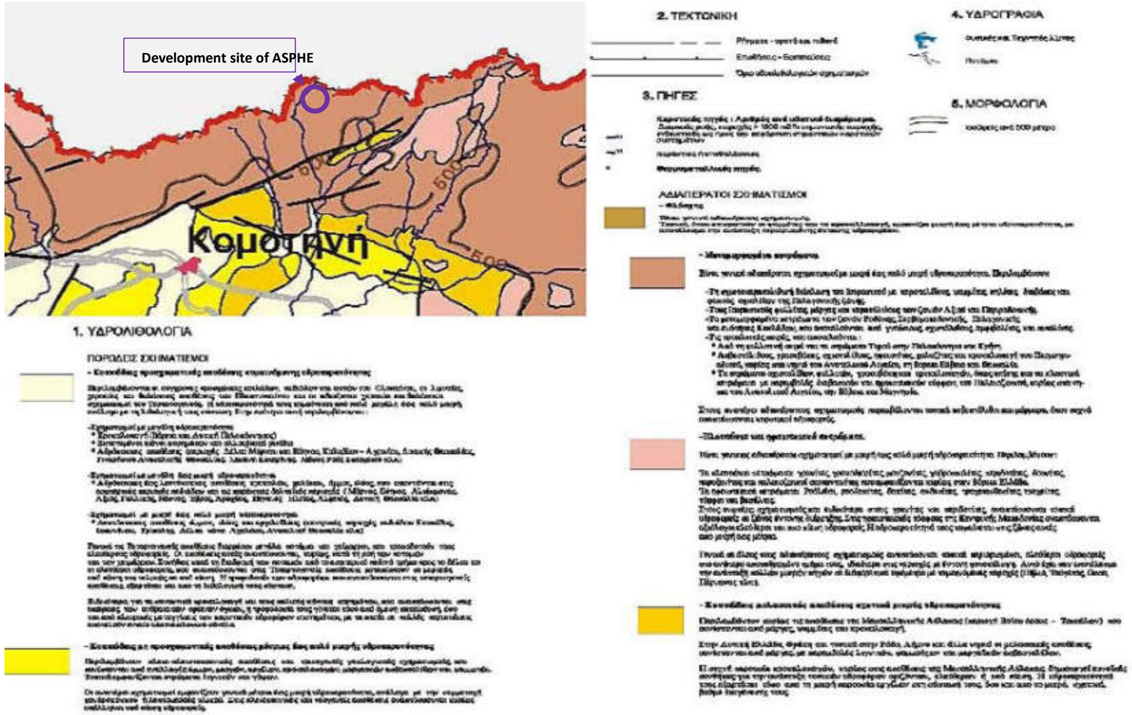


Figure 8.4- 4: Extract of hydro lithological map for the region of Eastern Macedonia

(Source: Ministry of Development-Directorate of Water Resources, Hydrolithological map of Greece)

Furthermore, according to the hydro-lithological map of the most recent Flood Risk Management Plan of the Watersheds of Eastern Macedonia and Thrace, the study area is dominated by hydro-lithological formations of fractured, metamorphic, igneous and sedimentary formations of high permeability, as presented in the following figure.

Figure 8.4- 5: Extract from the hydrogeological map

(Πηγή: Σχέδιο Διαχείρισης Κινδύνων Πλημύρας Λεκανών Απορροής των Υδατικών Διαμερισμάτων Ανατολικής Μακεδονίας και Θράκης, Υδατικό Διαμέρισμα Θράκης-GR12)

8.4.4 Tectonic and seismological data

The seismic hazard of an area is a quantity whose measure is the expected intensity of seismic motion in that area. The seismic hazard is also determined by physical factors such as seismicity, the properties of the seismic focus and the seismic wave propagation medium, and the properties of the foundation soil.

The basic elements of the seismicity and the seismic risk of the areas of the Greek territory are determined by the seismic map of Greece, according to the EAK-2000 and its amendment by the Decision D17a/115/9/FN275 of the Ministry of Environment and Natural Resources (Government Gazette 1154/B/12.08.2003), which has been in force since January 1, 2004. The seismic map distinguishes three seismic risk zones, on the basis of which the seismic forces with which structures are designed for each region of the country are determined.

From the three seismic hazard zones, the corresponding design ground acceleration values are determined. For the first zone (I) the ground acceleration is 0,16 g (percentage of gravity acceleration g), for the second zone (II) the ground acceleration is 0,24 g and for the third zone (III) the ground acceleration is 0,36 g.

From the distinction of seismic hazard zones, it follows that the wide area of the study area is classified in seismic hazard zone I. The seismic acceleration factor for zone I, as mentioned above, is α=0.16, while the seismic acceleration of the ground A is given by the formula: A=a x g (where g is the acceleration of gravity).

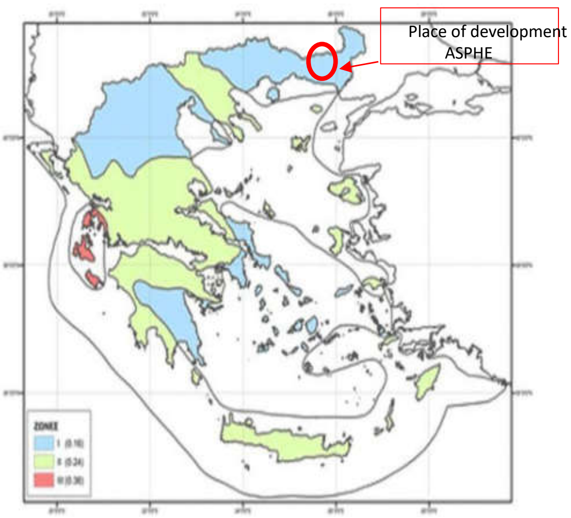


Figure 8.4- 6The three categories of seismic hazard zones (I, II, III) into which Greece (The circle marks the study area)

In general, in the Region of Eastern Macedonia-Thrace, as confirmed in the figure below, according to the Geodynamic Institute (for the period from 2010 to March 2023), no significant seismic phenomena have occurred.

Figure 8.4- 2: Map of seismic events in the wider area of the Region of Eastern Macedonia and Thrace

8.5 PHYSICAL ENVIRONMENT

8.5.1 General information

In this section the characteristics of the natural environment of the wider study area are investigated in detail.

It should be noted that the examined ASPEE is located <u>outside the boundaries of protected areas,</u> according to the Law for the protection of the environment (Law 1650/1986), as amended by Laws 3937/2011 and 4685/2020 and in force. However, it is located within the Important Bird Area (BSA) 'Filiouris Valley and Eastern Rhodopes' with code GR008.

In addition, it is noted that the area has been classified as a forest, according to the Decision of the Forestry Directorate of the Forestry Directorate No. 1197/29-01-2021.

Rodopi (IDA: Ω2ΩΝΟΡ1Υ-ΚΝ7), and based on the Decision No. 367908/18.10.2022 Ratification of the forest map of the Municipal and Local Units of the Municipalities of Komotini, Iasmos, Maronia-Sapes and Arrianon of the P.E. Rodopi of the Secretary General of Forests of the Ministry of Environment and Energy (Government Gazette 885/D/2022)

8.5.2 Vegetation-ecosystems

8.5.2.1 Vegetation and vegetation types

The wider study area has a rich and diverse flora with interspersed thermophilic subcontinental deciduous forests. The pronounced variability of the climate and its dependence on specific soil and microclimatic conditions play a key role in shaping the vegetation.

An important feature of the study area is the absence of strong anthropogenic influence, since it is mainly forested land.

In terms of general phyto-sociological classification, according to Mavromatis (1978) (**Figure 0-1**), in the immediate area an Oromo-Mediterranean beech-hybrid fir conformation occurs.

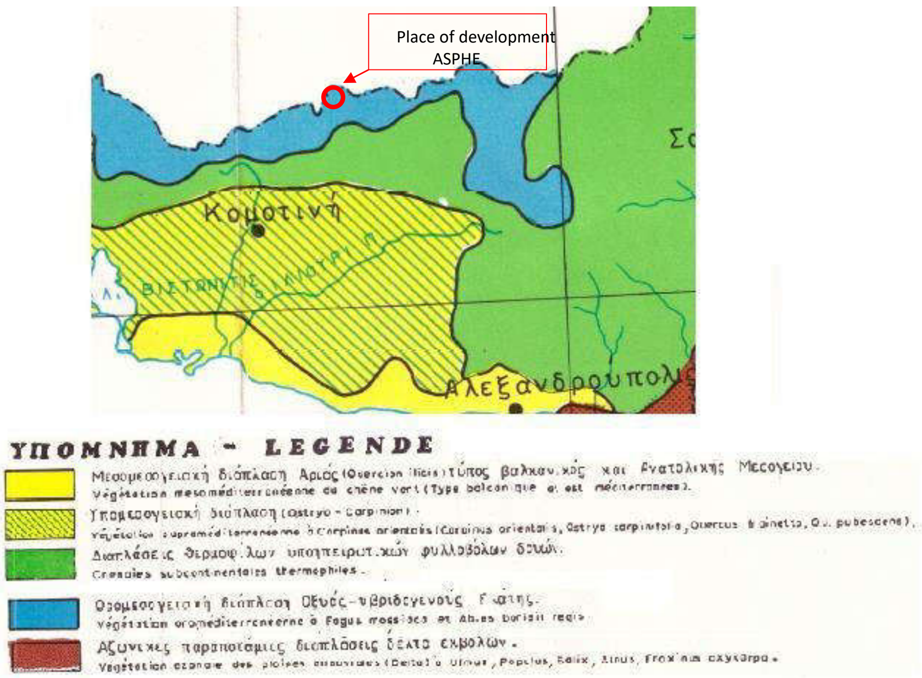


Figure 8.5- 1: Extract from the Vegetation Map of Greece (Mavromatis 1978)

This structure characterizes the largest part of the immediate study area and is composed of beech and deciduous oak forests.

The wider study area, based on the above division and other vegetation classification studies in Greece (Dafis, 1973), belongs to the zone with interspersed thermophilous subcontinental deciduous oaks.

In more detail about the vegetative formations:

A. Beech forests

Beech (Fagus sylvatica) forest ecosystems occupy a particularly important place in the vegetation of the mountains of central and northern Greece. It is the species that constitutes the dominant forest vegetation in the midlands of central-western Europe, with a distribution that extends to the Mediterranean massifs. The great competitive capacity of beech on medium, fertile stands on a variety of rocks, combined with its resistance to shading, is the reason for its wide distribution, often to the detriment of other species, which it displaces, forming final plant communities in pure stands.

B. Hybrid spruce forests

The hybrid fir forests are mainly spread in the central Pindos. This species is more demanding in stand conditions than A. cephalonica and, while in southern Greece it occurs sporadically, further north to the border it forms pure or mixed stands with other cold-hardy species (Dafis 1973, Athanasiadis 1986a).

C. Deciduous woodland

Deciduous oak forests are the main component of the riparian vegetation, as they currently cover about half of the country's forest area (44%) and 76% of the deciduous forests (Dafis 2005). Most of them are found in a pre-mature form and managed, while few are mature, constituting high seeded forests. Among them are notable examples of preserved remnant stands and alylls that were previously set aside from management for religious reasons (Korakis et al. 2008; K. Stara and R. Tsiakiris 2010 personal communication). Their traditional use includes charcoal burning and branching, especially in the regions of Western Macedonia and Thrace (Dafis 2005). Nowadays, according to Bergmeier and Dimopoulos (2008), most of the premature forests are older than 20 years, which is the usual age of the stand, and efforts are being made by the Forest Service to reduce them, where the stand allows, to more productive management forms.

8.5.2.2 Ecosystems

In the immediate study area of the intervention fields and the accompanying road and underground public transport network works. artificial (road network - transport infrastructure - industrial areas) and natural (bush, forest, hardwood vegetation, rock) ecosystems can be identified, while in the wider area artificial (road network - transport infrastructure) ecosystems can be distinguished, settlements), intermediate (crops with or without hedges) and natural (bush, woodland, hardwood, rocky slopes with or without vegetation, deciduous broadleaf species, natural grassland, mixed forest, grassland) ecosystems. The identification of these ecosystems is based on the type and levels of energy inputs (human interventions, solar radiation) (Odum, 1993).

8.5.3 Flora and fauna

8.5.3.1 Flora

Regarding the species and forms of vegetation recorded in the area are the following:

A. Broadleaf forest. A vegetation formation consisting mainly of trees, including sub-storey shrubs, dominated by broad-leaved species. Crown cover density is > 30 % or at least 500 individuals/acre density, with broadleaf trees accounting for > 75 % of the formation and a minimum tree height of 5 m.

B. Land mainly covered by agriculture with significant areas of natural vegetation. Areas predominantly occupied by agriculture, interspersed with significant natural or semi-natural areas (including forests, shrubs, wetlands, water bodies, mineral outcrops) in a mosaic pattern.

D. Natural pastures
Areas with herbaceous vegetation (maximum height = 150 cm) covering at least 50 % of the surface. In addition to herbaceous vegetation, there are also areas of scrubby, scattered trees.

E. Σκληροφυλλική βλάστηση
Θαμνώδης σκληρόφυλλη βλάστηση σε υψηλό επίπεδο ανάπτυξης. Συμπεριλαμβάνεται και το είδος maki.

F. Transitional wooded scrubland. Transitional scrub and herbaceous vegetation with occasional scattered trees. May represent forest degradation, forest regeneration/recolonization, or natural succession.

Areas representing the natural growth of forest formations, consisting of young broad-leaved and coniferous plants, with herbaceous vegetation and scattered solitary adult trees. The transition process can be for example natural succession on abandoned agricultural land, forest regeneration after damage of different origin (e.g. storm, avalanche), stages of forest degeneration caused by natural or anthropogenic stress factors (e.g. drought, pollution), reforestation after pruning and in formerly non-forested natural or semi-natural areas, etc.

8.5.3.2 Fauna other than avifauna

In the study area, the fauna can be considered to be at normal levels in terms of the quantity and variety of animals living in or passing through the county. Slight disturbance to the ecosystem balance has been caused by anthropogenic interventions (overgrazing, clear-cutting, cultivation), the restoration of which will improve the survival of existing species. The following species are expected to be present in the study area:

Amphibians

Green frog (Bufo viridis), Tree frog (Hyla arborea) etc. The above species are species of Annex IV of Directive 92/43/EC. They are species of Community interest that require strict protection by Member States by taking the necessary measures to prohibit any form of capture or killing on purpose, intentional harassment and damage or destruction of breeding and resting sites (H.P. 44105/1398/E.103/25-07-2013).

Reptiles

Lizardfish (Pseudopus apodus), Cyrtopodion kotschyi, Hemidactylus turcicus, Green lizard (Lacerta trilineata), Common viper (Vipera ammodytes), Aegean lizard (Podarcis erhardii), Lyconium (Chalcides occelatus), Hogfish (Telescopus fallax), Water snake (Natrix tesselata), Tree snake (Coluber gemonensis), River turtle (Mauremysri vulata), etc.α.

Mammals

Hedgehog (Erinaceus concolor), Hare (Lepus europaeus), Wild rabbit (Oryctolagus cuniculus), Little Mole (Spalax leucodon), Mole (Rattus rattus), Common Shrew (Crociduras uaveolens), Badger (Meles meles), Skunk (Martes foina), Weasel (Mustela nivalis), Wood Mouse (Apodemus sylvaticus), Acanthus (Acomys minous), Rhinolophus hipposideros, Rhinolophus ferrumequinum, Rhinolophus euryale, Rhinolophus blasii, Rhinolophus mehelyi and Myotis capaccinnii, Myotis emarginatus, Myotis myotis, Myotis blythii, Miniopterus schreibersii etc.ά.

Invertebrates

The following species of lepidoptera are expected to be present in the study area: Iphiclides podalirius, Papilio machaon, Pieris brasicae, Pieris rapae, Euchloe ausonia, Gonepteryx cleopatra, Leptidea sinapis, Lycaena phlaeas, Lampides boeticus, Celastrina argiolus, Aricia agestis, Polyom matusicarus, Nymfalis polychloros, Vanessa atalanta, Cyrinthia cardui, Polygonia aegea, Parangea egeria, Carcharodus alceae, Thymelicusaeteon and Gegene pumilio.

8.5.3.3 Bird fauna

The avifauna of the study area is of interest, as the considered ASPE and its accompanying projects are located within an area designated as an Important Bird Area, namely, within the SPA GR008 "Valley of Filliouris and Eastern Rhodope". At the same time, part of the underground interconnection line falls within the Wildlife Sanctuary - Wildlife Reserve - Wildlife Reserve. K805 "Patermon - Ada of the Municipality of Komotini".

Briefly, it is worth noting that this is an area in which twenty
(20) bird species which are:

- **Black vulture** (Aegypius monachus)
- **Golden eagle** (Aquila chrysaetos)
- **(Eastern) Basileus** (Aquila heliaca)
- **Black Stork** (Ciconia nigra)
- **Snake eagle** (Circaetus gallicus)
- **Steptococcus** (Circus macrourus)
- **Crane eagle** (Clanga pomarina)
- (**European) Bronze Crane** (Coracias garrulus)
- **Balkan woodpecker** (Dendrocopos syriacus)
- **(European) Curcinesis** (Falco naumanni) **- (European) Black Curkinese** (Falco vespertinus)
- **Oak woodpecker** (Ficedula semitorquata)
- **Vulture** (Gyps fulvus)
- **Common Eagle** (Hieraaetus pennatus)
- **Eagle-eye** (Lanius collurio)
- **Medium woodpecker** (Leiopicus medius)
- **Egyptian vulture** (Neophron percnopterus)
- **Buntsy** (Phylloscopus bonelli)
- (Common) Huhurist (Strix aluco)
- **Gull Cirrus** (Sylvia crassirostris)

This is a protected area with rich birdlife, which is analysed and evaluated in the Special Ecological Assessment Study, which is an integral part of this EIA.

8.5.4 Areas of the National System of Protected Areas of Law 3937/2011 (A' 60) and Law 1650/1986 (A' 160) as amended and in force

All of the projects of the ASPEE under study, as well as its development polygon are located outside the boundaries of the areas belonging to the National System of Protected Areas, such as Natura Areas, National Parks, Wildlife Refuges, Aesthetic Forests, Wetlands, etc.

The project is located within the boundaries of the northern part of the Important Bird Area GR0008 called "Filiouris Valley and Eastern Rhodopes".

In the wider area there is a Special Protection Area for birds (SPA) of the NATURA 2000 network called 'Filiouri Valley' and code GR1130011, at a distance of more than 10.5km east of the nearest A/E of the examined EAFM. In addition, at a distance of ~5km from the end of the project's interconnection line, the Special Conservation Area (SCA) of the NATURA 2000 network named 'River - Filliouris Valley' and code GR1130006 is also present.

The existing access road that is planned to be widened to meet the manufacturer's specifications, as well as the new road sections for access to the ASPHE site are located outside and at a significant distance from the GR1130011 "Filiouris Valley" SPA. Finally, with regard to the route of the underground MT interconnection line, most of it does not fall within a protected area, except for the part (~6.8km) which runs within and on the boundary of the Wildlife Sanctuary - WZ. K809 "Patermon - Ada of the Municipality of Komotini" (Government Gazette 842/B/03-07-01).

<u>Important Bird Area (SIA) GR008 'Filiouris Valley and Eastern Rhodope</u>'

The characteristics of GR008 according to its description form are as follows:

✓ <u>Geographical</u> location

41° 13' 3.491" N

25° 41' 34.680" E

✓ Area: 82529 ha

✓ Maximum altitude: 1195.0 m

✓ Minimum altitude: 0 m

✓ Administrative affiliation: Region of Eastern Macedonia - Thrace

The SPA where the project is located is within the administrative boundaries of the P.E. Rodopi and the Municipality of Komotini and the Municipality of Arrianon. The area encompasses the hills of south-eastern Rhodope and the valley of the river Filiouri. The dominant vegetation is maquis, with scattered clumps of grazing oak (*Quercus* spp.). The isolation of this mountainous area to date has not allowed it to develop (network of forest roads, other types of development and management interventions), so that the character of the landscape has not yet been altered. The main land uses in the area remain traditional - extensive (agriculture, livestock farming) and contribute to the conservation of biodiversity. It is only in recent years that some infrastructure (e.g. roads) has begun to be created to serve the local population.

For SPA GR008 the habitat types occurring in the SPA GR008 are not available. The percentage of habitat coverage according to data from the Hellenic Ornithological Society is as follows: Forests (36,6 %), Shrublands (33,6 %), Artificial landscapes (19,6 %), Grasslands/Bosque (6 %), Rocky areas (3,8 %), Wetlands (inland) (0,1 %). In more detail, according to the CORINE Land Cover 2018 data, the SPP is 29.73% covered by Hardwood Forest (323), 27.90% by Broadleaf Forest (311), 16.64% by Land covered mainly by agriculture with significant areas of natural vegetation (243), 7.31% by Conifer Forest (312), 6.00% Natural Grasslands (321), 3,73% from Land with sparse vegetation (333), 2,83% from Transitional shrub-forest land (324), 2,64% from Non-irrigated - arable land (211), 1,81% from Industrial or commercial zones (121), 0.65% from Mixed forest (313), 0.53% from Road/rail networks and adjacent land (122), 0.12% from Grassland (231) and 0.11% from Water collections (512).

The main threats that have been recorded in the area are the increasing construction of roads, intensification of forest exploitation (clear-cutting, removal of mature and dead trees), poaching, the use of poisoned baits which creates a significant problem for scavenging predators and, locally, overgrazing.

The species recorded in this area are the following:

Black vulture Aegypius monachus

Golden eagle Aquila chrysaetos

(Eastern) Kingfisher Aquila heliaca

Black Stork Ciconia nigra

Snake eagle Circaetus gallicus

Common Gull Circus macrourus

Craig Eagle Clanga pomarina

(European) Bronze Crane Coracias garrulus

Balkan woodpecker Dendrocopos syriacus

(European) Currinesi Falco naumanni

(European) Black guillemot Falco vespertinus

Oak flycatcher Ficedula semitorquata

Vulture Gyps fulvus

Gull Hieraaetus pennatus

Eagle-eye Lanius collurio

Medium woodpecker Leiopicus medius

Egyptian vulture Neophron percnopterus

Mountain pondweed Phylloscopus bonelli

(Common) Strix aluco (common)

Gyrfalcon Sylvia crassirostris

Special Protection Area (SPA) GR1130011 'Filiouri Valley'

The characteristics of the SPA GR1110009 according to the Natura 2000 datasheets are as follows:

- ✓ Geographical location

  Latitude: 40.919326

  Longitude: 26.032907

- ✓ Area: 37565.90ha
- ✓ Maximum altitude: 1225.0 m
- ✓ Minimum altitude: 56.0 m
- ✓ Administrative affiliation: Prefecture of Rodopi

It is a zone that encompasses the catchment area of the Filiouri River and the surrounding hills in the southeast of the Rhodope Mountains. It is an important area because it is home to several species of predators which use the sites of the zone for breeding. Priority and protected species include the Egyptian vulture (Neophron percnopterus), the vulture (Gyps fulvus), the black vulture (Aegypius monachus), the snake eagle Circaetus gallicus, the king eagle (Aquila heliaca) and the golden eagle (Aquila chrysaetos), Ciricinese (Falco naumanni), Balkan warbler (Dendrocopos syriacus), Middle warbler (Dendrocopos medius medius), Oak grosbeak (Ficedula semitorquataurio), Eagle-eye (Lanius collurio), Red-breasted Grosbeak (Emberiza hortulana). As regards the types of vegetation found in the area, the main form is shrubs and also the oak bush. The land use of the area is traditional and non-intensive.

The main threats to the species hosted by the SPA consist of the illegal use of poison baits for predators, road construction, deforestation, intensive forest management and illegal hunting.

The species recorded in this area are the following:

Shark (Accipiter brevipes)

Black vulture (Aegypius monachus)

Alcyona (Alcedo atthis)

Chamomile (Anthus campestris campestris)

Goldfinch (Aquila chrysaetos chrysaetos)

Basileus (Aquila heliaca heliaca)

Crabeater (Aquila pomarina)

Bubo bubo (Bubo bubo)

Cuckoo Shrike (Buteo rufinus rufinus)

Glow-worm (Caprimulgus europaeus)

White-throated stork (Ciconia ciconia)

Black stork (Ciconia nigra)

Squid (Circus aeruginosus)

White-tailed gull (Circus cyaneus)

Steptococcus (Circus macrourus)

Common Cormorant (Circus pygargus)

Bronze Crane (Coracias garrulus)

Intermediate ciclid (Dendrocopos medius medius)

Salamander (Dendrocopos syriacus)

Vlach (Emberiza hortulana)

Black-backed Gull (Falco eleonorae)

Curcinesis (Falco naumanni)

Peregrine Falcon (Falco peregrinus brookei)

Crested flycatcher (Ficedula albicollis)

Ficedula parva parva (Ficedula parva parva)

Oak woodpecker (Ficedula semitorquata)

Gypaetus barbatus aureus (Gypaetus barbatus aureus)

Vulture (Gyps fulvus)

Crossbill (Hieraaetus pennatus)

Hippolais olivetorum (Hippolais olivetorum)

Eagle-eye (Lanius collurio collurio)

Thistlehead (Lanius minor)

Tree star (Lullula arborea arborea)

Egyptian vulture (Neophron percnopterus)

Wasp (Pernis apivorus)

Scissortail (Sylvia nisoria nisoria)

Special Conservation Area (SPA) GR1130006 "Filiouros River"

The characteristics of the SPA GR1130006 according to the Natura 2000 datasheets are as follows:

✓ Geographical location

Latitude: 41.100139

Longitude: 25.653147

✓ Area: 2058.44ha

✓ Maximum altitude: 624.0m

✓ Minimum altitude: 5.0m

✓ Administrative affiliation: Prefecture of Rodopi

It is a steep valley, which adjoins the Evros Mountains. It consists of oak forests and pastures. The core of the area is the Lissos River, which is long and consists of many streams. Several stretches of riparian forest are found along the river, especially along the river and within various farmland cultivation areas. The Lissos River supplies fresh water to the wetlands closest to the sea, which are located in the marshes.

The area is rich in birds of prey such as Egyptian vulture (Neophron percnopterus), vulture (Gyps fulvus), snake eagle (Circaetus Gallicus), crane eagle (Aquila pomarina), golden eagle (Aquila chrysaetos chrysaetos) and possibly, crossbill eagle (Hieraaetus pennatus). It is also an important feeding area for vultures. The species Black-backed Nightjar (Ciconia nigra), Midge (Dendrocopos medius medius) and Lesser Spotted Vulture (Hippolais olivetorum) also breed in the area.

Threats to the protected area and its species are mainly due to excessive reforestation of pine trees in open oak forest, road construction, and modern forms of development in general.

The species recorded in this area are the following:

Notable Mammals

Wolf (Canis lupus)

Buzzard cat (Felis silvestris morea)

Otter (Lutra)

Skunk (Martes foina)

Badger (Meles)

Weasel (Mustela nivalis galinthias)

Remarkable Amphibians/Reptiles

Ablepharus kitaibelii fabichi (Ablepharus kitaibelii fabichi)

Red goby (Bombina)

Cumin (Coronella austriaca)

Lafite (Elaphe quatuorlineata)

Swallowtail **turtle** (Emys orbicularis)

Tree frog (Hyla arborea)

Tranosaurus of Ikaria (Lacerta trilineata cariensis)

Greensaur (Lacerta viridis meridionalis)

Sapite (Malpolon monspessulanus insignitus)

River turtle (Mauremys caspica rivulata)

Cuvofid (**Natrix** tessellata)

Grey turtle (Testudo graeca ibera)

Onyx turtle (Testudo hermanni)

Viper (Vipera ammodytes meridionalis)

Remarkable Fish

Chalcalburnus chalcoides macedonicus (Chalcalburnus chalcoides macedonicus)

Tyrannulet (Leuciscus cephalus albus) [referring to the subspecies *Macedonicus*] **Moorhen** (Rhodeus sericeus amarus)

The following areas are also located in the wider study area:

- Wildlife Sanctuary 'Patermma-Adas of the Municipality of Komotini' with code K805, at a distance of 2.1 km southwest of the nearest ASPEO A/G.
- Wildlife Sanctuary (Wildlife Sanctuary) 'Nymphaia Municipality of Komotini' with code K799, at a distance of more than 16.8 km southwest of the nearest ASPEO A/G.
- Wildlife Sanctuary (WSA) 'Arrianon - Nea Sata D. Arrianon-Sapes' with code K798, at a distance of more than 22 km southeast of the nearest A/C of ASPEO.

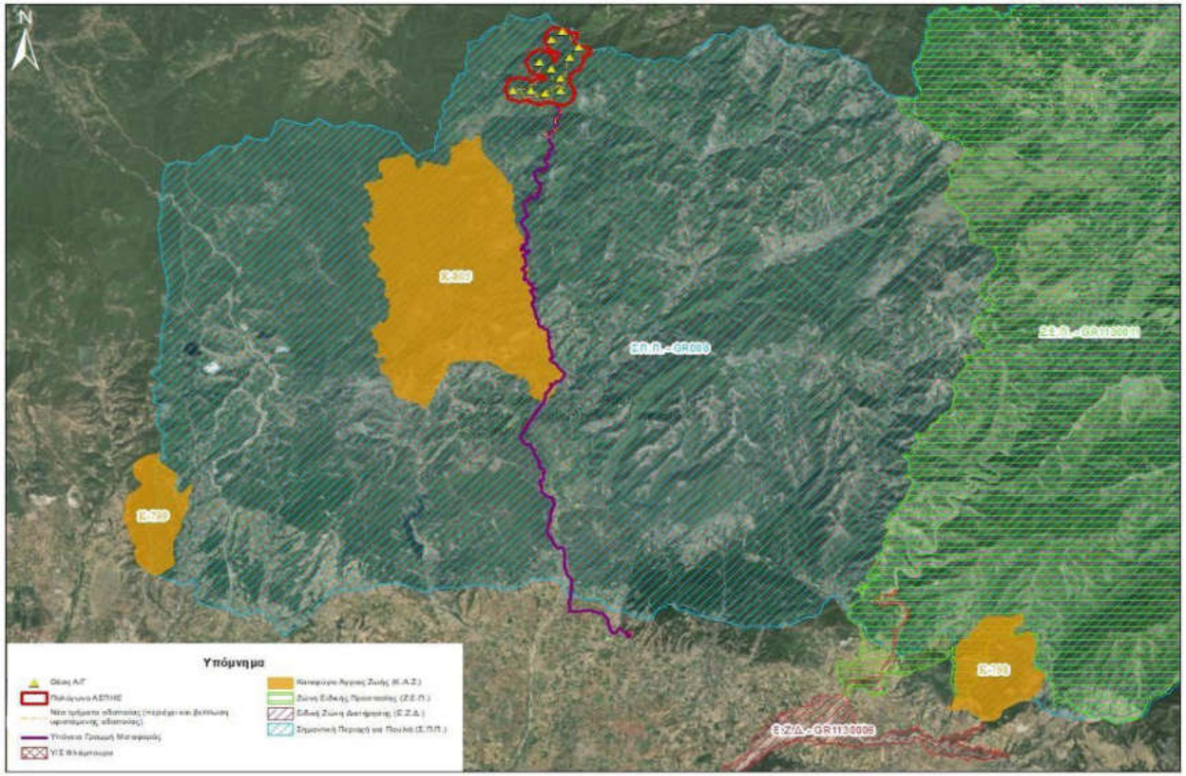


Figure 8.5- 2: Protected areas in the immediate and wider study area

Protected Areas of a neighbouring State

The project is located on the Greek-Bulgarian border. Specifically, the nearest A/C is located at a distance of ~170m.

On the territory of Bulgaria, there is a designated Natura 2000 Protected Area.

This is the area called "Rodopi - Iztochni" and code BG0001032 - S.C.I. Using the Greek terminology, this area falls under the Special Conservation Zones
(E.Z.D.).

The characteristics of the S.C.I. - BG0001032 according to the Natura 2000 Standard Forms (S.C.I.) are the following:

✓ Geographical location

Latitude: 41.505000
Longitude: 25.846000

✓ Area: 217446.9973 ha

✓ Administrative affiliation: Yuzhen Tsentralen District

This Natura 2000 site protects 45 species of fauna and 1 species of flora as well as 27 habitat species.

As far as the species protected are concerned, they are the following:

Flora

Orchid (Himantoglossum caprinum (M.Bieb.) Spreng)

Fauna

Mammals:

Grey Wolf (Wolf Canis lupus), Mouse-tailed dormouse, Lesser mouse-eared bat Myotis blythii, Bechstein's bat , Barbastelle - Barbastella barbastellus, Schreiber's Bat Miniopterus schreibersii, Long-fingered bat Myotis caaccinii, Geoffroy's bat - Myotis emarginatus, Greater mouse-eared bat, Blasius' horseshoe bat - Rhinolophus blasii, Mediterranean horseshoe bat, Greater horseshoe bat - Rhinolophus ferrumequinum, Greater horseshoe bat Rhinolophus euryale, Lesser horseshoe bat - Rhinolophus hipposideros, Mehely's horseshoe bat - Rhinolophus mehelyi, European souslik (Spermophilus citellus), Eurasian brown bear (Ursus arctos), Marbled polecat (Vormela peregusna), Eurasian otter (Lutra lutra)

Amphibians:

Yellow-bellied toad (Bombina variegata), Triturus
Karelinii), ,

Reptiles:

European pond terrapin (Emys orbicularis), Caspian terrapin (Mauremys caspica), Mediterranean spur-thighed tortoise (Testudo graeca)

Invertebrates:

Πετροκαραβίδα (Austropotamobius torrentium), Κεράμβυξ ο κέρδος (Cerambyx cerdo), Dioszeghyana schmidtii, Coenagrion ornatum, Eriogaster catax, Πεταλούδα των Ελών (Marsh Fritillary - Euphydryas aurinia), Πεταλούδα της Ρόδου (Euplagia quadripunctaria), Λουκανίδα (Stag beetle), Χαλκούχα λύκαινα του έλους (Large Copper), Μόριμος ο πένθιμος (Morimus funereus), Ερημίτης (Osmoderma eremita), Paracaloptenus caloptenoides, Probaticus subrugosus, Ροσάλια η αλπική (Rosalia alpina), Unio crassus,

Fish:

Egyptian vulture (Aral asp - Aspius), Thracian bryozoan (Barbus cyclolepis), Spined loach (Barbus cyclolepis), Spined loach (Barbus cyclolepis)
Cobitis taenia), Murmurica (Rhodeus Amarus), Golden loach (Sabanejewia aurata),

Table 8.5-1 below summarises the habitat types that are protected in this area.

Table 8.5- 1Habitats of the Protected Area "Rodopi - Iztochni" (BG0001032)

LIST OF HABITATS PROTECTED IN BG0001032		
CODE	**NAME**	**AREA (ha)**
3140	Hard, oligo-mediterranean waters with juniper vegetation	0.02055
3260	Water streams of plains (up to mountainous levels) with vegetation	272509
5130	Cypresses in heather or calcareous grassland	361.36
5210	Shrubs of juniper trees	3022.77
6110	Littoral calcareous or basophilic grasslands of Alysso-Sedion albi	144.08

6210	Semi-natural dry grasslands on calcareous substrates (Festuco-Brometalia) (*important areas with orheids	634.1
6220	Pseudosteppe with grasses and annuals of Thero-Brachypodietea	14107
6430	Hygrophilic communities with high drinking rates	1.96
6510	Low-altitude coppice (Alopecurus pratensis, Sanguisorba officinalis)	44.68
6520	Mountain hay meadows	71.69
8210	Mossy vegetation of limestone cliffs	457.19
8220	Pyrite rocky slopes with grassy vegetation	690.07
8230	Precursor vegetation on siliceous rocky surfaces of Sedo Scleranthion or Sedo albi-Veronicion dillenii	1479.93
8310	Caves which are not exploited for tourism	0
9130	Beech forests of Asperulo-Fagetum	1141.67
9150	Meso-European calcareous beech forests of the Cephalanthero-Fagion	341.59
9170	Eastern oak-black oak forests	4166
91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	761064
92A0	Forest-storage with Salix alba and Populus alba	2.16
92C0	Platanus orientalis and/or Liquidambar orientalis (Platanion orientalis) forests	31.15
92D0	Southern riparian galleries and thickets of tamarisk (Tamarix), oleander (Nerium oleander), wattle and daub (Vitex agnus-castus) and similar woody formations in continuous or intermittent streams and wetlands	50.0128
9530	Sub-Mediterranean black pine forests	98.06
62A0	Sub-continental, dry to semi-dry grasslands	4222.09
91M0	Pannonic oak forests with Quercus cerris and/or Quercus petraea	63263.2
62D0	Mountain acid grasslands	6.55
91W0	Beech forests of Moesia	6552.68
91AA	Eastern white oak	14225.9

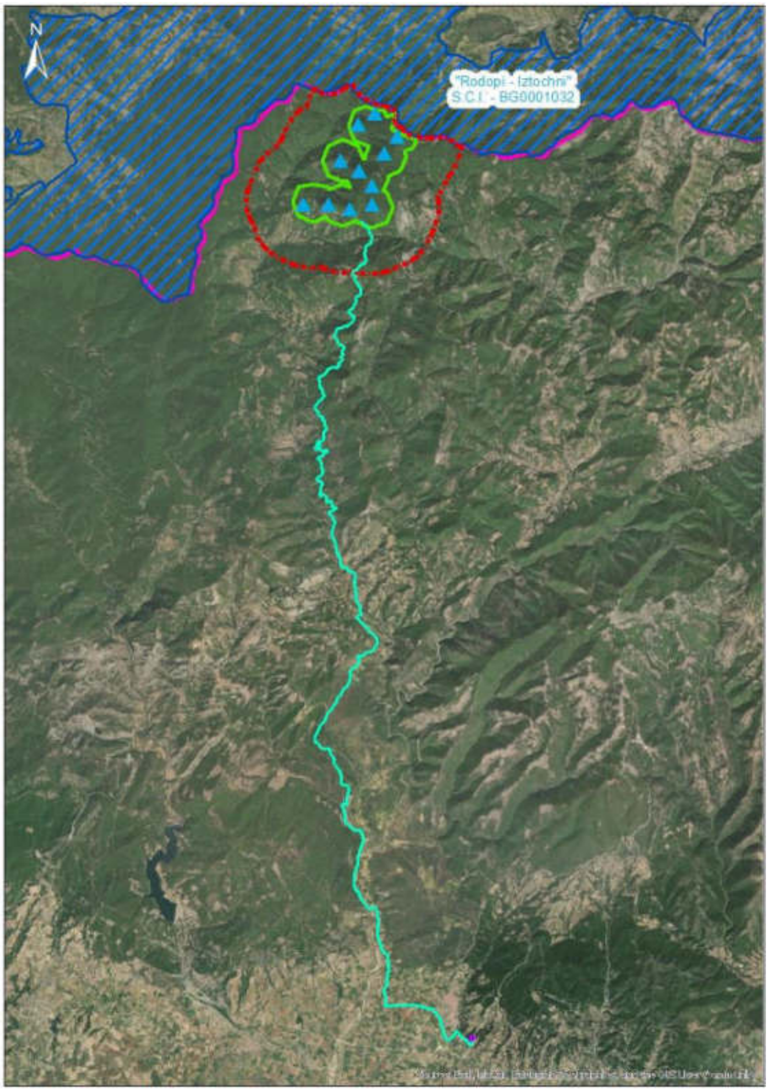


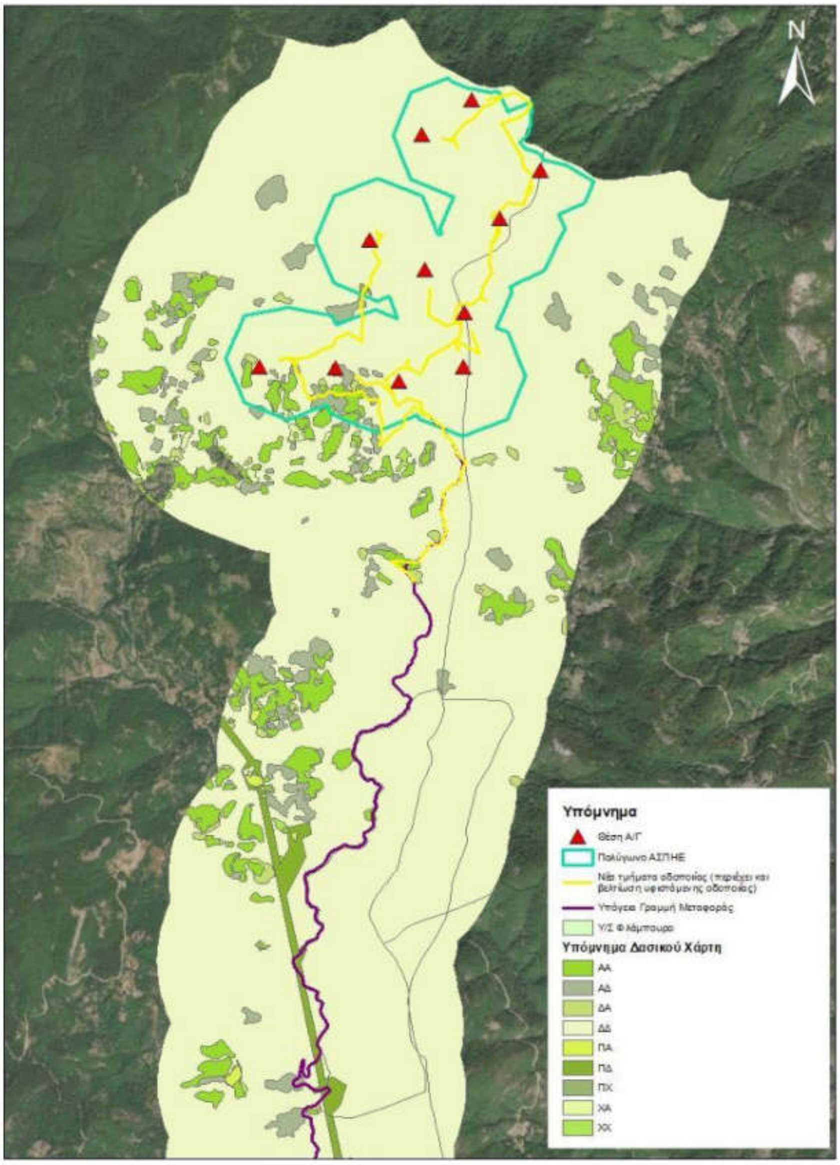
Figure 8.5- 3: Protected areas in the territory of Bulgaria falling within the immediate study area of the project (**Source: https:**//natura2000.egov.bg)

Chapters 9 and 10 of this study further examine and assess the potential impacts of the proposed ESDS on the above species, as well as the measures to prevent and address these potential impacts.

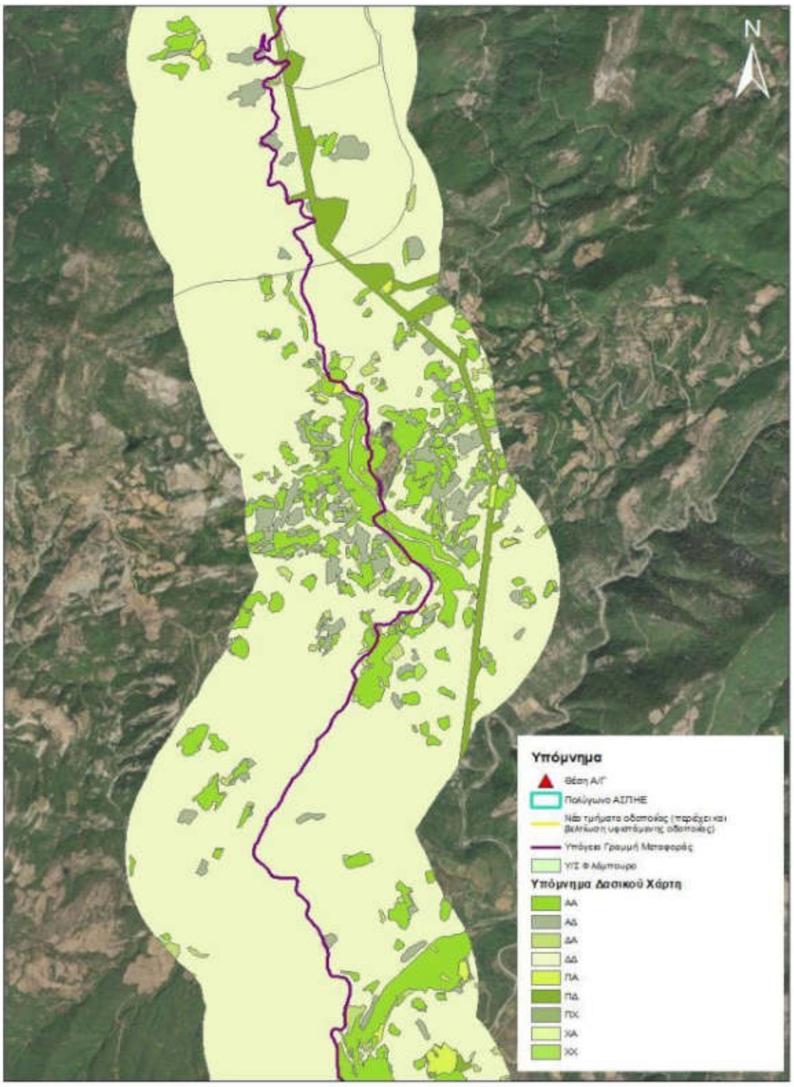
8.5.5 Forests and woodlands

According to the posted Forest Map of the Municipal and Local Communities of the Municipalities of Komotini, Iasmos, Maronia-Sapes and Arrianon of the Prefecture of Rodopi, the area of the polygon of the installation of the Gensets of the ASPIE under study is mainly characterized as forest and woodland (forests and woodland in the aerial photographs of older or previous data and forests/woodland in the aerial photographs of recent photos and in the autopsies). In smaller parts, to the south-west of the project, it is classified as AD (other landforms/cover in the aerial photographs of the earlier aerial photographs and forest/woodland in the aerial photographs of the recent and autopsies), AA (other landform/cover in old and recent aerial photographs & autopsies) and DA (forest and woodland in old aerial photographs or pre-existing data and other landform/cover in recent aerial photographs & autopsies).

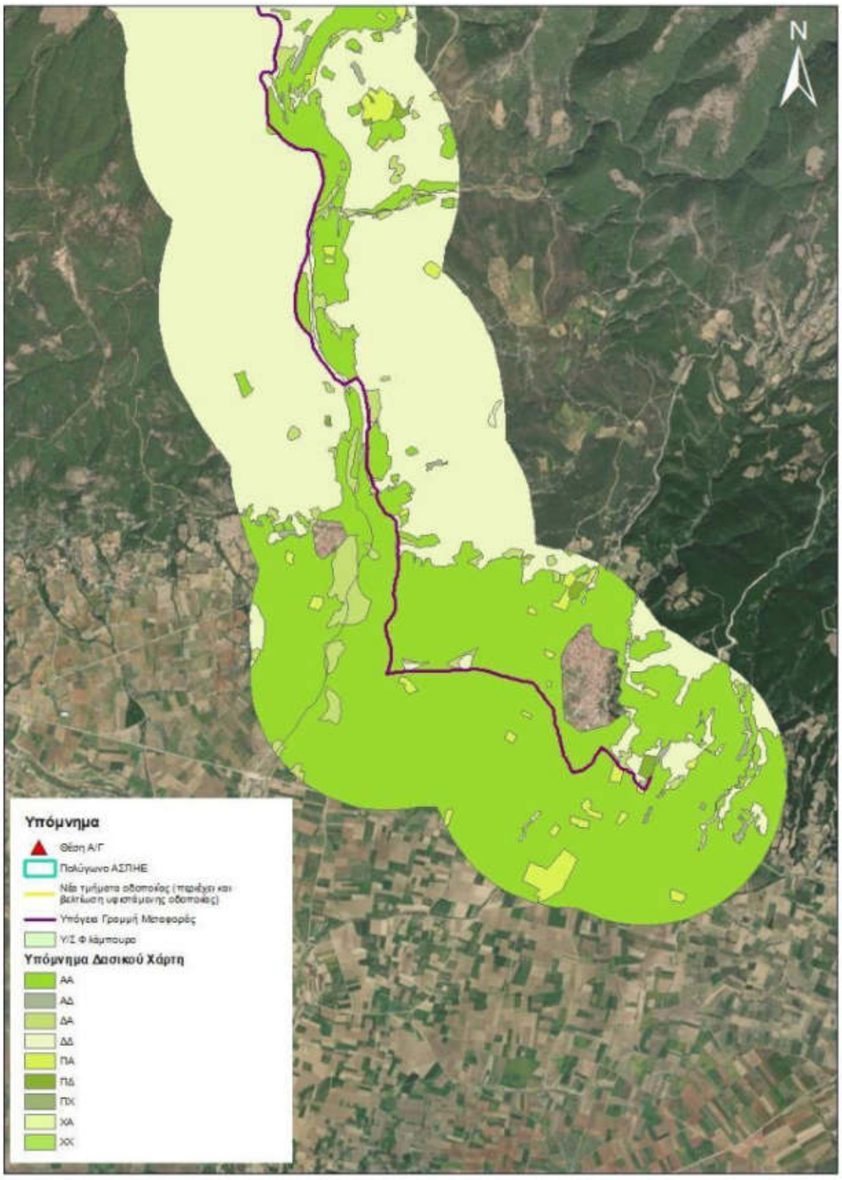
The medium voltage interconnection line will be built alongside the road network, on existing rural, forest and country roads. Regarding the licensed polygon of the installation of the ASPIE and the access road, the project developer has received the Certificate No. 427492/22-11-2022 of the Forestry Directorate of the Prefecture of Rhodope, which certifies the above, which concerned the previous design of the project as regards the route of the interconnection line.



EXTRACT 1 OF 3



EXTRACT 2 OF 3



EXTRACT 3 OF 3

ΠΔ	Δασική Έκταση (με Τελεσίδικη Απόφαση)
ΔΔ	Δασικές Εκτάσεις στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Δασικές Εκτάσεις στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΔΑ	Δασικές Εκτάσεις στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Άλλης Μορφής Κάλυψη στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΑΔ	Άλλης Μορφής Κάλυψη στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Δασικές Εκτάσεις στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΧΑ	Χορτολιβαδικές Εκτάσεις στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Άλλης Μορφής Κάλυψη στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΧΧ	Χορτολιβαδικές Εκτάσεις στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Χορτολιβαδικές Εκτάσεις στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΠΧ	Χορτολιβαδικές Εκτάσεις (με Τελεσίδικη Απόφαση)
ΑΑ	Άλλης Μορφής Κάλυψη στις Α/Φ παλαιότερης λήψης ή προϋφιστάμενα στοιχεία
	Άλλης Μορφής Κάλυψη στις πρόσφατες Α/Φ, ή Αυτοψίες, ή στους Κτηματικούς Χάρτες του Ν. 248/1976
ΠΑ	Μη Δασική Έκταση (με Τελεσίδικη Απόφαση)

Figure 8.5- 4: Classification categories of forest and non-forest land in the study area (Extract 1 to 4)

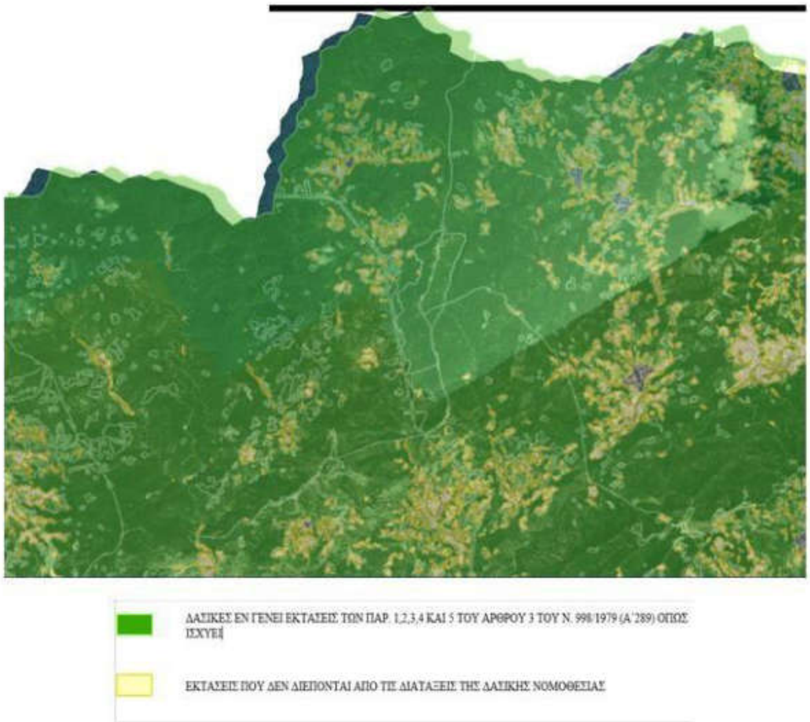


Figure 8.5- 5: Validated Forest Map in the wider area of the P.E. Rodopi

8.6 MAN-MADE ENVIRONMENT

8.6.1 Statutory settlement boundaries and approved urban plans

Examination of the study area, as well as the wider area, reveals that **the project is located outside of settlement boundaries and outside of city plans**.

In the study area and in the wider area the following are found:

- At a distance of more than 8.1km and to the south of the ASPEO, the designated settlement 'Drymi' is located, with a permanent population of 302 inhabitants according to the 2011 census.

- at a distance of > 9.1 km from the project is the settlement of Ardeia, with a permanent population of 27 inhabitants according to the 2011 census.

Other settlements close to the considered ESDP, the boundaries of which are of course not established, are:

- "*Sarakinis*", at a distance of more than 1000m to the southwest of the project and,
- *"Upper Kardamos"*, at a distance of more than 2500m to the east of the Wind Farm under study

8.6.2 Spatial planning-Land use

8.6.2.1 Established land uses

This section presents information regarding the existing land uses of the wider study area.

As stated above, the study area is not located within the boundaries of settlements and approved urban plans. In particular, the settlement of Drymi is located more than 8.1 km from the project, and the designated settlement of Ardeia is located more than 9.1 km away. The settlement of Ano Drosini is located more than 11.1km south of the location of the ASDP. Furthermore, the settlement Kato Drosini, which is a pre-1923 settlement, is located at a distance of more than 7.7 km, as well as the settlement Patterma, which is located at a distance of more than 11.1 km southwest of the location of the considered RESEO, which is a pre-1923 settlement, as confirmed by the Technical Service of the Municipality of Arriana.

It is worth noting that the nearest approved General Urban Plan to the study area has been approved in the Municipality of Komotini by the Decision of the Deputy Minister of Environment, Energy and Climate Change (Government Gazette 52/AAP/2012), which is located at a distance of more than 21.6km.

8.6.2.2 Existing land use

The land use by Corine Land Cover 2018 of the study area is depicted in the figure below. The following land covers (Corine 2018) are found in the study area:

- 122 Road/cycle networks and adjacent land
- 211 Non-irrigated-arable land
- 243 Land used mainly for agriculture, together with significant parts of agricultural vegetation
- 311 Broadleaf forest
- 312 Coniferous forest
- 313 Mixed forest
- 321 Natural pastures
- 323 Hardwood vegetation
- 324 Transitional woodland and scrubland
- 333 Areas with sparse vegetation

The study area, as shown in the figure below, is dominated by broadleaf forest and mixed forest, while in the wider area there are also areas of land used for cultivation and has significant parts of agricultural vegetation, as well as hardwood vegetation.

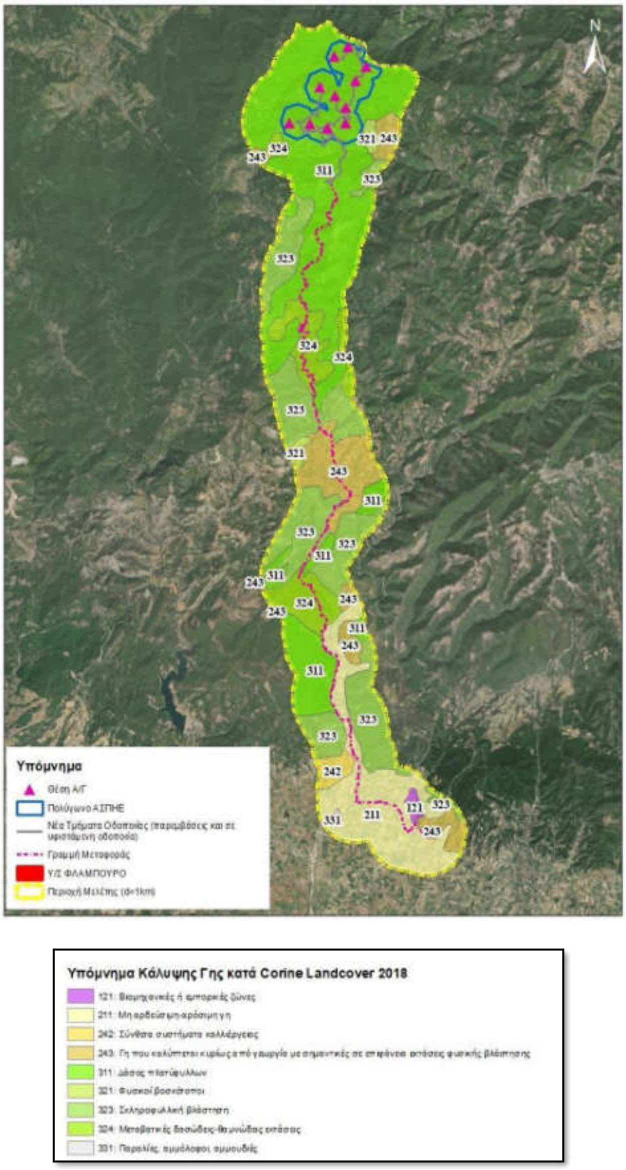


Figure 8.6- 1: Land cover map according to CORINE LAND COVER 2018

8.6.3 Structure and functions of the man-made environment

The structure, the main characteristics and functions of the wider project area, as shaped by the established and existing land uses, as well as the current zoning and urban planning regulations, have been presented in detail in previous sections.

8.6.4 Cultural heritage

The Polygon of the installation of the ASPIE under study is located outside declared archaeological sites and monuments. Also, according to the data of the Archive of Traditional Settlements and Listed Buildings of the Ministry of Environment and Energy[1] , in the study area there are no traditional settlements or protected parts of settlements due to their special urban, aesthetic, historical, folklore or architectural character.

According to the Permanent List of the Declared Archaeological Sites and Monuments of Greece[2] , the following areas of archaeological interest are listed, which are located within a sufficient distance from the project site:

- Monument of the Fortified enclosure of Asar-Tepé Sarakinis in Rodopi (Government Gazette 468/B/1981), at a distance of >1.4km southwest of the project.
- Archaeological site Kale Tepe Nymfaias hill in Rodopi (Government Gazette 731/B/1979) at a distance of >9.8 km southwest of the project.
- Kale-Teppe Nymphaea perimeter (Government Gazette 731/B/1979) at a distance of >13.7 km southwest of the project.

In the wider area of the Municipality of Komotini there is a plethora of monuments and sites of archaeological interest, according to the Archaeological Cadastre, as shown in the following picture.

Figure 8.6- 2: Sites of archaeological interest in the region

(Source: National Monuments Archive - **https://www.arxaiologikoktimatologio.gov.gr/**)

The following table lists the sites of archaeological interest, according to the Permanent List of the Declared Archaeological Sites and Monuments of Greece, in the wider area of the project.

Table 8.6- 1: Sites of archaeological interest in the study area

Name of the Monument	Administrative Treatment	Protection regime
Historical listed monument Workhouse	DE Komotini	GOVERNMENT GAZETTE 63/B/1950
Byzantine walls of the city of Komotini	DE Komotini	FEK 239/B/1964, FEK 404/B/1965

Ruins of Byzantine walls of Gratianople (beyond the present village of Gratini)	DE Komotini	GOVERNMENT GAZETTE 239/B/1964
Archaeological site of the ruins of the ancient city of Maroneia and its walls, after of the town centre and the included within these premises	DE Komotini	GOVERNMENT GAZETTE 239/B/1964

Name of the Monument	Administrative Treatment	Protection regime
Archaeological site of the prehistoric tomb of Parade	DE Komotini	GOVERNMENT GAZETTE 239/B/1964
Historical monument of the Church of the Assumption of the Virgin Mary in Komotini	DE Komotini	GOVERNMENT GAZETTE 521/B/1968
Building in need of special state protection, the Mansion of the Hellenic Urban School (Tsanaklis Mansion)	DE Komotini	GOVERNMENT GAZETTE 136/B/1974
Byzantine fortress	DE Komotini	GOVERNMENT GAZETTE 731/B/1979
Ellipsoidal enclosure defence complex	DE Komotini	GOVERNMENT GAZETTE 731/B/1979
Roman baths and later cemetery (Arrianon)	DE Arrianon	GOVERNMENT GAZETTE 731/B/1979
The Peidou Mansion in Komotini (property of the Cultural Group)	DE Komotini	GOVERNMENT GAZETTE 750/B/1979
Prehistoric fortification enclosure at the Asar-Tepé Hill (Tash Hill)	DE Komotini	GOVERNMENT GAZETTE 468/B/1981
The building of the Jewish Community is a work of art Synagogue of Komotini (property of the Central Board of Jewish Communities)	DE Komotini	GOVERNMENT GAZETTE 888/B/1982
Work of art Building on Agios Georgios Street 42 (State-owned)	DE Komotini	GOVERNMENT GAZETTE 562/B/1983
Work of art Building on 15 Tsanaklis Street No. 15 (property of Aiko Tamaresi)	DE Komotini	GOVERNMENT GAZETTE 683/B/1984
Work of art Stalios Mansion on the street Kondyli no. 64 (owned by Afon Kyrazoglou)	DE Komotini	FEK 344/B/1985, FEK 795/B/1988
Work of art Archontiko Dermetzoglou at 23 Nestoros Tsanaklis Street	DE Komotini	GOVERNMENT GAZETTE 344/B/1985

Work of art Building on Tsanaklis street no. 6- Iliadis Mansion (owned by G. Antoniadis)	DE Komotini	GOVERNMENT GAZETTE 568/B/1985
Archaeological site of Papikio Oros	DE Komotini	FEK 364/B/1986, FEK 284/B/1987
The Hotel is a historical monument 'Astoria'	DE Komotini	GOVERNMENT GAZETTE 345/B/1990
Historical monument the building of the Tobacco warehouse at 8 Parnassos Street (owned by the Thrace Technical University of Thrace)	DE Komotini	GOVERNMENT GAZETTE 112/B/1992
The building on Ioakim III Street (owned by Ant. George) is a historical monument	DE Komotini	GOVERNMENT GAZETTE 594/B/1995
Work of art Smokehouse in the central square of Komotini (property of I. Kaldirimtzi)	DE Komotini	FEK 882/REV/1995, FEK 420/REV/1998
Historically preserved monuments and works of art five (5) buildings in Komotini along with the their surroundings	DE Komotini	FEK 1719/REV/1999
Historical place part of the traditional market of Komotini	DE Komotini	FEK 2059/REV/1999
Name of the Monument	**Administrative Treatment**	**Protection regime**
Historical monument and work of art Two-storey auxiliary building on Heroes Avenue (owned by the Ministry of National Defence)	DE Komotini	GOVERNMENT GAZETTE 793/B/2002
Historical monument and work of art building of the Old Division on Heroes Avenue (owned by the Ministry of National Defence)	DE Komotini	GOVERNMENT GAZETTE 793/B/2002
Building at the junction of Al. Simeonidis 4 and Byronos where the Archaeological Museum is housed Museum of Komotini (ΙΘ ' ΕΠΚΑ) (property of the Greek State)	DE Komotini	FEK 121/AAP/2011
Archaeological site of Dikaia at the sites 'Lasspotopos' and 'Fountain of Daout'	DE Komotini	FEK 298/AAP/2012

8.7 SOCIO-ECONOMIC ENVIRONMENT

8.7.1 Social environment

8.7.1.1 Demographics and trends

The area of the proposed project falls administratively under the Municipal Unit of Komotini of the Municipality of Komotini and the Municipal Unit of Organi of the Municipality of Arrianon, of the Regional Unit of Rodopi of the Region of Eastern Macedonia and Thrace. According to the provisional data of the most recent census of the permanent population of the country (2021), the population of the Municipality of Komotini corresponds to approximately 62.6% of the permanent population of the P.E. Rodopi, while the permanent population of the Municipality of Arrianon corresponds to approximately 14.3% of the same P.E. The table below shows the change in the permanent population between the 2011 and 2021 censuses of EL.STAT. at the level of the Region, P.E. and Municipalities.

Table 8.7- 1: Permanent Population by Gender (2021) in the Municipality of Soufli of the Regional Unit of Evros of the Region of Eastern Macedonia and Thrace

	Permanent Population (2021)				
	Total	Arenas		Theles	
		Number	%	Number	%
***Region of Eastern Macedonia & Thrac*e**	**562.069**	275.340	49,0%	286.729	51,0%
Regional Unity of Rodopi	104.262	50.607	48,5%	53.655	51,5%
Municipality of Komotini	65.243	31.436	48,2%	33.807	51,8%
Municipality of Arrianon	14.905	7.402	49,7%	7.503	50,3%

Source : EL.STAT 2021

The following table lists the demographic data of the Region of Eastern Macedonia and Thrace, the P.E. Rodopi, the Municipal Units and the Municipalities of Komotini and Arrianon, as well as their change between the two censuses 2001 and 2011 respectively.

Table 8.7- 2Demographic data of the Region of Eastern Macedonia & Thrace, the Regional Unit of Rodopi, the Municipalities of Komotini and Arrianon and the Municipal Units of Komotini and Organi, and changes in these figures during the period 2001-2011

	Permanent Population		
	2001	2011	Change 2001-2011

Region of Eastern Macedonia and *Thrace*	***620.613***	***608.****182*	*-2%*
Regional Unity of *Rodopi*	***111.237***	***112.****039*	***0****,7%*
Municipality of Komotini	61.501	66.919	8,8%
Municipal Unit of Komotini	53.719	60.648	12,9%
Municipality of Arrianon	18.259	16.577	-9,2%
Municipal Unit of Organi	2.865	2.183	-23,8%

The above table shows that in the Municipal Unit of Organi of the Municipality of Arrianon there was a significant decrease in the permanent population of 23.8%, which is much greater than the decrease in the Municipality of Arrianon for the same period (9.2%). At the same time, in the Municipality of Komotini there was an increase in the permanent population for the period 2001-2011 of 8.8%, while for the Municipality of Komotini there was a greater increase of about 12.9%. In the whole of the Rhodope Region for the period 2001-2011 there was a slight increase in the population of 0.7 %, while in the An. Macedonia and Thrace there was a decrease of 2 %.

The age composition of the Regional Unit of Rodopi during the 2011 census
is presented in the
Table 0-3. Specifically, it shows that the largest percentage of permanent residents belongs to age groups that potentially constitute the economically active population of the P.E. Rodopi.

Table 8.7- 3: Population of P.E. Rodopi by age group according to the 2011 census

		Population
Regional Unit of Evros		**112.039**
Age groups	0-29	38.537
	30-49	30.299
	50-69	26.659
	70+	16.544

Table 8.7- 4Population distribution in the Municipalities of Komotini and Arrianon by gender for the years 2011 and 2021

	Total population		Men		Women	
	2011	**2021**	**2011**	**2021**	**2011**	**2021**
Municipality of Komotini	**66.919**	**65.243**	**32.354**	**31.436**	**34.565**	**33.807**
Municipality of Arrianon	**16.577**	**14.905**	**8.183**	**7.402**	**8.394**	**7.503**

Source : EL.STAT 2011, 2021

Based on the above table, the largest percentage of the permanent population of the Municipality of Komotini is made up of women both in the 2011 census (51.7%) and in the 2021 census (51.8%). In addition, in the Municipality of Arrianon, the largest percentage of the resident population is again held by women both in the 2011 census (approximately 50.6%) and in the 2021 census (approximately 50.3%).

8.7.2 Productive structure of the economy

8.7.2.1 Primary sector

In the wider area, there is a wide range of productive activities in both agriculture and livestock farming. Naturally, the relief and geomorphology of the area play an important role in the development of the primary sector.

Specifically, tobacco, cotton and wheat are grown in Rodopi, while there are several crops of cereals, legumes and fruit and vegetables. In any case, there is potential for improving agricultural production, particularly through the use of modern technological tools.

In terms of livestock farming, cattle, pigs, sheep and poultry are mainly reared, presenting a generally stable picture.

8.7.2.2 Secondary sector

The secondary sector, as expected, is mainly developed in the Komotini area. These are mainly industries for the processing and standardisation of agricultural products. It should be noted that there is a general lack of know-how among the local population, which does not help the development of this sector.

It is also noted that in the whole of the Rhodope Region there are areas with mineral wealth, which remains untapped.

8.7.2.3 Tertiary sector

The tertiary sector is developing in the region, mainly in the tourism sector and the shift to alternative forms of tourism. In any case, there is cultural interest in the area, and local people could work together to strengthen the tourism sector and integrate technologies in the promotion of the tourism product.

Other sectors that have been on the rise in recent years are the wholesale and retail trade sector and the education sector.

8.7.3 Employment

The tables below list the available data on the number of people employed by sector of productive activity in the Municipality of Komotini and Arrianon, the P.E. Rodopi and the Region of Eastern Macedonia and Thrace.

Table 8.7- 5: Economically active population by sector of employment in the Region of Eastern Macedonia & Thrace, in the Regional Unit of Rodopi and the municipalities covered by project under consideration

Spatial unity	Economically active						Economically inactive
	Total	Employed				Unemployed	
		Total	Primary sector	Secondary sector	Tertiary sector	Total	
Region of Eastern Macedonia & Thrace	**234.579**	**187.306**	**38.787**	**30.892**	**117.627**	**47.273**	**373.603**
P.E. Rodopi	43.013	35.798	13.180	4.890	17.728	7.215	69.026
Municipality of Komotini	25.386	20.631	2.879	3.187	14.565	4.755	41.533
Municipality of Arrianon	7.232	6.658	5.532	368	758	574	9.345

Source : EL.STAT 2011

Table 8.7- 6Number of persons employed by economic activity (single digit) in Eastern Macedonia and Thrace, the P.E. Rodopi and the Municipalities of Komotini and Arrianon where the project area falls

	Sectors of economic activity										
	Total	A. Georgia, Forestry and Fisheries	F. Construction	Z. Wholesale and retail trade; Επισκευή μηχανοκίνητων οχημάτων κι μοτοσυκλετών	H. Transportation and Storage	Θ. Service activities Provided by accommodation and catering services	N. Administrative and supporting activities	Ξ. Δημόσια διοίκηση και άμυνα-Υποχρεωτική Social Security	O. Education	Π. Δραστηριότητες σχετικές με την human health and social care	Other sectors
Region Eastern Macedonia & Thrace	**187.306**	**38.787**	**9.924**	**27.778**	**5.881**	**11.673**	**3.469**	**26.110**	**14.995**	**10.677**	**38.012**
P.E. Rodopi	**35.798**	**13.180**	**1.357**	**4.276**	**774**	**1.735**	**448**	**3.868**	**2.454**	**1.467**	**6.239**
City of Komotini	**20.631**	**2.879**	**830**	**3.180**	**491**	**1.259**	**358**	**3.467**	**2.172**	**1.291**	**4.704**
City of Arrian	**6.658**	**5.532**	**111**	**299**	**92**	**109**	**12**	**33**	**107**	**36**	**327**

Source : EL.STAT 2011

The economically active population of the Region of Macedonia amounted to 234.579 people, of which 79.8% were employed according to the 2011 census of the National Statistical Office. Furthermore, the economically active population of the P.E. Rodopi amounted to 43.013 persons, of which 83,2% were employed according to the most recent available data of the 2011 census of EL.STAT.

The economically active population of the Municipality of Komotini amounted to 25.386 people, according to the latest available data of the National Statistical Office for 2011, of which 81,3% were employed. This percentage is clearly higher than that of the region and lower than that of the Rhodope Region. The largest share of the municipality's employees was employed in the service sector - tertiary sector with a share of about 70.6% of the employed. The manufacturing sector or secondary sector occupied the second place, in terms of the number of employees, reaching about 15.4%, while the primary sector of employment was the last with the least number of employees, with only 14%.

More specifically, for the Municipality of Komotini, the largest absolute percentage of employees was in the public administration and defence - compulsory social security sector (about 16.8%), followed by the wholesale and retail trade - repair of motor vehicles and motorcycles (about 15.4%). The other sectors follow with a significant gap, with agriculture, forestry and fishing employing the most people (around 14%), while the administrative and support activities sector (around 1.7%) had the least employees.

The unemployment rate of the Municipality of Komotini was estimated at 18.7% of the economically active residents, compared to 16.8% in the Region of Rhodope and 20.2% in the Region of Eastern Macedonia and Thrace.

Regarding the Municipality of Arrianon, the economically active population amounted to 7.232 people, according to the latest available data of the National Statistical Office for 2011, of which 92,1% were employed. This percentage is clearly higher than that of the region and lower than that of the Rhodope Region. The largest proportion of the municipality's employees were employed in the primary sector of employment with a share of approximately 83.1% of the employed. The service sector - tertiary sector followed in terms of the number of employees with a share of about 11.4%, while the manufacturing sector or secondary sector was the last sector with the least number of employees, with a share of only 5.5%.

More specifically, for the Municipality of Arrianon, the largest absolute percentage of employees was in the sector of agriculture, forestry and fishing with the most employees (about 83.1%), followed by the sector of wholesale and retail trade and repair of motor vehicles and motorcycles (about 4.5%). The least number of employees was in the sector of administrative and support activities (about 0.2%).

The unemployment rate of the Municipality of Komotini was estimated at 7.9% of the economically active residents, compared to 16.8% in the Region of Rhodope and 20.2% in the Region of Eastern Macedonia and Thrace. Therefore, the Municipality of Arrianon is clearly better than the Municipality of Rodopi and the Region of An. Macedonia and Thrace in terms of unemployment rate.

8.7.4 Income per capita

According to the ELSTAT data, the following table presents the variation of the per capita GDP between 2000-2019 in the Region of Eastern Macedonia and Thrace, as well as in the Region of Rodopi, where the project under consideration falls spatially.

Table 8.7- 7: Gross Domestic Product per capita

Year	GDP per capita Region of An. Macedonia & Thrace (€)	GDP per capita of the Rhodope Region (€)
2000	10.075	10.497
2001	10.701	11.686
2002	11.316	11.680
2003	12.146	13.062
2004	12.772	12.870
2005	13.142	12.875
2006	13.535	13.212
2007	14.741	14.379
2008	15.568	15.148
2009	15.272	14.608
2010	14.996	13.589
2011	13.094	12.213
2012	12.227	11.045
2013	11.463	10.561
2014	11.218	9.912
2015	11.207	9.776
2016	11.277	10.499
2017	11.308	10.469
2018	11.472	10.449
2019	11.639	10.517

During the period 2000-2008 there was a gradual increase in the CER in the P.E. of Rodopi. For the years 2009-2015 there was a gradual decrease in GDP per capita.

8.8. TECHNICAL INFRASTRUCTURE

8.8.1. Transport infrastructure

Road network

The transport system in the wider area mainly serves local needs and connections between the various settlements. It is a provincial network with the main axes being the Nymphaeus-Kato Drosinis Provincial Road (west of the project area) and the Drania-Kardamos-Kymi-Smigada Provincial Road (east of the project area).

However, it is noted that the road network of the Municipality of Komotini includes the Egnatia highway, south of the city of Komotini. Furthermore, with regard to the Municipality of Arrianon, it is noted that there are serious shortcomings in the road transport sector. In particular, many sections are not paved, creating problems of accessibility, while in other areas the road surface has not been properly maintained.

At the same time, in the Municipality of Komotini there are also public transport (KTEL) that operate local or inter-regional routes.

Airports - Air transport

Air transport in the wider Rhodope region is served by the international airport of Alexandroupolis 'Demokritos', which is designated as the gateway of the Egnatia Highway and is part of the extensive trans-European air transport network, as well as by the state airport of Kavala 'Alexander the Great' near Chrysoupolis.

Railway network

Regarding the railway network that serves the entire Region of Eastern Macedonia-Thrace, it is worth noting that it crosses all of the region and its total length is estimated at 410 km. This railway line connects Thessaloniki with Alexandroupolis, where freight and passenger stations are located.

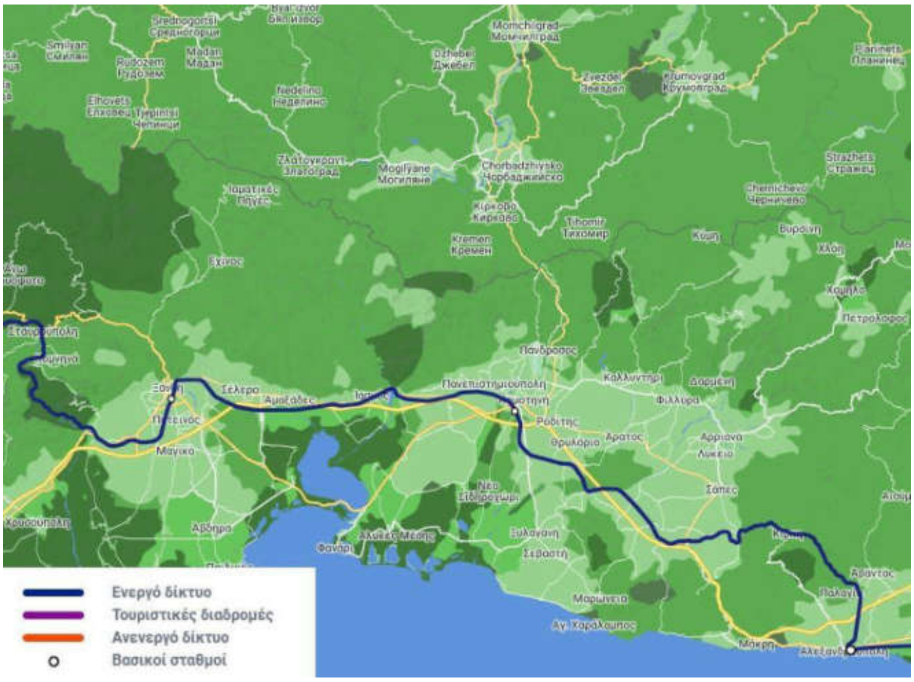


Figure 8.8- 1: Location of railway network

8.8.2. Water supply and irrigation networks

The water supply needs of the Municipality of Komotini are covered by the water supply network of the Municipal Water Supply and Sewerage Company of Komotini.

In the Municipality of Arrianon, according to the confirmation of the competent technical service of the Municipality, there is a water supply network to which all settlements are connected and which is mainly supplied by boreholes. However, there are serious water supply problems mainly in the mountainous settlements and the existing network needs immediate replacement.

In the study area, no water abstraction points are identified. However, there are several water abstraction points in the area, as shown in the figure below, either springs (in yellow) or boreholes (in green).

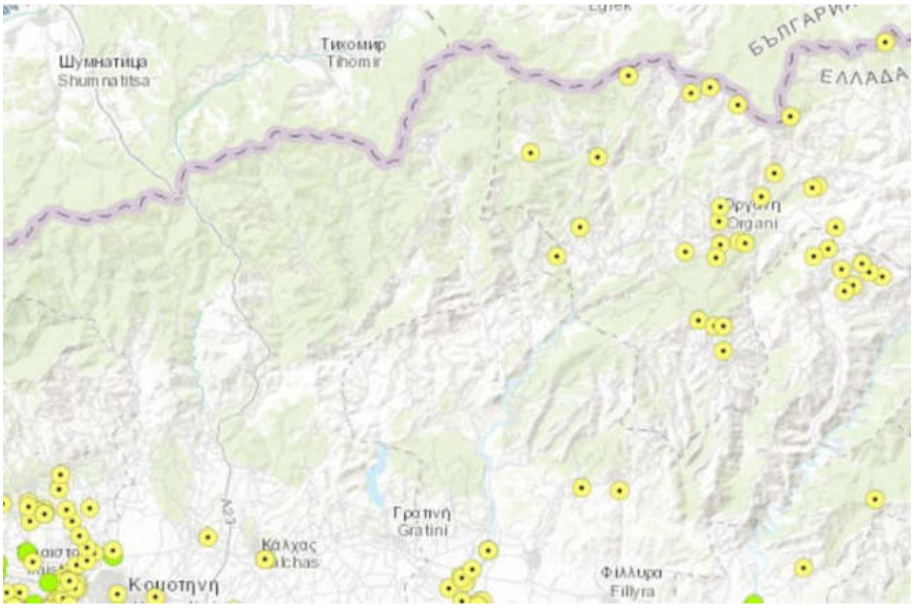


Figure 8.8- 2: Locations of nearest water abstraction points in the project area

8.8.3. Environmental infrastructure systems

8.8.3.1. Wastewater Treatment Plants

In the countryside of the Municipality of Komotini there is no sewerage system and septic or absorption tanks are used. In addition, the same picture is found in the Municipality of Arrianon, where there is no integrated sewerage system to meet the needs of all the settlements.

The nearest locations of Wastewater Treatment Plants in the project area are in Komotini, which essentially serves all settlements of the Rhodope Region[1] , and in Alexandroupolis.

[1] Renewal and amendment of the A.E.P.O. for the "Wastewater Treatment Plant (WWTP) Komotini" with IDA: 6ZBOOP1Y-PS7O.

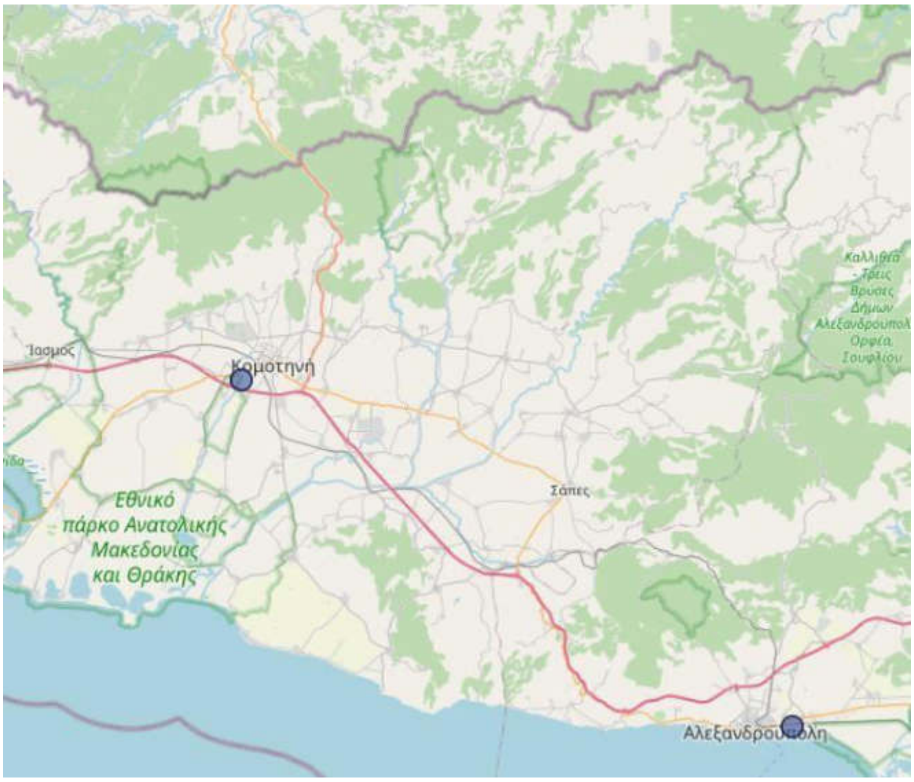


Figure 8.8- 3: Location of the WWTP in the wider project area

8.8.3.2. Waste management and treatment

In the Municipality of Komotini, mixed solid waste is collected and finally disposed of at the Komotini Landfill in Siderades. Furthermore, there is a recycling system and recyclable waste is taken to the Komotini waste disposal centre. Finally, it is noted, according to the Municipality's Operational Programme [2] , that in the Municipality of Komotini in general, various recycling programmes are implemented, such as the recycling of electrical and electronic appliances, the recycling of portable batteries, the recycling of glass, tyres, mineral oils and vehicle batteries, the recycling of medicines, the management system for used clothing and footwear, etc.

[2] Business Plan of the Municipality of Komotini 2019-2023, Phase A: Strategic Planning, Komotini 2021-2022

According to information provided by the technical department of the Municipality of Arrianon, the municipality operates a waste collection system, while the collected household solid waste is taken to the Komotini Landfill. Furthermore, separate waste recycling bins have been placed in the municipality.

Based on the Update Study of the Regional Solid Waste Management Plan of the Region of Eastern Macedonia and Thrace (2016), the operation of a Waste Treatment Plant (WTP) in Komotini with a composting unit of only pre-sorted material to serve all municipalities of the Rhodope Region is foreseen. Furthermore, for the safe disposal of the residues, a landfill of the Eastern Sector in Alexandroupolis will be opened to serve the Rhodope Region. In the next phase, a Landfill Site will be constructed and operated in Komotini, where the municipalities served include the municipalities of Komotini and Arrianon. Furthermore, the current plan foresaw the construction of a landfill site in Komotini, where the Municipalities of Komotini and Arrianon will be served, while a landfill site in Komotini will be operated to serve the Municipalities of Komotini and Arrianon in the initial phase, while in the subsequent phase (period 2018-2020) the landfill site in Komotini will be operated, where the Municipality of Komotini will be served, as well as the landfill site in Sapes, where the Municipality of Arrianon will be served. Finally, the construction of 2 green points in Komotini and 1 in Arriana is foreseen.

8.8.4. Electricity transmission and telecommunications networks

8.8.4.1. Telecommunications

In the telecommunications sector, the wider area is covered by the OTE telephone network and mobile telephony networks. Furthermore, it is noted that according to the data of the National Telecommunications Commission & Telecommunications and Postal Services and the Land Construction Information Portal (https://keraies.eett.gr/), no telecommunications antennae can be found within a radius of
1.500m from the project under consideration.

8.8.4.2. Energy

To the south of the development site of the ASPEO there is a 150kV simple circuit overhead transmission line, as well as a 150kV/MT substation for connection to a substation at Flambouro. In addition, as shown in the image below, the 400/150kV extra high voltage substation is located to the southeast in the area of Nea Sanda.

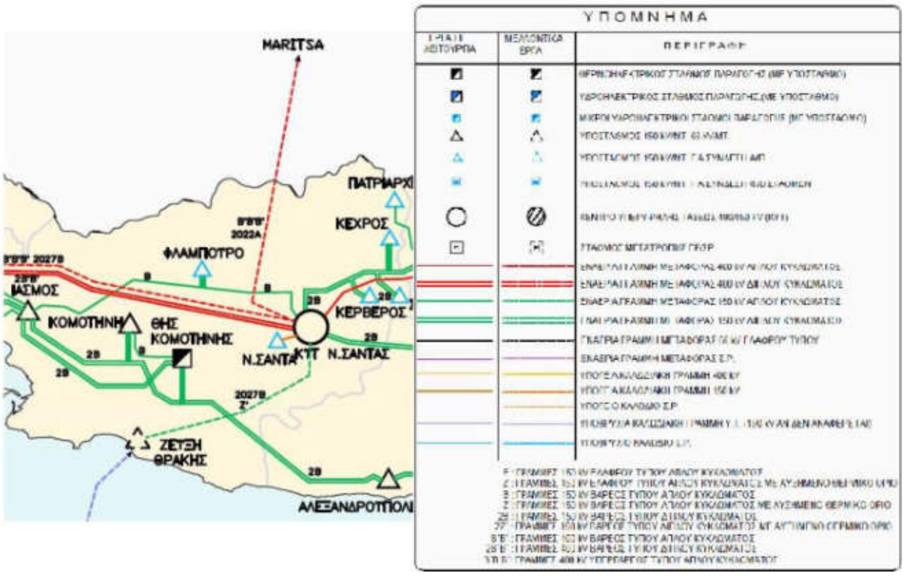


Figure 8.8- 4: Energy infrastructure networks in the region

(Source: Map of the Greek interconnected electricity transmission system with a time horizon until 2031; Decennial Development Programme for the period 2022-2031, Government Gazette 4789/B/2022)

In terms of RES development, the wider study area is very active, mainly in terms of wind farm development.

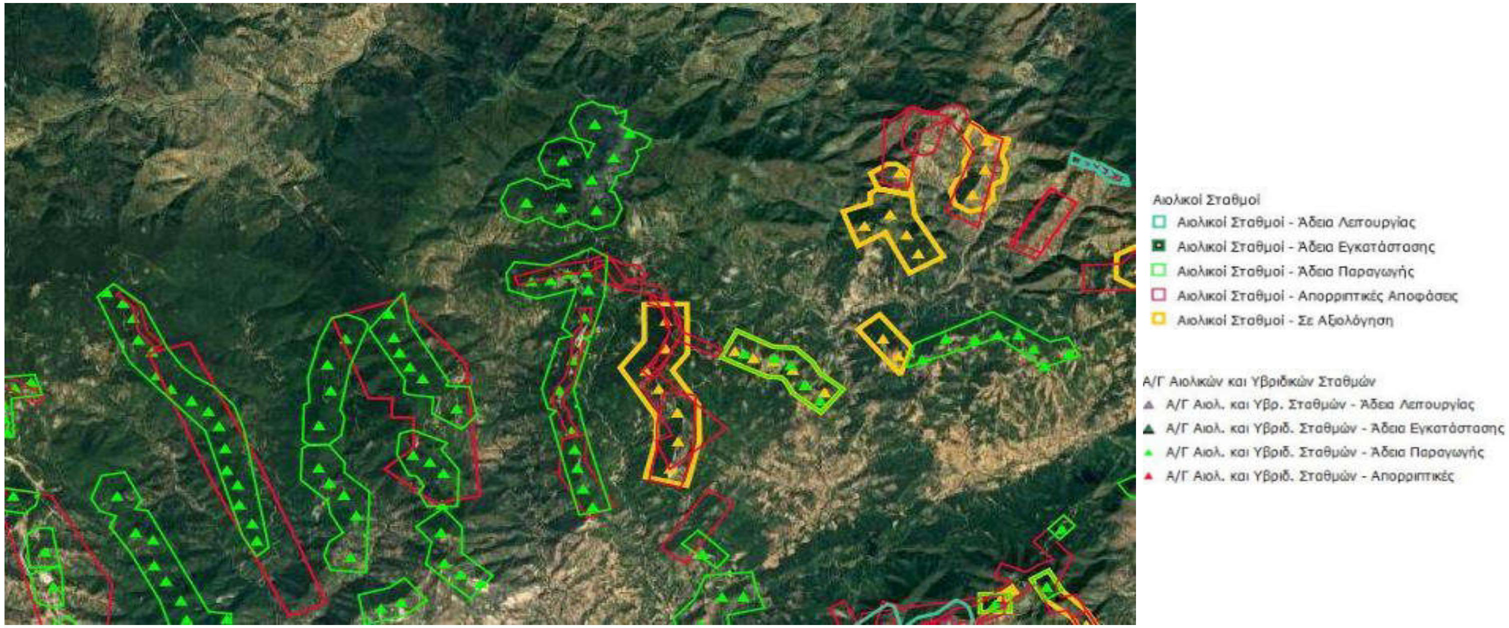


Figure 8.8- 5: Extract from Geo-Information Map of Renewable Energy Sources

The figure above shows the position of the project under consideration among the wind farms with a production license, while in the wider area there are a number of wind farms under evaluation and rejection decisions.

Natural gas

In the wider area and well south of the project there is the route of the Trans Adriatic Pipeline - TAP, as shown in the figure below. To the west of the project, there is also a route of an independent FA system with a final investment decision.

Figure 8.8- 6: Extract from the High Pressure Gas Transmission Network Map

8.8.5. Social Infrastructure

In the present chapter, the infrastructure related to health and welfare, education, research and sports, which affect the character of the development prospects for the study area, are presented at the level of the wider study area.

As far as the health and welfare sector is concerned, the needs of the residents of the Municipalities of Komotini and Arrianon are covered by the General Hospital of Komotini, the Health Centre of Komotini, the Centres
Iasmos and Sapes Health Clinics, as well as a number of Regional Clinics in the wider region.

It is noted that the Municipality of Arrianon operates the Arrianon Regional Medical Centre. Finally, it is mentioned that there is a plethora of private doctors.

Regarding the educational infrastructure, in the wider area, within a radius of 10km, there are 2 kindergartens in Kymi and Organi, as well as 5 primary schools in the settlements of Kymi, Kato Kardamos, Organi, Drymi and Ano Drosini, according to the available data of the Primary Education Directorate of Rodopi[3] . In addition, in the wider area there is a secondary school in the settlement of Organi and a number of high schools in Komotini and other settlements, according to the data available from the Directorate of Secondary Education of Rodopi[4] .

In the field of sports, it is worth noting that no sports facilities are located in the study area. However, the construction and operation of a 5X5 football pitch, a basketball court and an indoor gym are planned in the Municipality of Arrianon. In addition, many sports facilities are found in the municipality of Komotini (Municipal Sports Centre of Komotini, Panthraki Stadium, Municipal Outdoor Sports Centre, Municipal Gymnasium and Swimming Pool, etc.).

8.9. ANTHROPOGENIC PRESSURES ON THE ENVIRONMENT

Anthropogenic pressures on the environment are the pressures exerted on the various components of the environment by anthropogenic activities. Such pressures include agricultural and livestock activities, the development of transport infrastructure, residential and tourism development, and industrial and craft activities. These activities exert pressure through the pollution they cause to soil, water, flora and fauna and the atmosphere.

8.9.1. Major pressures

8.9.1.1. Water pressures

With regard to the pressures on water in the wider area, according to the current revision of the River Basin Management Plan of the Water Department

Thrace, in the R. Komotini-Loutroi Evros (EL1209), where the project under consideration falls, the total annual loads resulting from the sum of the individual point pressures are 173.6 tonnes/year of BOD, 85.3 tonnes/year of N and 32.1 tonnes/year of P, with the largest load coming from sewerage discharges to a natural receptor, wastewater treatment plants (WWTPs) and industrial plants. The corresponding loads resulting from diffuse sources of pollution are 2224.8 t/year BOD, 906.4 t/year N and 33.6 t/year P, with most pressures coming from pastoral livestock production and to a lesser extent from agriculture.

Table 8.9- 1: Total annual loads of BOD, N and P produced by point sources of pollution in LAP R. Komotini-Loutrou Evros (EL1209)

POINT SOURCES OF POLLUTION	Annual BOD (tonnes/year)	Annual N (tonnes/year)	Annual P (tonnes/year)
Industrial units	27,9	26,1	25,9
Leaks from landfills and landfill sites	0,0	0,0	0,0
Wastewater Treatment Plants (WWTP)	70,1	43,0	2,8
Discharge of sewerage networks to a natural recipient	72,4	14,5	3,0
Large Hotel Groups	0,0	0,0	0,0
Aquaculture - Fish farming	0,0	0,0	0,0
Large Livestock Farms	3,1	1,8	0,4
TOTAL	**173,6**	**85,3**	**32,1**

Source: 1η Revision of the SDLAP of the Thrace MoD

Table 8.9- 2Total annual surface loads of BOD, N and P produced from diffuse sources in the R. Komotini-Lutroi Evros LAP (EL1209)

LAND USE	Annual BOD	Annual N (tonnes/year)	Annual P (tonnes/year)
CITY	186,7	53,2	1,3
AGRICULTURE	0,0	196,7	11,9
LIVESTOCK	2038,2	538,5	19,5
OTHER SOURCES	0,0	118,0	0,9
TOTAL	**2224,8**	**906,4**	**33,6**

Source: 1st Revision of the SDLAP of the Thrace MoD

8.9.1.2. Discharges from surface and groundwater systems of the R. Komotini-Lutroi Evros LAP

In the Komotini-Loutrou Evros River Basin the total annual estimated withdrawals amount to 187.34 hm^3 . Of these, the overwhelmingly largest part is intended for irrigation (160.44 hm^3), a part for water supply (14.66 hm^3), while the estimated withdrawals for livestock (0.70 hm^3) and industry (11.55 hm^3) are significantly smaller.

Table 8.9- 3: Annual water abstractions from the surface water bodies of the RMP Rem. Komotini-Lutroi Evros

A/A	Name of PS	HS code	Annual Disposable Quantity (m^3 /year)	Purpose of withdrawal
1	GRATINIS T.L.	EL1209RL002040003H	8,00	Industry

Source: 1st Revision of the SDLAP of the Thrace MoD

Regarding the estimated withdrawals from the Groundwater Systems (GSS), the largest percentage is for irrigation (75.7 hm^3), while the estimated withdrawals for the needs of water supply (15 hm^3) and livestock (0.947 hm^3) are smaller. Komotini-Loutroi Evros is considered good.

8.9.1.3. Pressures in the acoustic and atmospheric environment

In general, there are no significant pressures in the wider study area, due to the small size and intensity of human presence. The natural environment is in very good condition, and there are no indicators of pollution, as the existing anthropogenic activities are particularly mild (low-intensity livestock and agricultural activities, road transport) and the land cover is mainly natural vegetation. There is therefore no pollution of the air and the acoustic environment.

In conclusion, the activities that have been developed have not caused any uncontrolled degradation of the characteristics of the natural environment, fauna and flora, air and acoustic environment of the wider area.

8.9.2. Desertification

Regarding the risk of erosion and desertification, it is noted that the study area falls within the Zones of Moderate Potential Risk of Desertification due to erosion, as shown in the figure below.

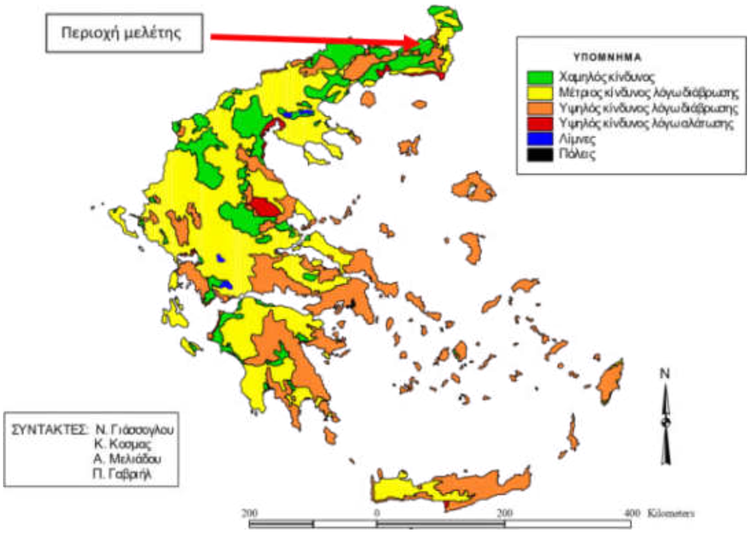


Figure 8.9- 1: Map of potential desertification risk in Greece (National Commission against Desertification)

8.10. ATMOSPHERIC ENVIRONMENT - AIR QUALITY

In general, the presence of large quantities of undesirable material-substances in the atmosphere that can cause damage to human health and the living environment is defined as air pollution. The main air pollutants emitted by human activities in this area are mainly from road traffic, combustion for heating of dwellings, combustion in the industrial sector (carbon monoxide CO, hydrocarbons VOCs, nitrogen oxides NO_x , sulphur dioxide SO_2 and particulate matter).

Due to the lack of air pollution measurements in the study area, the quality of the air environment in the immediate project area cannot be assessed quantitatively. Therefore the assessment attempted below is mainly qualitative.

In the immediate project area there are no intensive activities, the provincial and rural road network is not heavily used, and there are no settlements and industrial-industrial units. Therefore, stable sources of pollution are completely absent.

For the completeness of this report, the available data published on the Ministry of Environment and Energy (MoEEE) Geospatial Information Portal[5] are provided, where it is considered that the wider study area is not located in a part of zones where an elevated concentration of air pollutants has been assessed. In particular, the following values are given:

1. sulphur dioxide - SO_2 : <24 exceedances of the hourly limit value of 350 μg/m^3 (which falls within the established limits for the protection of human health)
2. nitrogen dioxide - NO_2 : annual average <26 μg/m^3 (meeting the statutory limits for the protection of human health)

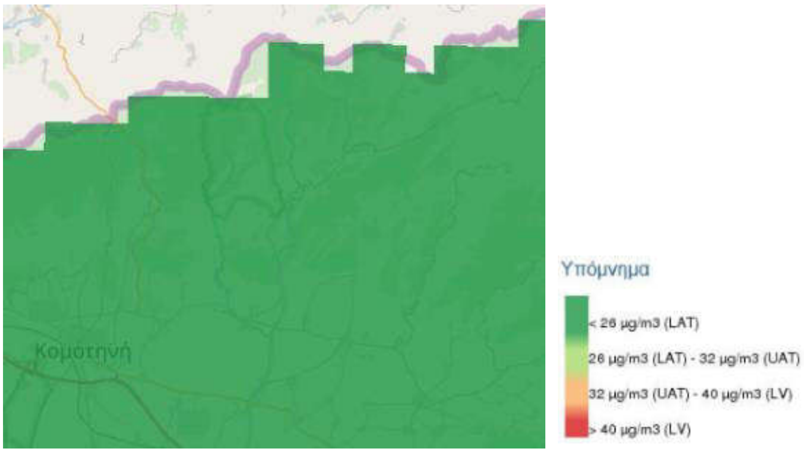


Figure 8.10- 1: Nitrogen dioxide concentration map - Annual average

3. Particulate matter PM 2.5: annual average of 12 - 17 μg/m^3 (within the statutory limits)

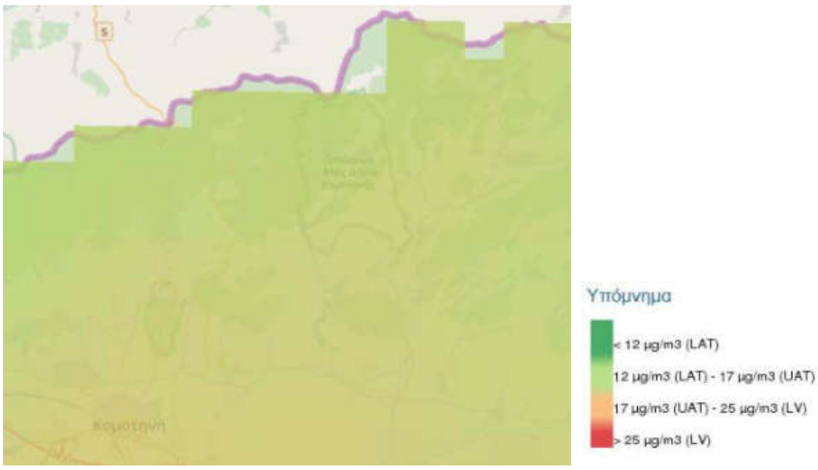


Figure 8.10- 2: Particulate matter concentration map 2.5 (PM 2.5) - Annual average

4. particulate matter PM 10: annual average value <20 μg/m^3 (meeting the statutory limits for the protection of human health)

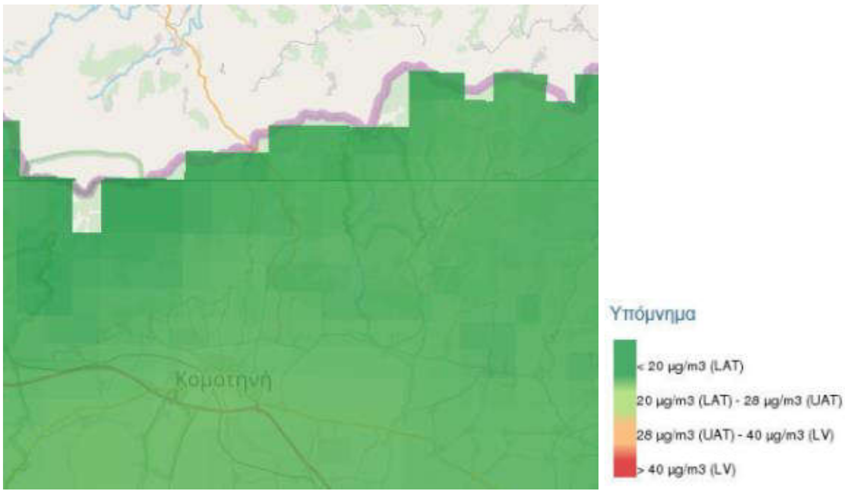


Figure 8.10- 3: Particulate matter 10 (PM 10) concentration map - Annual average

5. ozone - O_3 : >25 exceedances of the maximum daily 8-hour daily limit value of 120 μg/m^3 (exceeding the established values - targets for the protection of human health)
6. carbon monoxide - CO: maximum annual value of maximum daily 8-hour maximum <5mg/m^3 (which meets the statutory limits for the protection of human health)

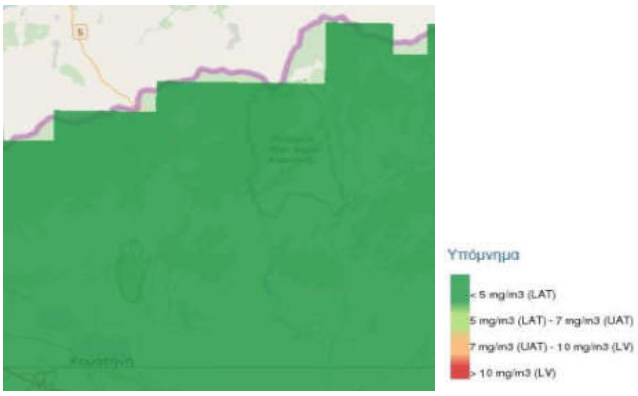


Figure 8.10- 4: Carbon monoxide (CO) concentration map - Annual average

7. benzene: annual mean value < 2 μg/m^3 (which falls within the legal limits for the protection of human health)
8. benzopyrene (BaP): annual average <0.4 ng/m^3 (not exceeding the statutory target value of 1 ng/m)^3
9. metals (the values below correspond to the lower limit - LAT):
    a. Arsenic (As): annual mean <2.4 ng/m^3 (meeting the statutory target value of 6 ng/m)^3
    b. Cadmium (Cd): annual average <2 ng/m^3 (meeting the statutory target value of 5 ng/m)^3
    c. Lead (Pb): average annual value <0.25 μg/m^3 (which falls within the legal limits for the protection of human health)
    d. Nickel (Ni): annual mean <10 ng/m^3 (meeting the statutory target value of 20 ng/m).^{3}

The air pollution assessment thresholds are defined in the No. H.P. 14122/549/E.103/24.03.2011 K.Y.A. on "measures for the improvement of air quality in compliance with Directive 2008/50/EC" (Government Gazette 488/B/30.03.2011) and with the Decree No. H.P. 22306/1075/E103/29.05.2007 of the Ministerial Decree on "setting values - objectives and assessment thresholds for the concentrations of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air in compliance with the provisions of Directive 2004/107/EC" (Government Gazette 920/NV/08.06.2007).

8.11. ACOUSTIC ENVIRONMENT AND VIBRATIONS

8.11.1. Sources of noise pollution in the project area

Due to the lack of systematic noise level measurements in the study area, the quality of the acoustic environment cannot be assessed with quantitative data. Therefore the assessment attempted below is mainly qualitative.

The immediate area where the wind farm is located is characterised by extremely low noise levels, given the dominance of the natural environment and the lack of significant noise sources. The absence of industrial-industrial facilities, the absence of urban centres and the limited road traffic on the road network in the project area mean that noise levels are low. The only activities in the immediate project area are grazing and agriculture, which are not likely to cause high levels of noise and vibration.

Therefore, due to the existing very good state of the acoustic environment, it is estimated that over time the acoustic environment of the area is not subject to substantial changes in noise levels and the trends in this area are stable.

8.11.2. Vibrations

There are no significant sources of vibration in the study area.

8.12. ELECTROMAGNETIC FIELDS

8.12.1. State of Electromagnetic Fields

The sources of electromagnetic radiation in the area come from the operation of mobile phone base stations, fixed telephone, radio and television transponders. In addition, possible sources of radiation emission are high-voltage power transmission lines, which emit low-frequency (50 Hz) electromagnetic radiation. These radiations are classified as non-ionising, as opposed to ionising radiations such as X-rays and gamma rays, which are hazardous to human health.

The National Electromagnetic Fields Observatory, in order to monitor compliance with the statutory limits for the safe exposure of the public to electromagnetic fields, has created a network of fixed, broadband-type measuring stations installed at pre-selected points throughout the country. **Figure 8.12-1** shows the location of the EMF measurement stations in the project area.

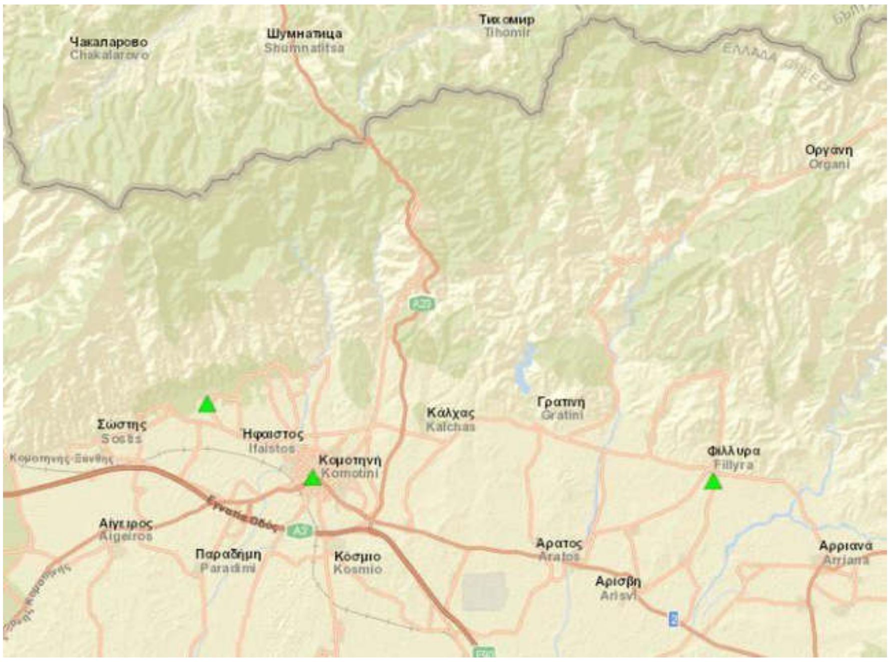


Figure 8.12- 1: Location of electromagnetic radiation measuring stations of broadband type

The location of the fixed measuring station in Iasmos is located in the Asomatas Municipal Community building. The location of the electromagnetic radiation measuring station in Komotini is located at the Municipal Conservatory of Komotini, while the location of the electromagnetic radiation measuring station in Fillyra is located in a municipal store of the settlement.

According to the most recent measurements of the above stations, the electric field intensity over eight years does not exceed the exposure limit of 21.7 V/m for the broadband area and much more for the other frequency ranges.

8.13. HYDATA

8.13.1 Thrace Water Management Plan (EL12)

The provisions of the Thrace River Basin Management Plan and its current revision, as well as the compatibility of the project under consideration and the activities that will take place in it, are presented in detail in Section 5.2.3 As discussed in this section, the project - due to its nature - cannot affect in any way the surface and groundwater bodies of the region, nor degrade their status, or prevent them from achieving good status.

8.13.2. Surface water

As mentioned above, the project under consideration will be located in the area falling within the Komotini-Loutroi Evros River Basin (EL 1209). The main project is located on a ridge and therefore away from streams and rivers. Therefore, no surface water bodies are identified in the immediate study area, as shown in **Figure 8.13-1**. The nearest surface water bodies are Iron P. (EL1209R00020400101N), which is located approximately 5.0 km southeast of the ASPHE and its overall status is good, according to the current 1^{η} Thrace SDLAP Revision, as well as the Almond Pond
R. (EL1209R00020402100N), which is located more than 9.4 km south of the ESDP and its overall condition is good.

Regarding access roads, it is noted that the nearest river system identified by the Management Plan is 5km away. In addition, the alignment of the transmission line (up to the existing Flamburo PSU) is designed on existing roads, and although it passes close to a river system, it is not expected to cause any impacts on the river's diet. Therefore, no impact to the system is caused by the project under consideration.

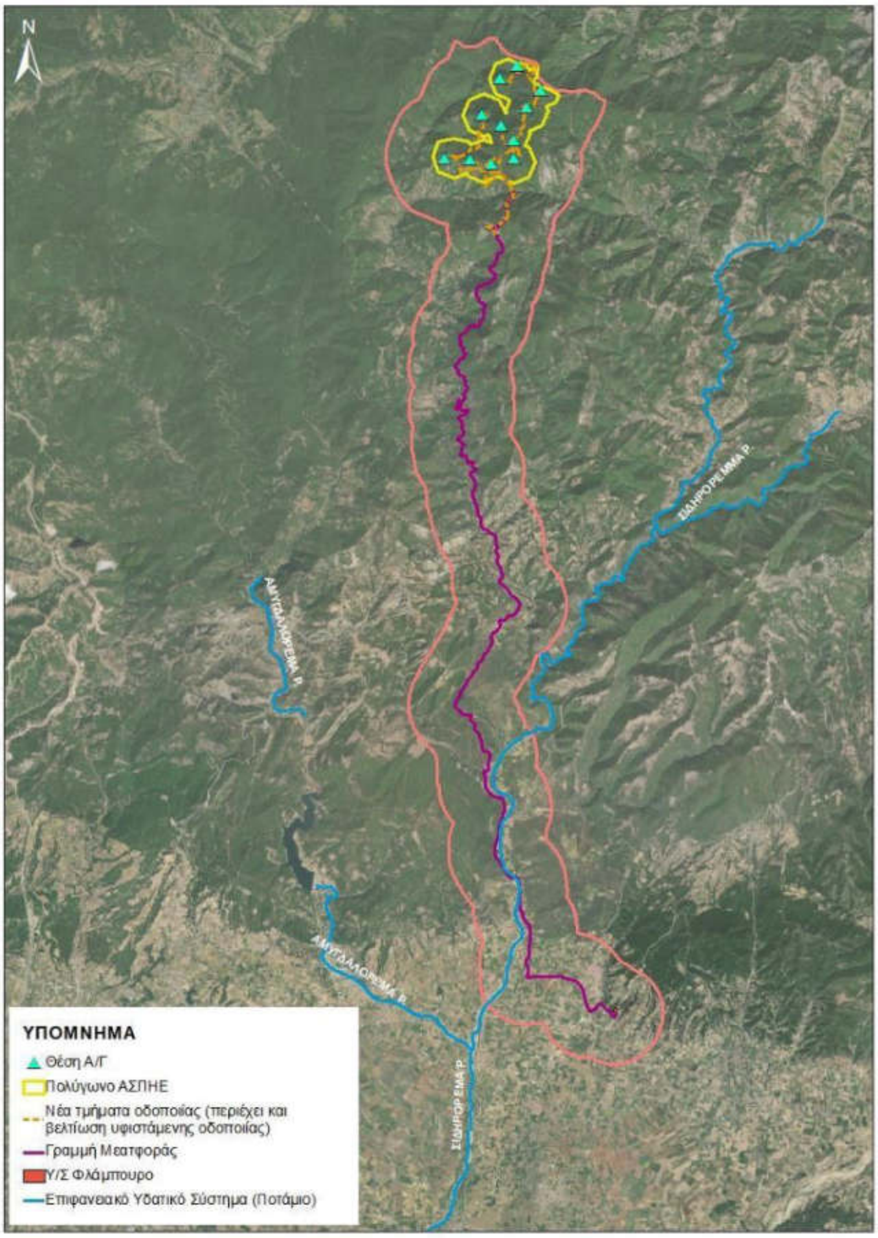


Figure 8.13- 1: Surface Water Systems in the study area

The table below shows the river basins of the wider area with their new typology.

Table 8.13- 1: River water bodies in the project area

A/A	Name of PS	HS code	Category*	Length (km)	Direct Basin Retrieved from (km2)	Aggregate Basin Retrieved from (km2)	Middle Annual Retrieved from (hm3)	Type of PS
LAP OF COMOTINI - EVROS BATH (EL1209)								
93	SIDERROME R.	EL1209R0002040010101N	PHYS	23,26	153,23	153,2	31,14	R-M2
94	SIDERROME R.	EL1209R0002040096N	PHYS	3,54	41,36	362,7	73,71	R-M1
95	SIDERROME R.	EL1209R0002040097N	ITYS	3,01	5,39	321,3	65,3	R-M1
96	SIDERROME R.	EL1209R0002040098N	PHYS	13,85	70,53	314,9	64,01	R-M1
97	ALMOND CREAM R.	EL1209R0002040199N	ITYS	6,08	22,34	91,2	18,53	R-M1
98	ALMOND CREAM R.	EL1209R00020402100N	PHYS	4,09	58,92	58,9	11,97	R-M1
**FYS: Natural Water Body, ITYS: Specially Modified Water Body, TYS: Artificial Water Body*								

Source: 1st Revision of the Thrace SDLAP (Table 4-3 and own editing)

Table 8.13- 2: Assessment of the status of river water bodies in the project area

A/A	Name of PS	HS code	Category*	Connection to Protected by sites	Ecological Catas addre	Chemical Status	Trust level		Overall situation
							Commercial	Bulky	
93	SIDERROME R.	EL1209R0002040010101N	PHYS		Good	Good	1	1	Good
94	SIDERROME R.	EL1209R0002040096N	PHYS	√	Good	Good	1	1	Good
95	SIDERROME R.	EL1209R0002040097N	ITYS	√	Unknown	Good	0	1	Unknown
96	SIDERROME R.	EL1209R0002040098N	PHYS	√	Medium	Good	3	2	Medium
97	ALMOND CREAM R.	EL1209R0002040199N	ITYS	√	Medium	Good	3	1	Medium
98	ALMOND CREAM R.	EL1209R00020402100N	PHYS		Good	Good	1	1	Good

Source: 1st Revision of the Thrace SDLAP (own editing)

(Interpretation of Trust Level indicators: "0" = No information, "1" = Low confidence, "2" = Medium confidence, "3" = High confidence).

8.13.3 Groundwater

The project falls within the "Drosinio System" (EL120B100), which is in good condition, and the "FillIouris System" (EL1200040), which is characterised by poor chemical and good quality status. (**Figure 8.13-2**), The table below presents the Groundwater System with its chemical and quantitative status. According to the data of the 1ης Thrace SDLAP Revision, it can be seen that this WSS is not under pressure.

Table 8.13- 3: Groundwater System, Chemical and Quantitative Status

GIS code	Name YUS	Chemical situation	Quantitative situation	Increased Prices data due to Physical Background	Increased Prices data anthropogenic Effect	Main Pressure	Marine Penetration	Protected μενες sites
EL120B100	Drosinium system	Good	Good	-	-	-	NO	YES
EL1200040	Fillliouris System	Poor	Good	-	NO3 and C	Georgia	YES	NO

Source : 1st Revision of the Thrace SDLAP

The table below presents the data on the withdrawals and supply from the WFD of the study area.

Table 8.13- 4: Annual supply and abstractions from groundwater bodies in the region study of the project

Code	Name	Average Annual Power supply (10 m) [63]	Average Annual Retrieved from (10 m) [63]	Irrigation (10 m) [63]	Water supply (10 m) [63]	Quantitative Status YUS	Area (km)²
EL120B100	Drosinium system	96	43,72	33	10,1	Good	1.807,04
EL1200040	Fillliouris System	21,4	19,39	17,6	1,7	Good	332,07

Source : 1st Revision of the Thrace SDLAP

Figure 8.13- 2: Groundwater systems in the study area

8.13.4. Flood Risk Management Plan for FR 08

According to the data in the Flood Risk Management Plan for the River Basin of the Thrace River Basin (EL12) (Government Gazette 2639/B/0507.2018), the Flood Risk Maps and the corresponding Flood Risk Maps, as well as based on the 1 η

Review of the Preliminary Flood Risk Assessment for the 14 Water Departments of the country[6] , which was posted on the specially designed website of the Ministry of Environment and Natural Resources[7] , the area of the ASPHE is outside of Potentially High Flood Risk Zones (HPZs).

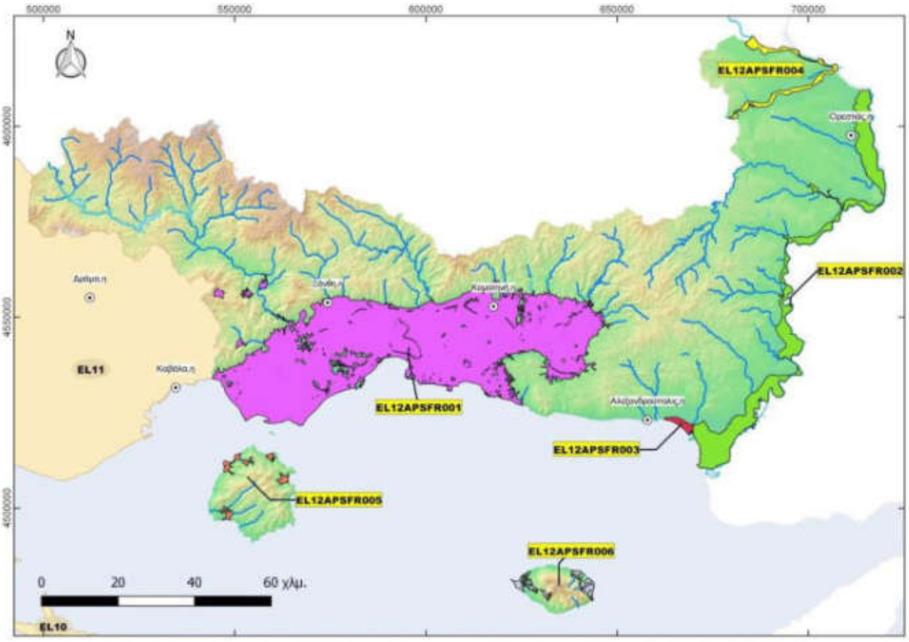


Figure 8.13- 3: Potentially High Flood Risk Zones in the region (1η Revision EIA, 2019)

As shown in **Figure 8.13-4** below, the entire project is located outside of the Revised Potentially High Flood Hazard Zones (EIR, 2019) and a long distance from areas where significant flooding has occurred. In any event, the operation of the subject AIS would not be affected.

6 'IMPLEMENTATION OF DIRECTIVE 2007/60/EC, 1η REVIEW OF THE PRELIMINARY FLOOD RISK ASSESSMENT', GENERAL SECRETARIAT FOR THE NATURAL ENVIRONMENT & ENVIRONMENT POLICY WATER, ATHENS 2019

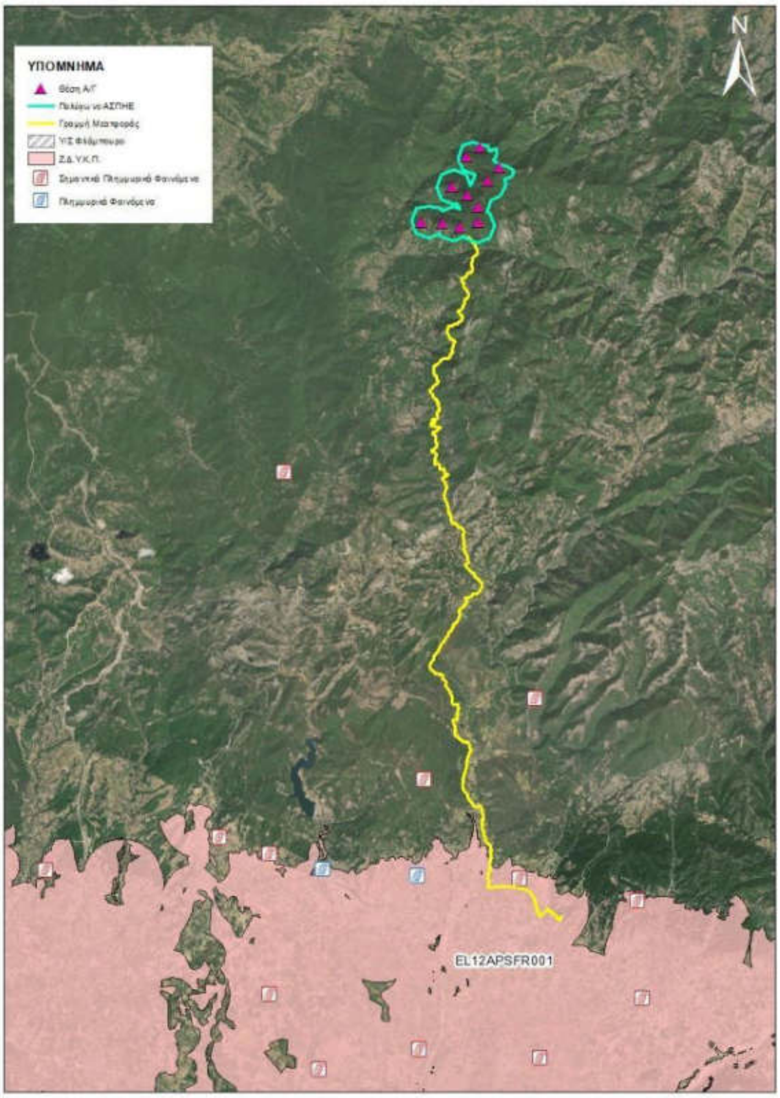


Figure 8.13- 4: Zones of Potentially High Flood Risk in the region (1η Revision EIA, 2019)

8.14. RISKS TO HUMAN HEALTH, CULTURAL HERITAGE AND/OR THE ENVIRONMENT, MAINLY DUE TO ACCIDENTS OR DISASTERS

8.14.1 Natural and man-made disasters

Disasters are usually categorised into natural and man-made disasters and according to the type of natural or other threatening event that causes them.

A natural disaster is a severe, large-scale, adverse event resulting from natural processes of the earth and the biosphere. Typical examples are floods, volcanic eruptions and earthquakes. A natural disaster causes losses of people, animals and property, injuries and health problems, damage to the natural and built environment, and in most cases leaves in its wake economic and social losses, the severity and magnitude of which depend on vulnerability, resilience and recovery capacity. The rapid growth of the world's population and its increasing concentration in hazardous environments has led to an escalation in the frequency and severity of natural disasters. Developing countries suffer in a chronic and persistent manner from natural disasters due to a combination of adverse climatic conditions and unstable geo-analysis with deforestation, unmanaged spatial development expansion, unmanaged construction making them disaster-prone, areas more vulnerable, with meagre or non-existent funding for prevention and delayed or non-existent communication with vulnerable populations. Asia leads the lists of injuries caused by natural disasters. In 2007, CRED and Munich RE undertook an initiative to agree on a common "Classification of Disaster Categories and Risk Terminology for Operational Databases". This classification represents a first and key step towards the development of standardised international risk terminology and disaster categorisation (Below et al., 2009). It makes a first basic distinction between natural and technological disasters. The general category of natural is divided into six groups: geophysical, meteorological, hydrological, climatological, biological and extraterrestrial. Geophysicals are events originating in the solid crust of the earth (**Table 8.14-1**). Meteorological ones are events caused by short-term (instantaneous to a few days), small- to medium-scale atmospheric processes (**Table 8.14-2**). Hydrological events are caused by diversions and deviations in the normal and expected water cycle and/or overflow of water receptors caused by winds (**Table 8.14-3**). Climatological (**Table 8.14-4**) are caused by long-term, medium to large-scale atmospheric processes ranging from intra-annual to multi-decadal climate changes. Biological ones are caused by the exposure of living organisms to pathogenic microbes and toxic substances of other organisms (e.g., poisonous insects and wildlife, poisonous plants, and mosquitoes, which are vectors of diseases caused by parasites, bacteria, or viruses, such as malaria) (**Table 8.14-5**) **(Table 8.14-5**). Each group covers various sub-cases and combinations of primary types of destruction with secondary and tertiary types. **Tables 8.14-1 to 8.14-5** give a global picture of the grouping and classification of natural disasters.

Table 8.14- 1: Classification of geophysical disasters

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Γεωφυσικές	Σεισμοί (Earthquakes)	Εδαφική κίνηση (Ground Shaking)	
			Tsunami	
		Ηφαίστεια (Volcanoes)	Ηφαιστειακές εκρήξεις (Volcanic Eruptions)	
		Μετακίνηση μαζών (Mass Movements-dry)	Καταπτώσεις βράχων	
			Avalanche	Χιονοστιβάδες (Snow Avalanches)
				Εδαφοστιβάδες (Debris Avalanches)
			Κατολισθήσεις (Landslides)	Κατολισθήσεις λάσπης Lahar, Ροές κορημάτων
			Καθιζήσεις (Subsidence)	Αιφνίδιες καθιζήσεις
				Μακροχρόνιες καθιζήσεις

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 2: Classification of meteorological disasters

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΗΣ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Μετεωρολογικές	Θύελλες	Τροπικές θύελλες	
			Υπερτροπικοί κυκλώνες (Χειμερινές θύελλες)	
			Τοπική/Θύελλα από μεταφορά	Καταιγίδες / Κεραυνοί
				Χιονοθύελλες/
				Αμμοθύελλες
				Generic (severe) storms
				Tornados
				Orographic Storms (strong winds)

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 3: Classification of hydrological disasters

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΗΣ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Υδρολογικές	Πλημμύρες	Γενική (ποτάμια) πλημμύρα	
			Αιφνίδια πλημμύρα (Flash Flood)	
			Κύματα Θυέλλας / Παράκτιες Πλημμύρες	
		Μετακίνηση μαζών (υγρών)(Mass Movements-wet)	Καταπτώσεις βράχων	
			Κατολισθήσεις	Ροή θραυσμάτων
			Στιβάδες (Avalanche)	Χιονοστιβάδες
				Στιβάδες θραυσμάτων
			Καθιζήσεις (Subsidence)	Αιφνίδιες καθιζήσεις
				Μακροχρόνιες καθιζήσεις

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 4: Classification of climatic disasters

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΗΣ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Κλιματολογικές	Ακραίες θερμοκρασίες	Κύματα καύσωνα	
			Κύματα ψύχους	Παγετός
			Ακραίες χειμερινές συνθήκες	Snow Pressure
				Icing
				Freezing Rain
				Στιβάδα θραυσμάτων (Debris Avalanche)
		Ξηρασία	Ξηρασία	
		Πυρκαγιές υπαίθρου	Δασικές πυρκαγιές	
			Πυρκαγιές εδάφους (σε λιβάδια, θαμνότοπους κλπ.)	

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 5: Classification of biological disasters

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΗΣ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Βιολογικές	Επιδημίες	Ιογενείς μολυσματικές ασθένειες	
			Βακτηριακές μολυσματικές ασθένειες	
			Παρασιτικές μολυσματικές ασθένειες	
			Μυκητιασικές λοιμώξεις	
			Πρωτεϊνικές μολυσματικές ασθένειες	
		Εισβολή εντόμων		
		Αφηνιασμός ζώων		

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 6: Classification of disasters of extraterrestrial origin

ΓΕΝΙΚΗ ΚΑΤΗΓΟΡΙΑ ΚΑΤΑΣΤΡΟΦΗΣ	ΟΜΑΔΑ ΚΑΤΑΣΤΡΟΦΩΝ	ΤΥΠΟΣ ΚΥΡΙΑΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΔΕΥΤΕΡΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ	ΤΥΠΟΣ ΤΡΙΤΟΓΕΝΟΥΣ ΚΑΤΑΣΤΡΟΦΗΣ
Φυσικές καταστροφές	Εξωγήινης προέλευσης	Μετεωρίτες / Αστεροειδείς		

(Source: Sapountzaki K., Dandoulaki M., 2015)

Table 8.14- 7: Classification and nomenclature of technological disasters

Man-made disasters are the result of technological hazards (threats). These include fires, transport accidents, industrial accidents, oil spills and nuclear explosions/radiation. War and intentional attacks can be included in this category.

8.14.2 Risk assessment

Research on measurements of natural phenomena, in a way that is appropriate and useful for addressing the risks associated with them, is at the boundary between the natural and social sciences. The key characteristics of a hazard are considered to be the magnitude, duration and extent associated with the physical mechanism of hazard occurrence, the frequency and seasonality associated with its temporal distribution, the location and geographic dispersion associated with its spatial distribution and the speed of hazard occurrence.

Examples of risk assessment are the following parameters:

- Seismic hazard. Seismic hazard is defined as the probability that a parameter of ground motion will exceed a certain value at a location or area within a given time interval. The ground parameter can be ground acceleration, ground velocity, ground displacement, intensity, duration, etc.
- Danger of slipping. The term landslide describes the movement of rock from the highest position of a slope to the lowest under the influence of gravity; it is the phenomenon of the disturbance of the equilibrium of a mass of soil or rock. According to another definition, a landslide is a downward movement of a section of rock mass or loose material along a soil surface of a slope or along several surfaces. However, the volume of soil that has failed or the deposits of the landslide are also called a landslide.

- Flood risk. Flooding is defined as the uncontrolled inundation by water of an area which, under normal conditions, is not covered by water. These include: river floods, flash floods, coastal floods.
- Forest fire risk. Fire as a phenomenon depends on three main factors that make up the so-called "fire triangle": heat, the presence of oxygen and fuel (quantity, type, moisture).
- Technological and transport accidents. The term technological accident is used to describe a variety of situations, such as industrial accidents, transport accidents, hazardous substance spills, oil spills, air and road accidents, shipwrecks, network and infrastructure failures and nuclear accidents.
- The hazards mentioned above are unevenly distributed in space, e.g. with regard to earthquakes the high risk zones are clearly distinguished. However, disasters are also geographically fragmented and concentrated, as are their impacts.

According to the ECLAC/World Bank (2003) system, experience gained over the last 30 years shows some consistent relationships between the type of disaster and the nature of losses:

- Hydro-meteorological disasters - such as floods, hurricanes and droughts - usually affect wider geographical areas than those affected by geologically triggered disasters.
- In areas with a similar population density, the number of victims of geological disasters such as earthquakes is generally higher than in the case of hydro-meteorological events.
- The damage to the capital stock in technical and social infrastructure caused by earthquakes is generally much greater than that caused by floods.
- Indirect losses (in production and in general), on the other hand, are generally higher in cases of floods and droughts.
- A geological baseline event that causes flooding or mudflows usually causes greater indirect impacts than other types of geological disasters.

However, the following impacts are common to all categories of natural disasters:

- A fluctuating number of victims,
- Significantly reducing the availability of housing, health care and education facilities that deepens the relatively precarious deficits in developing countries,
- A temporary reduction in the income of the most disadvantaged social strata and a corresponding increase in the already high rates of underemployment and unemployment,
- Temporary interruption of water and sewerage, electricity, communications and transport services,

- Temporary shortages of foodstuffs and raw materials for agricultural and industrial production,
- A tendency for small businesses and personal service providers to be among the first to recover, regardless of the extent of the damage they suffered,
- In countries where the modern and traditional sectors of the economy coexist, employment losses in the modern sector are more severe and longer lasting than in the traditional, often informal sector,
- Greater and longer-term employment losses in the industrial sector than in the agricultural, trade and services sectors,
- Modification of the employment structure during the rehabilitation and reconstruction phases, when the housing and engineering construction sector is growing,
- A decline in the volume of exports and a corresponding increase in imports, a trend towards public deficits, because increased social spending and increased investment are usually accompanied by lower tax receipts and reduced public revenues in general.

Taking into account the above mentioned and assessing the existing situation of the study area and the wider area in general (geological, seismological, hydrogeological, hydrogeological, water data), there is and is not expected the expression of seismic, landslide and flood risk in the area or risk of technological and transport accidents, since the industrial units and plants and infrastructure handling hazardous substances are eliminated in the area. With regard to the risk of forest fires, the probability of occurrence does not appear to be particularly high for the study area. Of course, according to the definition of fire hazard, this is defined as the probability of fire occurrence as a consequence of the presence and influence of a fire cause in an area.

The initiation and spread of a forest fire depends on a range of factors such as meteorological factors, geomorphology, fuel, soil moisture, the interaction of these factors that contribute to the initiation and spread of forest fires. In Greece, during the fire season (from 1^{η} May to 31 October), the Fire Risk Index is assessed daily by a scientific team of the General Secretariat for Civil Protection by the Forestry Department's area of responsibility and the Fire Risk Map is issued (**Figure 8.14-1**). The main factors taken into account in the development of the Index are the forecasts of fire-related weather events for the next 24 hours, measurements of preceding rainfall, existing temperature and relative humidity, the condition of vegetation, and any other available information (such as forest fire history) that helps to determine the risk of an area at a given time.

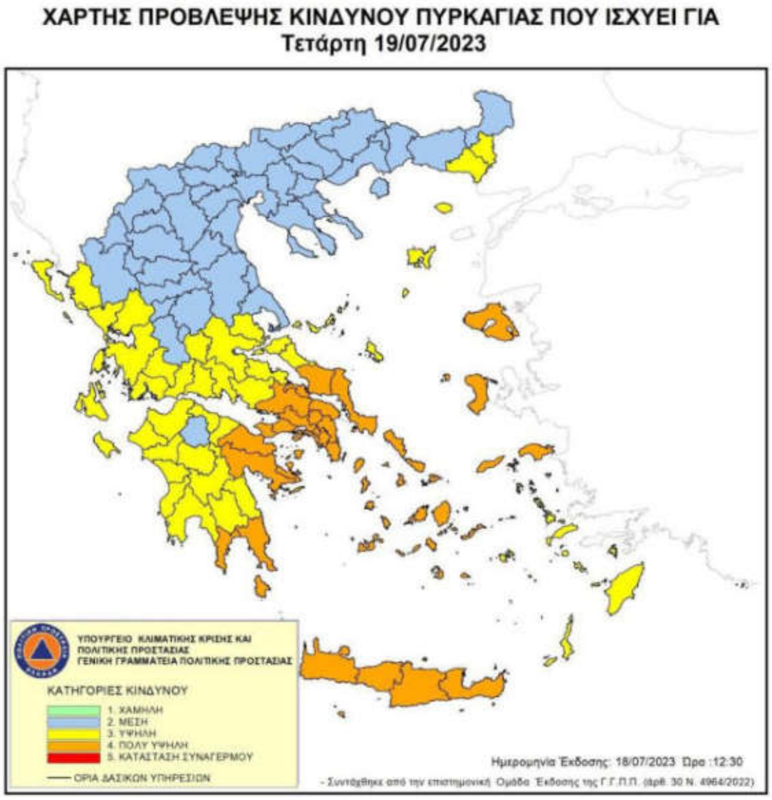


Figure 8.14- 1: Fire Risk Prediction Map

In addition, according to an approximate model of the National Observatory, the forest fire risk is estimated (approximately) by two specific fire risk indicators "*FS*" and "*SU*". The first index estimates the fire risk situation in the summer season (Summer) (**Figure 8.14-2**) , and the second one in fire season (Fire Season) (**Figure 8.14-3**). As reflected in the above mentioned figures, the time series 2021-2050 has been chosen for the study area of the considered ASPEE, considering that the project is about 25 years old. According to the above data, for the immediate study area, for both the fire season and summer season, the forest fire risk is determined to be intermediate to low.

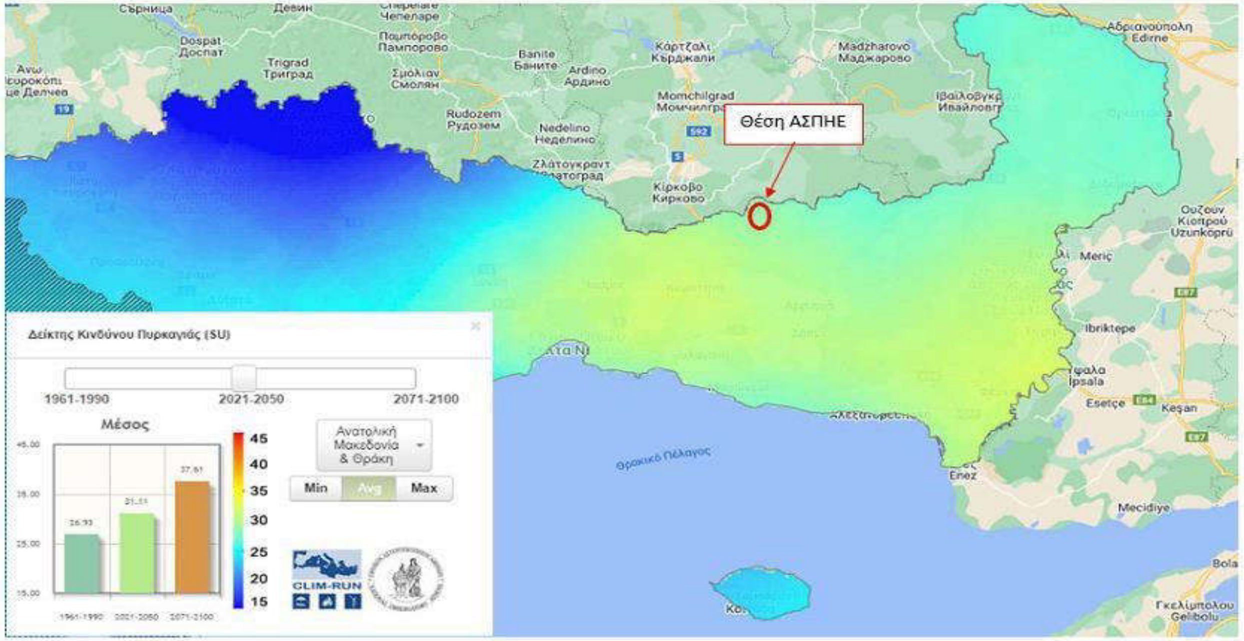


Figure 8.14- 2: Fire Risk Index (SU) Map (Source: http://www.oikoskopio.gr/map/ **)**

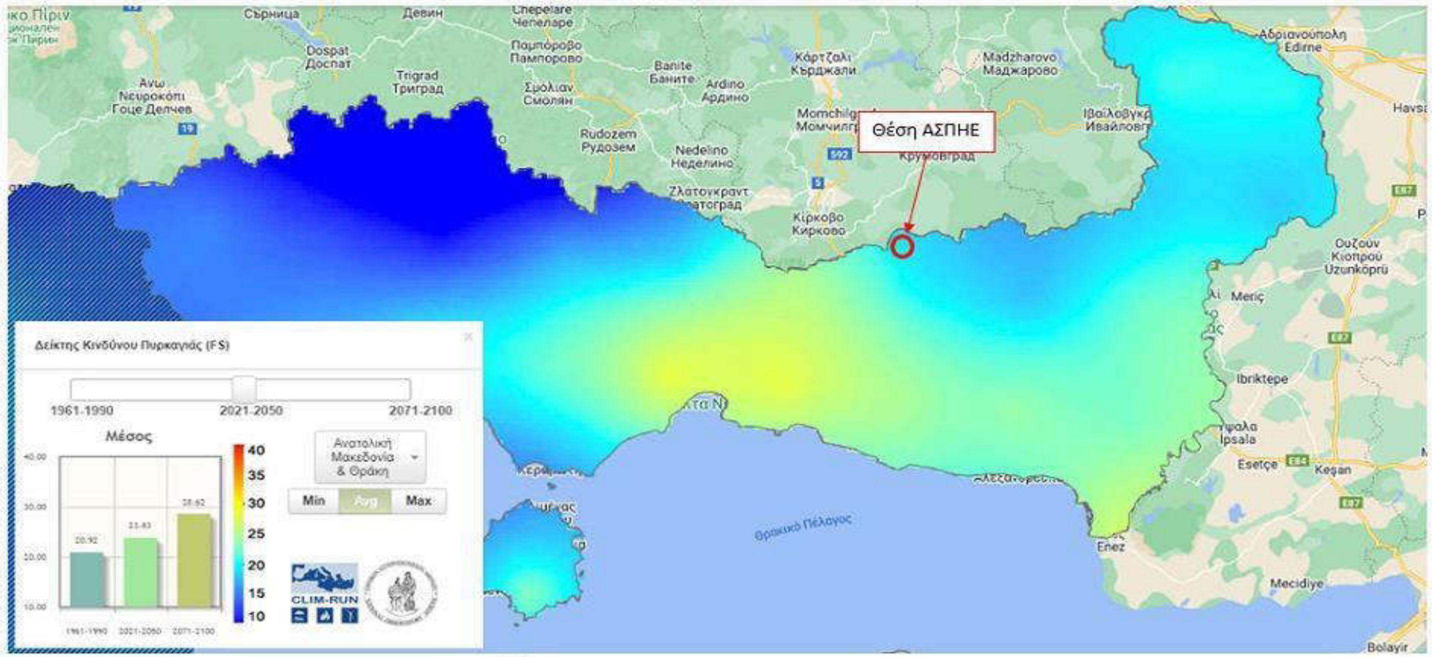


Figure 8.14- 3: Fire Risk Index (FS) map

In conclusion, as regards the vulnerability of the project to disasters (floods, earthquakes, fires) and climate change, as analysed above, the following are noted:

1. During the operation phase the ageing of the equipment should be checked. The study area, according to the approved Flood Risk Management Plan for the Thrace Hydrological Region (EL12), is not associated with flooding phenomena and therefore, no additional measures are required.
2. The materials used for the construction are of national and/or international specifications in order to ensure the resistance of road works, engineering works and accompanying works to fire, earthquakes and flooding.
3. Κατά τη μελέτη εφαρμογής του έργου λαμβάνονται υπόψη οι πρόσφατες τεχνολογικές εξελίξεις σε θέματα σχεδιασμού. Ταυτόχρονα, οι παραδοχές σχεδιασμού του έργου εναρμονίζονται με τις τοπικά επικρατούσες οικιστικές, μορφολογικές, κλιματικές, φυσικές συνθήκες και με το τοπίο, λαμβάνοντας υπόψη την επίδραση της κλιματικής αλλαγής στην υπό μελέτη υποδομή (φαινόμενα ερημοποίησης, αύξησης της θερμοκρασίας, είτε δεν επηρεάζουν καθόλου το έργο είτε δεν είναι εκτεταμένα στην περιοχή του και άρα ιδιαίτερα επικίνδυνα για το έργο).
4. Finally, it should be noted that the proposed projects are constructed with modern materials and modern construction methods, so as to provide the necessary coverage at all levels for any disasters resulting from adverse weather conditions, earthquakes and floods, which may occur in the future at the project.

The impact assessment with the corresponding mitigation measures to prevent accidents to which the project is vulnerable are provided in Chapters 9 and 10 of this study.

8.15. ENVIRONMENTAL TRENDS (WITHOUT THE PROJECT)

The non-construction and operation of the project will lead to the continuation of meeting energy needs from conventional forms of energy. The construction and operation of the project will result in electricity generation through the exploitation of wind potential, which is a renewable and sustainable form of energy. The electricity produced is exclusively supplied to the country's energy system, thus strengthening it at local and supra-regional level by generating clean and renewable energy.

In this way and by using mature and economically competitive technology, the project contributes to the achievement of climate goals and in particular to the reduction of greenhouse gases (GHG), as well as the pollution of the atmosphere, the subsoil and water resources, substituting the production of electricity from conventional power plants, which are polluting, but also saving fuel for the benefit of the national economy. However, in addition to the environmental contribution of the project, the project also makes a developmental contribution both at the local level by creating jobs, and at the regional-national level by increasing available power, contributing to the country's energy sufficiency and making the national energy system less dependent.

Το υφιστάμενο φυσικό και ανθρωπογενές περιβάλλον στην άμεση περιοχή δεν αναμένεται να επηρεαστεί αρνητικά από τη λειτουργία του έργου. Από την άλλη μεριά, θα επηρεαστεί αρνητικά το περιβάλλον στις περιοχές των σταθμών παραγωγής με συμβατικά καύσιμα (πχ Φλώρινα, Κομοτηνή, Πτολεμαΐδα, Μεγαλόπολη, κλπ), καθώς και το παγκόσμιο κλίμα σε περίπτωση που δεν υλοποιηθεί το έργο, φυσικά στο βαθμό αναλογίας του. Ειδικότερα και όσον αφορά στα είδη ορνιθοπανίδας, σύμφωνα με τα στοιχεία της συνημμένης ΕΟΑ η διατήρηση των ειδών ορνιθοπανίδας του Παραρτήματος ΙΙ της Οδηγίας 92/43/ΕΟΚ και της Οδηγίας 2009/147/ΕΚ χαρακτηρίζεται ως σχετικά ουδέτερη. Οι τάσεις εξέλιξης των οικολογικών χαρακτηριστικών της ΣΠΠ - GR008 «Κιλάδα Φιλλιούρη και Ανατολική Ροδόπη», εκτιμώνται ως σταθερές, υπό την έννοια της διατήρησης των φυσικών χαρακτηριστικών της περιοχής

Evaluating all of the elements developed above, the existing environmental situation of the area, as well as the fact that with the measures proposed in chapters 10 and 11 of this document, the potentially negative impacts on the environment from the construction and operation of the project can be avoided and addressed, it is concluded that the development of the environment at local-regional and national level will be positive even with the implementation of the project.

CHAPTER 9: ASSESSMENT AND EVALUATION OF ENVIRONMENTAL IMPACTS

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9 ASSESSMENT AND EVALUATION OF ENVIRONMENTAL IMPACTS

9.1 METHODOLOGY FOR IMPACT ASSESSMENT

This chapter describes, assesses and evaluates the potential environmental impacts that the wind farm and its ancillary facilities may cause from the use of natural resources, the emission of pollutants, nuisance and waste disposal.

The purpose of this chapter is to assess the characteristics of each impact in order to determine whether the likelihood of occurrence, intensity, magnitude and potential for prevention or compensation from other impacts, as well as the other properties of the impact, allow measures to be taken, as well as to identify the type of measures that are appropriate to prevent or address the potential negative impacts.

The environmental impact attributes on which the assessment and evaluation of this chapter was based are as follows:

1. The likelihood of occurrence, i.e. whether it is certain (certain to occur), very likely, likely, unlikely
2. The extent of the impact, i.e. the geographical spread
3. The intensity of the impact, in terms of order of magnitude, i.e. whether the change is small, medium or large
4. The complexity of the impact, i.e. whether it is a direct or indirect impact
5. The time horizon of the impact, i.e. whether it is a short, medium or long-term impact
6. The ability to prevent, avoid, reverse or minimise
7. Synergistic or cumulative action with other impacts from the project itself or from other projects or activities

The impacts examined concern all abiotic and biotic parameters that shape the natural and anthropogenic environment of the area of intervention (atmosphere, soil, water, flora, fauna, noise, landscape, etc.), land use and land use, as well as the socio-economic characteristics of the study area.

The assessment and evaluation focuses mainly on the properties of the potentially significant impacts (likelihood of occurrence, magnitude, intensity, cumulative/ synergistic effects, etc.) of all activities and individual projects based on the project design elements, the supporting studies, the existing environmental situation (see Chapter 8) and the results of various calculations.

The impacts of the project under study are considered in two stages:

- The first stage concerns the construction phase of the proposed projects.
- The second stage concerns the operational phase of the proposed project.

At the end of the chapter, a summary of the impacts is presented in tabular form, following a specific rating scale, to assess and characterise the potentially significant impacts considered.

9.2 IMPACTS RELATED CLIMATE AND BIOCLIMATIC CHARACTERISTICS

The climate impact is global in terms of greenhouse gas emissions, most notably carbon dioxide (CO_2). These emissions intensify the phenomenon of climate change (resulting in rising temperatures, severe weather events, floods, sea level rise). In view of the above, reducing these emissions and the overall carbon footprint of anthropogenic activities is now a strategic priority at national and global level (Paris Climate Change Conference-New Global Agreement, 2015).

In this context, the following sections consider the potentially significant impacts of the project on climate and bioclimatic features at local (direct impacts) and supra-local (indirect impacts) levels.

9.2.1 Construction phase

During the construction of the projects there are expected to be emissions of gaseous pollutants, including CO_2 emissions. These emissions are mainly due to the movement of heavy vehicles and the operation of construction machinery (excavators, etc.) for small-scale work on the opening of small sections of access roads, the landscaping of the A/C squares, etc. Taking into account the simultaneous construction of the works in distinct spatial areas, these emissions will be of limited intensity and duration and will in no case cause a direct change in the climate and bioclimatic characteristics of the study area (wind direction, upward or downward currents or changes in the temperature of the area).

According to international literature and experience, CO_2 emissions from the construction sector are due to the energy consumption for the production of construction materials and the energy consumption of on-site machinery.

A typical construction site composition was presented in chapter 6 for the estimation of the generated air pollutants. The CO_2 emissions for a worst case scenario of simultaneous operation of all construction machinery amount to 0.47 tn/hr. By comparison, an Airbus A-319 aircraft during the LTO cycle alone, i.e. without the rest of the flight, emits 3.17 tn/hr of CO_2 based on EEA and ICAO emissions data. That is almost 6-7 times more CO_2 than the entire manufacturing machinery. In addition, the emissions from the construction project are of limited duration of a few months.

Therefore, the impacts on climate and bioclimatic characteristics from the construction of the project under consideration are expected to be negative, but very minor, local, short-term and reversible. Impacts on global climate are negligible.

9.2.2 Operating phase

The operation of the wind farm of this study is projected to produce 102 GWh/year, energy that if produced by a conventional plant would cause emissions of $_{CH4}$ and $_{CO2}$, which are the main greenhouse pollutants. The emissions of air pollutants from a conventional lignite and natural gas-fired plant for the above energy are shown in the table below (EPA, 2008 and EPA,2009. Emission factors for greenhouse gas inventories):

Table 9.2- 1: Emissions of gaseous pollutants avoided by the operation of the project

	CO2	CH4	N2O
	sound	sound	sound
Lignite	34.000	3,81	0,57
Natural gas	18.465	0,34	0,03

It is therefore clear that the significant benefits to the global climate and air quality that will result from the operation of this project will be significant. At the same time, there are no emissions of air pollutants locally in the project area, so there is no local air quality impact.

On the other hand, over the last 20 years several studies (Baidya Roy and Traiteur 2010, Zhou et al 2012, Harris et al 2014, Armstrong et al 2016, Xia et al 2016) have been conducted on the impact of wind farms on the microclimate of a region. The results converge on the fact that there is a change in air temperature near the ground surface during 24 hours. This phenomenon is due to the increased wind turbulence behind the wind turbines, which results in the vertical mixing of the gas masses in the different layers. Research has also shown that the temperature variation depends on land cover, time of year and time of day. All these parameters are related to the state of the atmosphere. In conditions of atmospheric instability, which prevail during the day due to solar radiation, the effect is very small. In conditions of atmospheric stability or neutral state, the vertical mixing of the gas masses is favoured and therefore the effect is greater.

Also, the effect occurs downstream of the A/C in the wind direction. This is due to wind turbulence due to the presence of the rotor and the reduced horizontal wind speed. The greater the turbulence, the greater the effect of the A/C on the surface temperature.

According to the study by Y. Qin et al, 2022 on 319 wind farms in the USA, a percentage of 61.1% of the A/Ps showed a temperature increase near the ground during the night, while 38.9% showed a temperature decrease. During the daytime, nearly 100% showed negligible temperature change compared to before the A/Ps were operating; the increase was generally greater in rural and grassland areas than in forested areas. On average, ground temperature showed insignificant increase compared to the pre-WTG condition during the daytime and significant warming of 0.10 ◦C of annual mean nighttime LST averaged over all wind farms tested ("Our results indicated insignificant impacts on LST during the daytime but significant warming of 0.10 ◦C of annual mean nighttime LST averaged over all wind farms")[1] .

Based on the above, it is estimated that the proposed project would have neutral impacts on the *local* climate and bioclimatic characteristics of the project area, while it would have positive impacts on climate and bioclimatic characteristics *globally*.

[1] Y. Qin et al "Impacts of 319 wind farms on surface temperature and vegetation in the United States" Environ. Res. Lett. 17 (2022) 024026)

9.3 EFFECTS ON MORPHOLOGICAL AND LANDSCAPE CHARACTERISTICS

The main impact of a project on the morphology of the terrain and landscape is the way in which it is visually integrated into the natural environment. The degree of alteration of a landscape depends largely on its degree of sensitivity and vulnerability. The more aesthetically interesting a landscape is, the more sensitive it is to alterations - interventions. The landscape in the project area is characterised as mountainous with a lack of anthropogenic texture, as the nearest settlement is more than 8 km away

The visual disturbance that a wind farm may cause depends on a number of factors, both subjective (people's attitude towards the landscape, wind energy, visual amenity, the undisturbed natural environment, etc.) and objective (geometric characteristics of the wind turbines, number and arrangement of wind turbines, landscape character and value, weather conditions, etc.).

9.3.1 Construction phase

During the construction phase of the project, certain negative impacts on the landscape and the aesthetic environment of the construction area are expected due to the visual disturbance caused by the construction of small sections of the new access roads to the A/C and the improvements to the existing roads, the construction of the A/C plazas with the installation of the construction site, as well as the temporary sites for the deposition of materials and the increase in road traffic on the rural forest roads.

The interventions on the road network in the area concern very minor road paving interventions, without creating large embankments or ditches and therefore will not alter the morphology of the area.

The earthworks for the **foundation of the A/Cs and the creation of squares** at their base will cause little disturbance, as these works in the A/C foundation area involve excavation, but are located at a considerable distance from settlements. In particular, the area occupied by the foundation and the safety walkway around it covers a square of approximately 20m in side.

The space for an assembly crane with an increased strength floor depends on the type of crane, with a typical square dimension of approximately 25m. Regarding the pylon element deposition space, it is a function of the number of pylon elements (rectangular rectangle of 30*35m in most cases), while the blade deposition space is related to rectangle with dimensions 85*15m. Finally, the free lane for crane assembly is parallel to the access road, 150m long and 10m wide free space.

In general, the interventions made on the installation sites of a wind farm are restored after the end of the works. The total construction work (drilling of foundations, platforms and installation of the A/C and other ancillary equipment) is estimated to take approximately 16 months. The construction works will not be cumulative, as each polygon will be installed one A/C at a time, while the road improvement will proceed relatively quickly due to the mild interventions required.

The landscape of the area is characterized by a weak human presence as it is a mountainous area far from settlements.

In any case, in order to reduce as far as possible, in a preventive and/or remedial way, even minor negative impacts on the landscape and the aesthetic environment, due to the construction of the project under study, appropriate measures will be taken during the construction of the project (see Chapter 10).

In conclusion, it is estimated that **landscape impacts during the construction phase of the project are expected to be of low to medium intensity, locally, short term, which will be largely reversed after the completion of the construction phase, subject to site restoration**.

9.3.2 Operating phase

9.3.2.1 Introduction

The aesthetics of a landscape and a work of art is largely a subjective matter. Something obvious and visible is not necessarily unsightly. Today, at the same time that some people express concerns about the impact that A/Vs can have on the landscape, there are others who consider them to be elegant and tasteful human constructions, the sight of which symbolizes and marks a path towards a better, less polluted planet. Indeed, if a comparison is made between an oil or lignite-fired power station and a wind farm, it is clear that the latter is also aesthetically superior, and by far.

Many people today, from specialized scientists (architects, landscape engineers) to the residents of areas near wind farms, express themselves positively about the simple design of wind turbines and their elegant character, as well as about the pleasant element of movement, the which they introduce into the landscape. As an example, a survey carried out in 1998 in various wind farms in Spain showed high rates of visual acceptance by the inhabitants:

In El Perdón 41% said that the presence of the park has no impact on the landscape, 32% that it degrades it and 24% that it improves it. In Leitza-Beruete 56% said that the park has no impact on the landscape, while 36% said it does. In Alaiz-Izco 45% believe that wind turbines have no impact, 29% believe they degrade the landscape and 19% believe they improve it.

In Scotland, a 2000 poll of residents living within a 20 km radius of four large wind farms showed that 67% of respondents liked the visual impression of their wind farm, and strikingly, this figure increased to 73% among those in the immediate vicinity of the turbines (less than 5 km radius).

Modern A/Vs are characterized by greater visual acceptance potential than those of older technology, since:

a) they are slim and elegant in design, compared to the early models that were bulky or based on trusses,

b) the speed of rotation of their blades is lower the larger the rotor, which creates a more pleasing visual effect,

c) are placed at greater distances from each other the larger the diameter of the rotor, thus achieving more sparse distributions, compared to the denser groupings that were present in earlier wind farms.

The process of integrating a wind turbine into the environment is based on the dynamic visual coupling of the wind turbines with the particular landscape features of the installation area. These landscape elements can be characterized by:

- The flat character of a lowland area.
- The slightly undulating topography of a hilly area.
- The intense relief of a ridge or mountain range.
- The urban and peri-urban landscape of a town, village or city.
- The highly industrial and strictly regulated profile of an industrial zone.
- The rural character of an area.
- Combinations of the above

Ultimately, the visual disturbance that a wind farm may cause depends on a number of factors, both subjective and objective:

<u>Objectives</u>

- the geometrical characteristics of the A/C (height of the pillars, rotor diameter)
- the number and arrangement of wind turbines within the wind farm
- the character and value of the landscape
- the density of the local population within the zone of visual influence of the wind farm
- the distance of the A/C from the observer
- the number of visitors to the surrounding area
- the weather conditions and the local topography (land formations).
- The degree of coverage of the horizon Subjective
- people's attitudes towards landscape and natural beauty
- people's perception of visual acuity
- the attitude of individuals towards wind energy
- each individual's weighing of the local impact against the wider local interest. To provide an insight into the variation in the landscape impact of a wind farm due to different observation distance, **Figure 9.3-1** shows the relative size of a wind farm's image relative to the field of view of the human eye from distances of 500, 1,000, 2,000, 5,000, and 10,000 meters from the base of the wind turbine. The greater the distance between the observer and the observed object, the smaller the object appears.

Similarly, as the altitude difference between the observation position and the A/C (the perpendicular distance between them kept constant) increases, the smaller the height of the A/C appears. Also, the apparent distance between two objects (in this case an A/C) varies according to the angle formed by the lines connecting the two A/Cs to the photographing position (observation angle). As this angle decreases, the apparent distance between the two A/Cs decreases. The above findings can be summarised in the following general observation/physical phenomenon: the apparent size of an object changes according to its angle of observation.

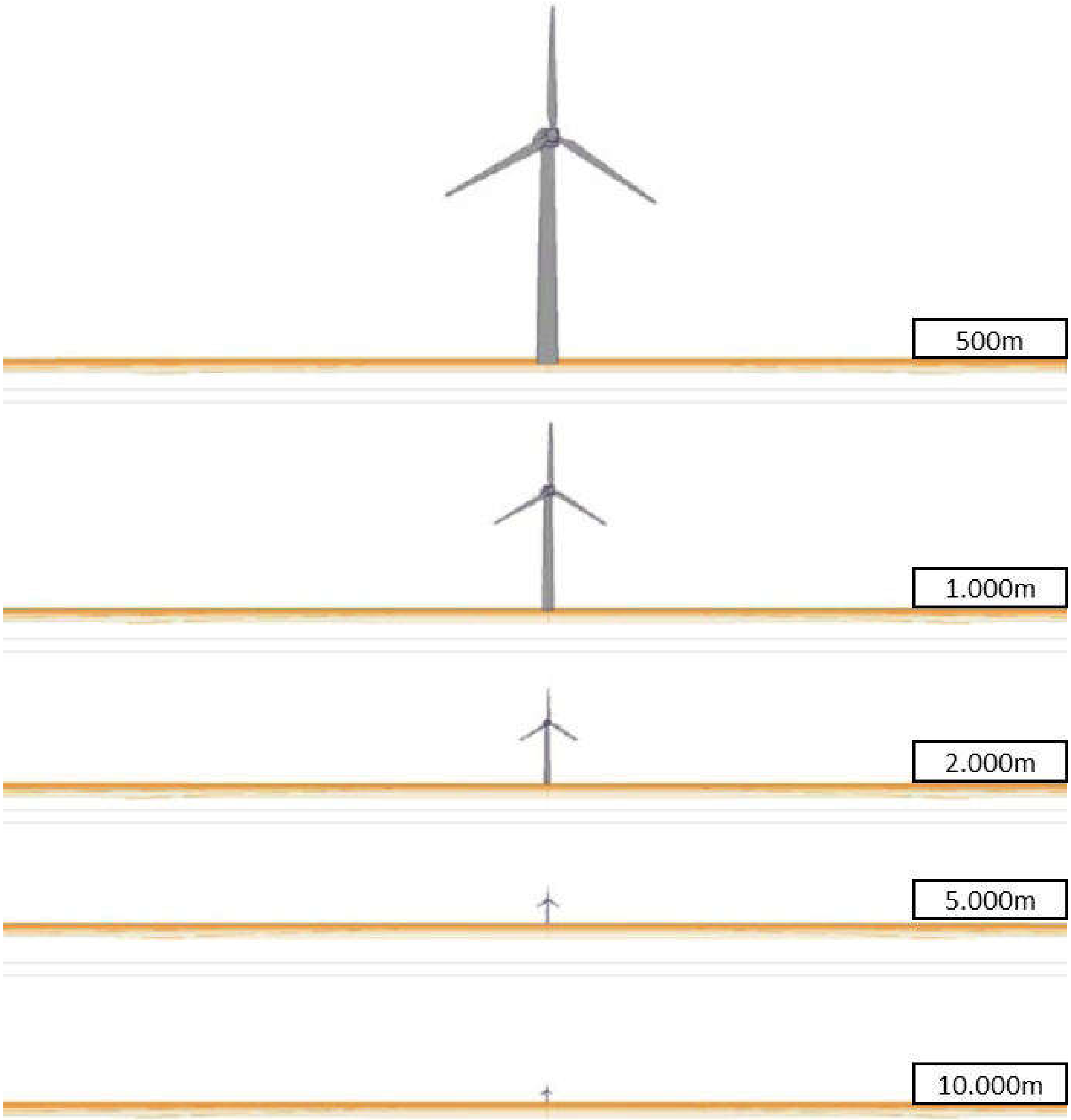

Figure 9.3- 1: Relative size of the image of an A/C depending on the observation distance

<u>A summary of the project elements considered in terms of their impact on the landscape</u>

In principle, the wind turbines themselves are the main part of the project which may have an impact on the landscape.

Secondly, the impact of the accompanying projects is considered.

- The road construction of the project does not have any impact on the landscape, as these are short sections of new openings and mainly concern the improvement of curved sections and ensuring the smooth transport of the A/C and easy access to them. The majority of these are improvements to the strength of the decking of existing rural forest roads. There is therefore no change in the landscape from road construction. In any case, where appropriate, the restoration of any altered landscape will be taken into account in the Phytotechnical Study.

- Medium voltage transmission network. The network - external interconnection and internal network between the gensets - will be underground along its entire length.

9.3.2.2 Visual analysis of potential impacts

A first step to objectively assess the potential impacts of a wind farm on the landscape is to evaluate from which locations and how many wind turbines are visible. By means of a Visibility Density Map one can estimate, given a certain distance from the project and therefore a certain size of the study area, the percentage of locations from which an observer can see the turbines and how many in number.

Using WindFarm Release 4.2 software, a view map was drawn, in which the number of A/Vs visible at each location on the map is displayed in a colour gradient (3 classes - the class where no A/Vs are visible is not displayed) (**Figure 9.3-2**). The results show that in 14.94 % (of the simulation area) between 7 and 11 A/Vs are visible, while in 54.93 % no A/Vs are visible.

Table 9.3- 1: Results of the visual contact analysis in the project under study

VISIBILITY A/C	PERCENT%	EXTENT (km)^2
0	54.93	108.06
1-3 A/C	13.72	26.99
4-6 A/C	16.40	32.26
7-11 A/C	14.94	29.39

However, the software does not take into account any artificial obstacles or vegetation that may hide the A/Vs, whereas based only on the morphology of the terrain, they are theoretically visible. Moreover, it does not take into account the distance and angle of view of each viewpoint from the S/Vs, so that all are considered equally visible, a view that overestimates the impact. Of the nearby settlements in the study area, between 1 and 3 S/Vs can be seen from Sarakini, while from Upper Cardamo, possibly 4 to 6 can be seen, although intervening vegetation may also obscure those marked above based on the view map.

The other settlements are more than 9 km away and there is no issue of visual disturbance.

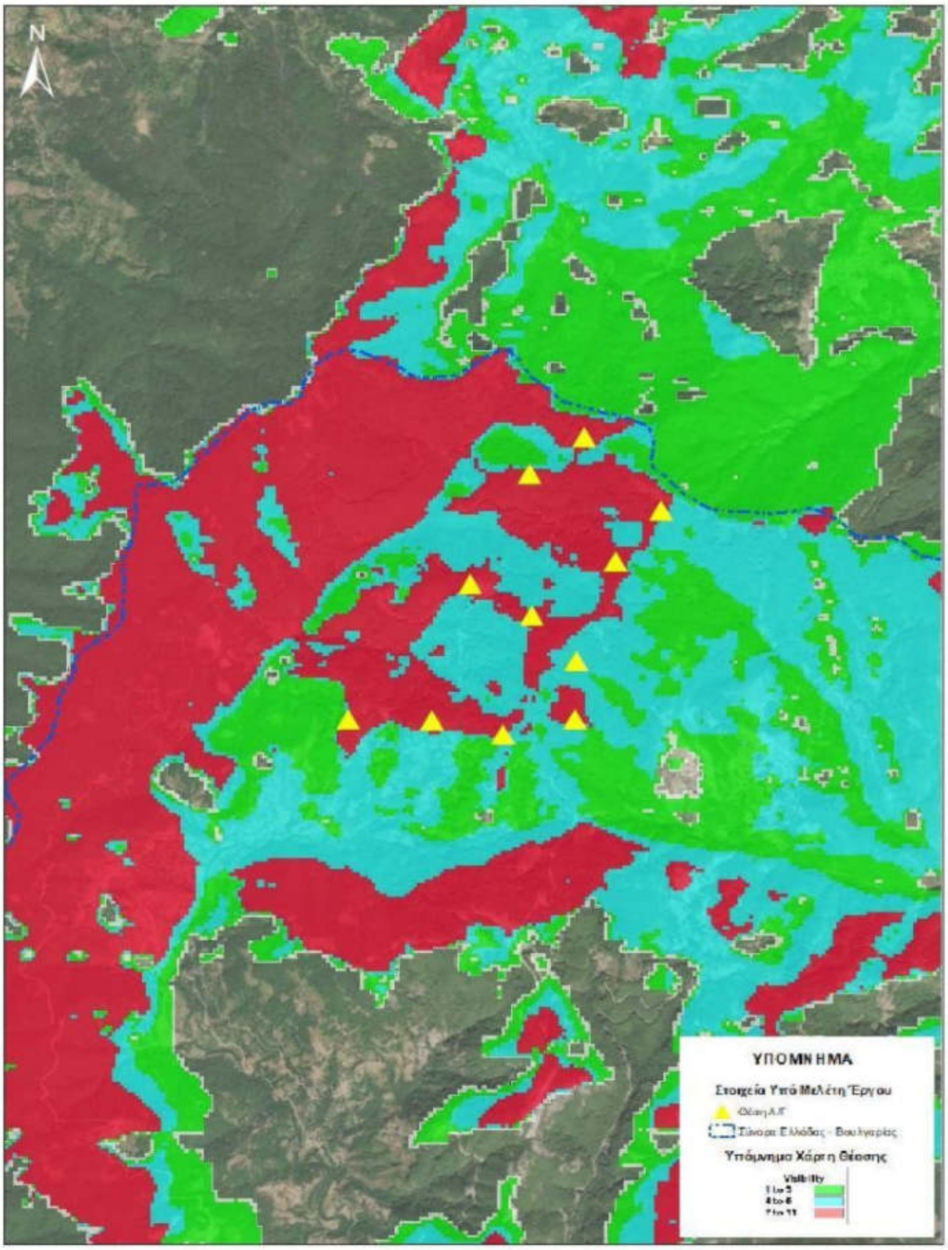

Figure 9.3- 2: Viewing map

A second step in the analysis of landscape impacts is the density criterion, which is also included in the Special Spatial Plan for RES. In this criterion, three zones are taken for each point of interest and the number of visible S/Vs is checked in these zones to ensure that it is less than the maximum acceptable limit. This analysis was carried out in Chapter 5 and the results show that the density of the proposed RES, assuming conservatively that they are all visible, which is not the case in practice, is well below the maximum limit and therefore all the criteria of Article 7.2 and Annex IV of the specific spatial framework for RES are met.

Finally, it is noted that there is an archaeological site in the area which is a sensitive viewpoint. This is the archaeological site "Peribolos, Asar-Teppe Heights, Rhodope", which is 1.5km from the nearest A/G. As documented in Chapter 5^{o} , the project is compatible with the cultural criteria because the nearest A/Es are located outside and at a significant distance from the exclusion zones introduced by the Special Spatial Framework for RES. However, the impact in terms of visual impact must also be checked, especially when the site is an archaeological site. According to **Figure 9.3-1** , which illustrates the relative size of the view of an A/E depending on the viewing distance, as well as the actual distance of the site in question from the nearest A/E (1.5 km), it can be concluded that there will be a minor impact.

In conclusion, from the above analysis, it is considered that the proposed location of the A/Cs is satisfactorily integrated into the landscape and therefore the operation of the project will generally have a minor impact on the landscape characteristics of the wider area.

9.4 EFFECTS RELATED TO GEOLOGICAL, TECTONIC AND SOIL CHARACTERISTICS

9.4.1 Construction phase

Due to the morphology of the terrain and the fact that there is already a road network in a fairly satisfactory condition, the earthworks to be carried out are small-scale surface excavations. The design of the project in question has taken care to limit this work to the minimum necessary, in order to avoid major interference with and deterioration of the environment.

In particular, they concern:

- in the foundation of the A/C and the formation of squares at their base,
- the underground routing of medium-voltage cables,
- the improvement of existing rural-forestry roads and the construction of new small sections of road network openings.

After the completion of the works, the open trenches are backfilled, preferably with excavation products, in order to achieve full restoration of the surrounding area.

Any remaining excavated material will be removed from the project site and disposed of in designated areas as described in Chapter 6.

Large trenches will be created only at the foundation locations of the A/C and will be made after geotechnical study and investigation during the construction phase. If reinforcements are required, they will be used in accordance with the geotechnical study. Other earthworks will involve very shallow excavations or very shallow embankments that are not likely to create unstable slope conditions/ subsidence or other impacts on the ground. It is noted that the earthworks will be carried out using standard machinery due to the generally earthy subsoil.

No soil contamination is also not expected during the construction phase (except in case of an accident), as no hazardous pollutants or waste production is foreseen. Maintenance of construction machinery will be carried out in specially licensed premises, while the concrete for the foundations will come ready-mixed from a concrete production industry.

In view of the above, it is estimated that the project will result in minor, permanent impacts on the soil.

9.4.2 Operating phase

During the operational phase the project will not have any kind of interaction with the soil and therefore will not have any impact on the soil and geology of the area.

9.5 EFFECTS ON THE NATURAL ENVIRONMENT

Climate change is now a direct threat to the planet's biodiversity, which is the number and diversity of living organisms - the sum of genes, species and ecosystems in an area and the relationships between them. The extinction of species of flora and fauna that has been taking place in recent decades is almost certain to trigger a chain reaction in global ecology.

Wind energy, as a Renewable Energy Source, is one of the most important tools for addressing the main manifestation of climate change, namely Global Warming, through the replacement of fossil fuels in electricity production.

However, there are concerns about the impact of wind farms on biodiversity, the main one being the negative impact of wind turbines on the avifauna of an area. Many people are of the opinion that the future of wind energy is caught in a dangerous tug-of-war: on the one hand, it cures climate change, which indirectly threatens global biodiversity, but on the other hand, it threatens the biodiversity of the immediate area due to the risks of wind turbine operation to birds and the destruction of habitats, mainly due to the wind farms' accompanying works (roads and power lines).

Greece is a country "blessed" in terms of wind power, as it has one of the highest wind potentials in Europe. Its rugged relief, the alternation of lowland and mountainous areas, the large number of islands and islets, combined with the prevailing climatic conditions (e.g. concave systems of depressions, annual winds) create numerous locations with exploitable wind potential.

On the other hand, Greece has a high level of biodiversity at all levels (genetic biodiversity, species biodiversity, plant community-ecosystem biodiversity and landscape biodiversity). Furthermore, the intense geographical and ecological dissection of Greece into many isolated areas, such as islands, mountains, streams and valleys, is responsible for the large number of endemic species of flora and fauna.

Greece, therefore, has a high wind potential which it must exploit, but also a rich and important biodiversity which it must preserve. The situation is further complicated by the fact that the most windy areas are also part of the Natura 2000 network. Bringing all the above together and finding a workable component is a major challenge for the next decade.

An assessment of the impacts of the project on the natural environment is then made, taking into account the analysis of the Appropriate Impact Assessment included in the EIA study, which is also provided in the Annex to this document.

9.5.1 Construction phase

9.5.1.1 Ecosystems-Flora

During the construction phase of the proposed ESDP (construction of access roads, A/C platforms, MT transmission line), activities that may negatively affect the ecosystems and flora species of the study area include limited excavation and backfilling, material deposition and the presence of people and machinery.

For the installation of the underground MT transmission line from the area of each polygon to the existing CS, the required channel boring works will be carried out along existing rural-forestry and rural roads. Therefore, no tree felling will take place and, in general, no removal of natural vegetation will be required. It is therefore concluded that the construction of the interconnection works will not affect the flora and ecosystems of the intervention area.

Minor impacts are also expected from the improvement of access roads. As has been presented in Chapter 6, the existing rural forestry and rural road network will be used. Minor road modifications will be made locally to create adequate radii at the bends, which will ensure smooth and proper transportation of the project equipment as well as continuous communication between the A/Cs. The road improvement works involve the reinforcement of the existing pavement of the rural-forest roads with layers of paving materials. Due to the existing road network, no special interventions are required and no widening of the overall network will be necessary, except locally. No destruction of vegetation or disturbance of habitat types is therefore foreseen.

There will be some deforestation, mainly of shrubs and trees, during the installation of the wind turbines, much of which will be replaced at the end of the installation of the project, just as the horticultural study that was to be carried out for such needs. The area occupied by the installation of the 11 wind turbines is estimated at approximately 50.3 hectares, a very small area compared to the thousands of hectares of woodland in the region.

As regards the produced LCW, they will be temporarily deposited in temporary landfills within the Installation Multiples, excluding the possibility of causing pollution in the field of work or in the surrounding area. In addition, any site waste and leachate will be controlled at source by implementing the rational management measures included in Chap. 10 herein.

In summary, very minor, short-term and localised negative impacts on existing ecosystems and the flora they support are expected during construction of the project, which will be partially reversible with the implementation of appropriate measures as described in Chapters 10 and 11 of this report. The installation of the project under consideration is not likely to threaten to any extent the status of any sensitive flora species.

9.5.1.2 Forests and woodlands

The impacts of the proposed project on forest areas relate to the occupation of forest areas and the possible required clearing of forest vegetation for the foundations of the A/Cs, as well as for the opening of access roads. It is recalled that the impact of the construction of the section of the interconnector that is adjacent to the access road is included in the impact of the construction of the road, while for the remaining length of the line that is built on the footprint of the existing road network, no clearance is carried out and, therefore, any impact on forest vegetation is negligible. The above areas largely, and according to the ratified Forest Map of the area, fall under the par. 1, 2, 3, 3, 4 and 5 of Article 3 of Law 998/79 as in force, while a small percentage of these areas are non-forest areas. In more detail, in the total area covered by the access road and the A/G platforms, an area of 104.00 ha. falls under forest land (AD, DA, PD) and an area of 2.5 ha. under other types of cover (AA, PA).

In these areas, special care should be taken to limit damage to forest vegetation. The nature of the project, the selection of appropriate design features and the adoption of appropriate measures during the construction phase, as described in detail in Chapter 10, will minimise potential impacts on natural vegetation in areas of woodland character in the immediate vicinity of the projects.

Specifically:

- As shown by the spatial control on a Google Earth 2020 satellite imagery background, most of the occupied areas of the A/C platforms are in mountainous areas with little vegetation cover and low vegetation (mostly bushy etc.)

while in addition, for access roads, interventions are made on existing rural- forestry roads, except for some sections where new pavements are needed.

• Equipment requiring minimal manufacturing support is selected.

• The transformers of the A/Cs are located inside the pylon, increasing the free space of the pitches.

• Optimal size and type of gensets were selected in order to produce electricity of sufficient power with the smallest possible number of gensets.

• The Medium Voltage Interconnector will run underground and will use existing roads. In addition, the internal interconnection network of the Gensets will also be underground.

• The access road improvements and channel excavation for the undergrounding of the MT cables involves linear and shallow depth and width excavations, which, with the backfilling of the excavations and restoration measures as described in Chapter 10, are not expected to result in significant impacts to forested areas. In locations where new road construction is required, it will be done in accordance with forest road specifications. In the first phase, the required vegetation clearance along the access road and to the required width if deemed necessary will be carried out in accordance with the final road design plans. Subsequently, excavation of the surface vegetation is planned. A grader and excavator will be required for this work. The movement of vehicles and machinery and dust emissions from the works are expected to cause localised moderate impacts on fauna, which with appropriate mitigation measures (Chapter 10) will be short-term and fully reversible at the end of the construction phase.

The placement of AT and its accompanying projects within forest areas is also accepted at international level (EEA, 2009), as it is a mild and low-disturbance activity, especially considering the very small number of AT, the low land occupation for the opening of access roads, since for a large length only improvements of existing roads are implemented, and the fact that the underground MT network is located on the base of existing roads. In any case, it is foreseen that the intervention zones will be restored by means of a specific study to be submitted for approval to the competent forestry authority.

Based on the above, the impacts of the project on the forest areas of the study area are assessed as moderate, limited in extent and partially reversible after the construction phase of the project.

9.5.1.3 Fauna (excluding avifauna)

The impacts during the construction phase are mainly related to the disturbance of the habitats of mammals, reptiles, amphibians, invertebrates, during the construction of new roads, the installation of the G/Ls and the construction of other electromechanical infrastructure (underground passage of MT cables). The characteristics of the works (point interventions on the site of the GIS and the linear, small width and earthen cross-section nature of the road works) are not expected to have a significant impact on the existing habitats of mammals, reptiles, amphibians and invertebrates.

Also, during the construction phase, there may be disturbance from the noise of machinery and operations during the day and from the light at the construction sites at night. Thus, locally and during the construction phase, it is possible that some of the existing animal species in the area, such as small mammals, may be temporarily removed from the construction area due to disturbance from noise, site light and general human presence, without further impact. Considering the small scale of the project in relation to the total area of distribution of the fauna species reported to occur in the area, impacts on them are expected to be very minor and in no way threaten the status of their presence in the area.

After the end of the construction phase, it will be possible to physically resettle almost the entire area that was disturbed and is not occupied by technical works. Furthermore, taking into account the wide range of most species in relation to the limited area that will be occupied by the works to serve the operation of the ESDP, it can be safely concluded that the impacts will not be significant.

<u>Manikins</u>

High activity and a high diversity of chironomid species was recorded in the project area. In the feeding area of the nearest known colony to the cave
"Supajin - Ine" diversity and activity is moderate. A total of 19 species of handraps were recorded. 5 species belong to an endangered category of the Greek Red Book and/or the European Red List (IUCN), while all species belong to Annexes IV and/or II of Directive 92/43/EEC. The dominant species in the project area was the Micro Bat (Pipistrellus pygmaeus), while the presence of the Nanon Bat (Pipistrellus pipistrellus) and the Nocturnal Bat (Nyctalus noctula) is significant. These species do not belong to any of the risk categories in the Greek Red Data Book (and in the IUCN list). Low presence of the species

of the nearest recorded colony of chiroptors in the cave "Supajin - Ine" with the possibility that the colony was not fully active during the field survey.

No disturbance impacts are expected on the chironomid colony in the "Supajin - Ine" cave from the construction and operation of the ASPHE project and associated works, as the ASPHE is located more than 8 km and the associated works more than 4 km from the important cave/refuge located in the centre of the foraging area.

Landscape change and occupation of project features in the installation area are not expected to cause significant impacts to the existing chironomid fauna, and there is potential for increased species diversity post-construction and increased interspecific competition.During the construction phase, no significant disturbance to chironomids feeding on the installation site is expected.

The impacts from the possibility of the collision of the cranes with the A/C are expected to be moderate and mainly concern populations that do not belong to a risk category in the Greek Red Data Book (and in the IUCN list). 5 of the species observed (Barbastella barbastellus, Miniopterus schreibersii, Myotis capaccinii, Myotis myotis and Rhinolophus hipposideros) are also included in the protected species of the TED of the Bulgarian EEZ "BG0001032". Of these, only Barbastella barbastellus is Vulnerable (VU) and had a presence rate well below 1%. The same is true for the other species, which had an equally very low presence rate of less than 1%. **No significant transboundary impacts on the populations of the chiropterans are expected in Natura 2000 "BG0001032" - Rodopi - Iztochni.**

If a significant number of fatalities from impacts (or barotrauma) occur during post-operational monitoring, it is proposed that mortality reduction measures such as increasing the minimum wind intensity for activation of the A/Cs be taken.

<u>Overall, the impacts of the project on fauna species in the study area are estimated to be negative, minor in magnitude and extent, localised and temporary during</u> the <u>construction phase, and are considered to be reversible and manageable. At the same time, positive impacts during construction (and operation) are expected from facilitating access for game and fire control agencies.</u>

9.5.1.4 Bird fauna

The entire ASPEE, including the accompanying works, is located outside the boundaries of protected areas of the Natura 2000 network, but within the Site of Importance for

Birds (SPA) called "Filiouris Valley and Eastern Rhodope" and code GR008. The species in the descriptor form for this SPA, which are categorised in relation to the European **Vulnerable Under** Threat **(VU)** status, are ***Coracias garrulus, Falco naumanni*** and ***Gyps fulvus.*** Those categorised as Endangered **(EN)** are ***Aegypius*** monachus, ***Aquila chrysaetos, Ciconia nigra, Clanga pomarina, Hieraaetus pennatus*** and those categorised as Critically Endangered (**CR**) are ***Aquila heliaca*** and ***Neophron percnopterus.*** The species included in Annex I are the following: ***Aegypius*** *monachus*, ***Aquila chrysaetos, Aquila heliaca, Ciconia nigra, Circaetus gallicus, Circus macrourus, Clanga pomarina, Coracias garrulus, Dendrocopos syriacus, Falco naumanni, Falco vespertinus, Ficedula semitorquata, Gyps fulvus, Hieraaetus pennatus, Lanius collurio, Leiopicus medius*** *and* ***Neophron percnopterus.***

Regarding the Vulture (Gyps fulvus), a mapping has been implemented by the Hellenic Ornithological Society for the sensitivity of critical areas for the species in our country (Figure 9.5-1).

For the production of the map, data from LIFE-IP 4 NATURA (LIFE16 IPE/GR/000002) "Integrated actions for the conservation and management of Natura 2000 sites, species, habitats and ecosystems in Greece -

National Action Plan for three scavenger species of avian fauna (vultures): Vulture (Gypaetus barbatus), Vulture (Gyps fulvus), Black Vulture (Aegypius monachus)", telemetry data provided specifically for this work by the Bulgarian organizations, the University of Crete/ Museum of Natural History of Crete (MFIK) and the results of recent work to determine the habitat of vultures in the Balkans (Peshev et al. 2021 - Figure 9.5-2).

The map shows 4 sensitivity zones:

- Sensitivity Zone A (Red) - Very High/Critical
- Sensitivity Zone B (Orange) - High: This is the zone located peripheral to the critical core of Vulture activity and includes areas of frequent and regular foraging by vultures, making it particularly important foraging areas.
- Sensitivity Zone C (Yellow) - Medium: This zone primarily includes areas on regular vulture routes between colonies and foraging areas, as well as the locations of recent historic colonies, which are expected to be the first areas of vulture recolonization as a result of natural population recovery and/or targeted actions to enhance natural populations.
- Sensitivity Zone D (Beige) - Low: This zone basically includes areas within the Vulture's habitat, but mainly at a seasonal level.

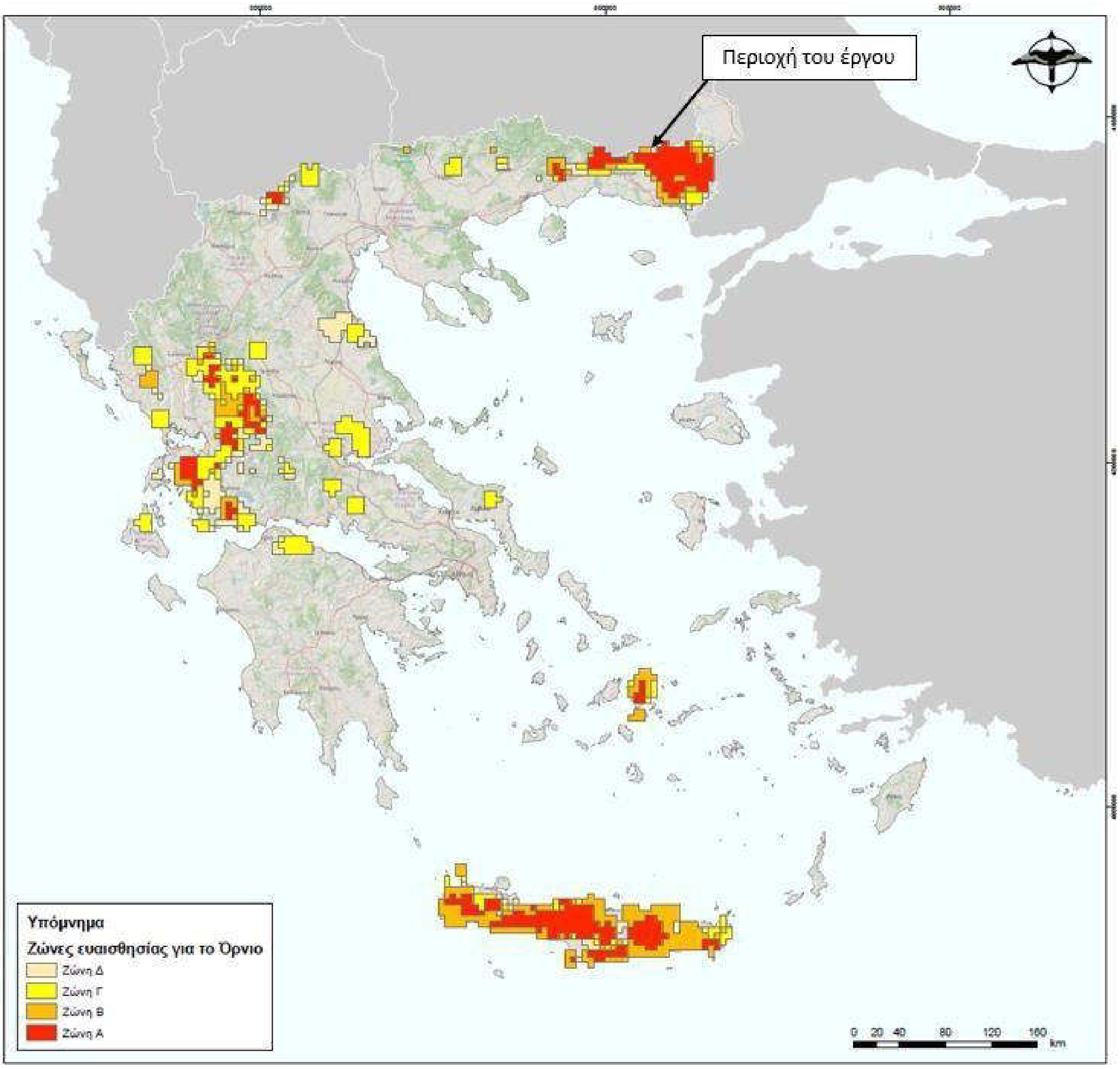

Figure 9.5- 1:Sensitivity map of the critical areas of Vulture in Greece (2023)

As shown on the map above, the project area is located within Zone B which is defined as "*the zone located peripheral to the critical core of vulture activity and includes areas of frequent and regular foraging by vultures, making it particularly important foraging areas.*" However, based on the field observations of the study team, the Vulture does not regularly pass through the area as it was observed only once in a group of 4 individuals in March and in none of the other three observation periods. It should be noted that the sensitivity zone classification of the aforementioned EIA study does not show the areas of bird occurrence in great detail as it uses 5x5 or 10x10 km polygons where the local scale gradients are not discernible at a smaller scale. This fact makes these maps sensitive potentially suitable for country or region-level spatial planning issues, but not for impact assessment at the level of an EIA. This assessment is confirmed by the precision maps for the region produced from telemetry data in a related scientific publication (Peshev et al. 2021) as shown in the next figure. Thus, according to this paper, in no season does the project area fall within the range of the Vulture (except perhaps in spring when its range is slightly closer to the project area and may result in opportunistic observations).

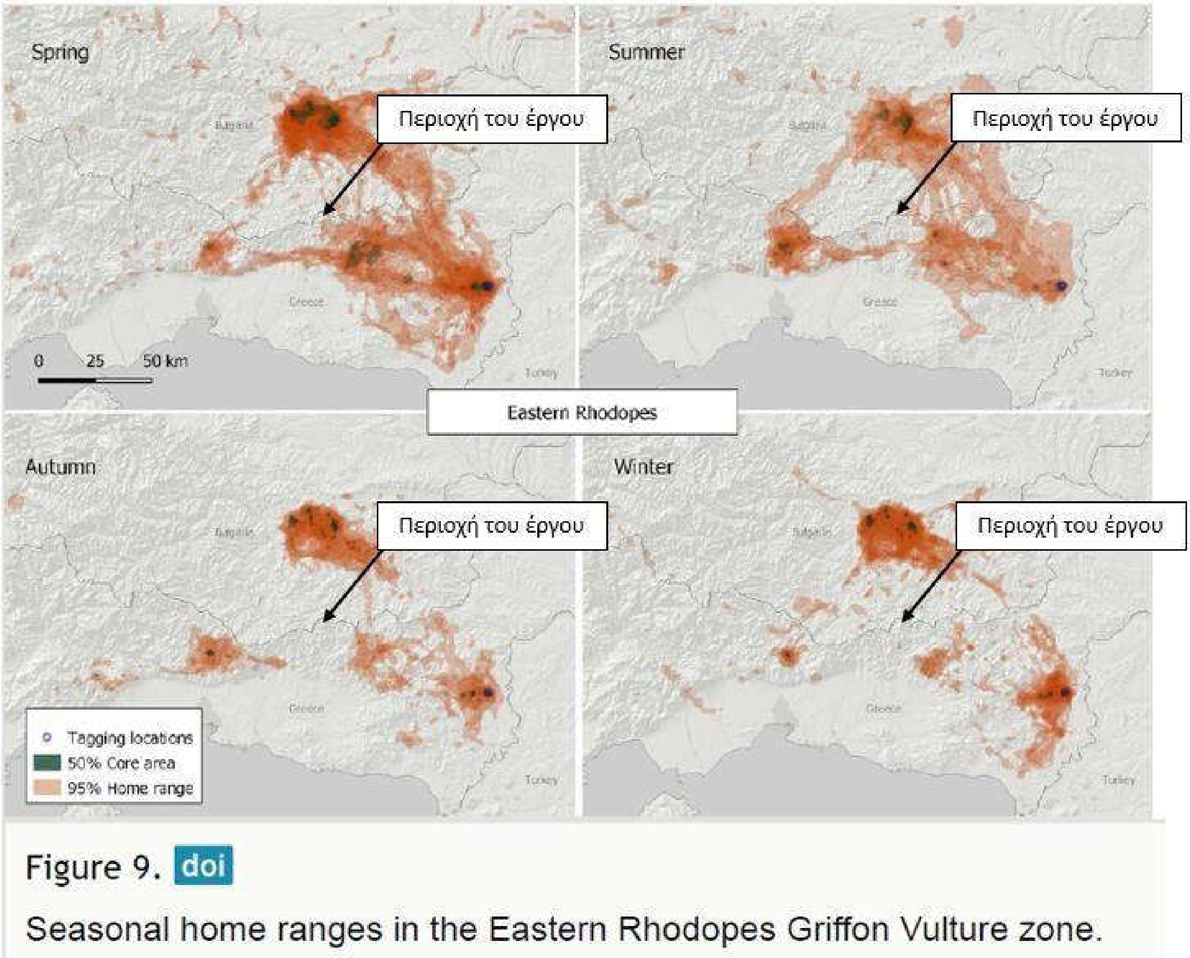

Figure 9.5- 2: Map depicting the 95% range and 50% core distribution area for Vulture in the Eastern Rhodopes for each season based on telemetry data (Peshev et al. 2021).

Therefore, based on the above, the project area cannot be considered as a high sensitivity zone.

As for the Snake Eagle (Circaetus gallicus), its presence was very limited as it was observed only twice in the south of the study area, one individual in March and one in June.

and so it is estimated that its territory is outside the project area as it occurs less frequently.

Some of the above species observed are migratory birds that were recorded in the area as transients due to the season and the location of the area, which is close to one of the important bird migration corridors in Greece and therefore functions as an intermediate migratory station for rest and refueling (Figure 9.5-1). Typical examples are migrants nesting for breeding such as Circaetus gallicus, Emberiza hortulana and Lanius collurio, and may also be transients such as Ficedula semitorquata. However, ostrich species fly at low altitude and are not expected to be affected by the project (check dam, impacts), while other migratory species fly at a much higher altitude than the turbines and are correspondingly not expected to be affected by the project.

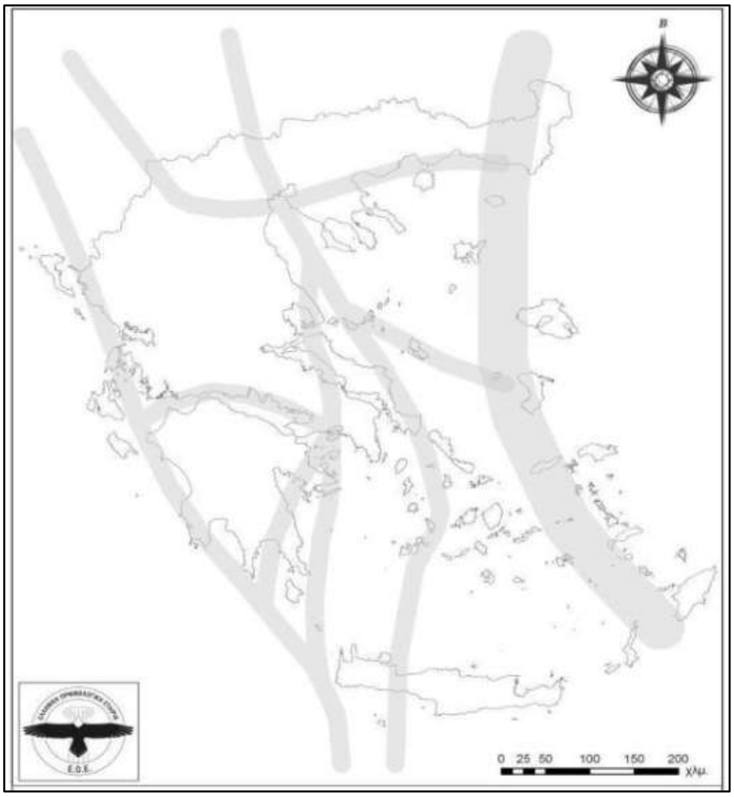

Figure 9.5- 3: Main bird migration corridors in Greece (source: Hellenic Ornithological Society).

Regarding the pressures and threats to the species of the SPA under crisis GR008 "Filiouris Valley and Eastern Rhodopes", these are mainly related to the increasing construction of roads, the intensification of forest exploitation, poaching and the placement of poisoned baits. These pressures are already present and no pressure on habitats and their associated species is expected from the project.

The potential impacts of the project and their significance are then assessed according to the European Commission's guidelines (European Commission, Guidance document on wind energy developments and EU Nature Legislation, 2020).

Nuisance and displacement

Overall, during the construction phase, there may be disturbance from the noise of machinery and operations during the day. The disturbances occur during the construction of the project, such as access roads, earthworks and concreting of the foundations of the A/C mainly). In addition, disturbances may also be caused by light at the construction sites during the night.

In general, disturbance to bird species depends on the size and extent of the disturbance and of course on the season. For all bird species, the impact is greatest during the breeding season as it can cause nest abandonment and breeding failure for that year or even permanent displacement from the area in the case of breeding raptors. In addition, one parameter for assessing the impact of disturbance on avifauna is the distance from the source, which again is different for each species. According to the literature, these distances vary considerably depending on the local conditions and the species present in the area where the disturbance occurs. These disturbances usually affect a radius of a few tens or a few hundred metres.

According to research on the reproductive success of the Black-backed Gull, which can also be considered as an umbrella species for predators, it was estimated that a threshold for anthropogenic disturbance with traffic noise is a noise level of Leq24h = 40 dB(A) (Esther Ortiz-Urbina, 2020). Specifically, the study found that the traditional view that disturbance to predators is a function of distance from road traffic may be overestimated. Instead, disturbance from traffic noise should be considered with the above threshold. This assessment can be extended with reasonable certainty to disturbance from other anthropogenic activities, such as wind turbine construction activities.

In the case of the "Warrior" ASPHE, it is estimated that the construction of the plazas and roads would not disturb any raptor nests with noise as no raptor nests were detected in the Field Survey Area, with the exception of a possible Hoochooris nesting site at a distance of more than 850 m from the nearest A/C. In any case, as a precautionary measure, it is recommended that measures be taken for these locations, as will be shown in the next section.

The disturbance from artificial lighting at night (during the construction phase) can affect nocturnal species, which are sensitive to bright light, if no action is taken. With appropriate measures, this impact becomes insignificant.

Overall, noise nuisances are expected at short distances from the works (a few tens of metres) and nuisances from site lighting can also be avoided to a significant extent after measures. In any case, impacts during construction from both noise and lighting will not be significant to site integrity and biodiversity and will be temporary during construction.

Direct loss of individuals and Habitat Degradation - Habitat Degradation

The individual parts of the AIS and the total, as well as the distribution of the individual areas and the total in terms of the area of the SPA are shown in the following table.

Table 9.5- 1: Distribution of land cover in relation to the area of the SPA

CORINE CODES	CORINE SURFACE WITHIN THE CIP (km)²	% OF THE SURFACE AREA SPP
311 Broadleaf forest	**137,17**	**16,62**
321 Natural pastures	**0,29**	**0,11**
324 Transitional woodland scrubland	**0,25**	**0,03**
SURFACE AREA OF THE CP	**825,54**	100
CIP AREA	**5,86**	**0,71**
SURFACE OF INTERVENTIONS	0,14	0,02

The above table gives the following interesting data:

• The total of the interventions (construction of squares, road construction) occupy 0.02% of the CP.

According to the field survey carried out, the main habitat type dominating the intervention areas of the Warrior ESDP and its accompanying projects, as noted in Table 5.1-1, is the broadleaf (deciduous) forest (16.62% of the habitat area within the MPA in relation to the total area of the MPA), followed by the cover (and use) of natural grassland (0.11% of the total area of the MPA habitat) and transitional forested shrubland (0.003% of the

area of habitat within the MPA in relation to the total area of the MPA).

The description of these habitats, documented and with photo extracts, was made in the EEA.

According to the analysis in Chapter 4 of the EIA, as indicated by the absence of important nesting sites and by the images of predator movements, the plaza areas (for the most part) and their accompanying works such as access roads and underground cabling (for the most part) are outside of important habitat and particularly outside of the habitat of important predators such as the Vulture and Snake Eagle. Therefore, the construction activities and their subsequent use in the operation of the project would not reduce any habitat area of the characteristic species. However, even assuming that these individual projects in Table 5.1-1 are included in the secondary foraging habitat, their extent relative to the total foraging habitat of the SPA, as shown by the percentages in the same table, is almost negligible, only 0.02% of the total projects in terms of the area of the SPA. Besides, these habitats are scattered and abundant throughout the region and the species active there use more than one habitat type. Finally, the projects are not located in areas that could support nesting habitat for the endangered species under consideration, therefore no significant impact on raptor nesting habitat is expected during project construction and operation.

As for the underground connection network, due to their very small footprint, this will have a negligible impact on the area through which they will pass during construction and no impact during operation and therefore there will be no significant impact.

In conclusion, there will be no significant loss of the habitats mentioned above as a result of the installation of the ASPHE. These habitats are scattered throughout the area and the species that operate there use more than one type of habitat. In addition, as the substation and the 25 km long external interconnection network are existing, no additional works will be required for these elements of the project. Furthermore, no sites that could host nests of the endangered species under consideration are identified in the project installation polygons and thus, no significant impacts on avifauna species from loss or degradation of habitat and habitat are expected either during the construction phase or during operation of the project.

In addition, the possible impacts of the construction of the project on the species of chironomids that can be found in the area based on their distribution maps and belong to the species found in Greece and Bulgaria are also investigated. The species included in the Red List of Greece in the category Vulnerable (VU) are Rhinolophus mehelyi and in the

Europe's Red List in the Vulnerable Species (VU) category are Barbastella barbastellus, Myotis bechsteinii and Rhinolophus blasii:

Habitat fragmentation and Habitat-Habitat degradation

There will be no fragmentation of raptor nesting habitat, as no nesting (except for hawks) is observed in the project area. Due to the geomorphology of the surrounding area, and the land cover, as shown on the Corine maps, foraging and wintering habitat of the species is not expected to be significantly impacted. Nesting of other bird species may be affected in close proximity to the project, but these species may be able to adapt to the adjacent area covered by approximately the same habitat and vegetation types.

9.5.2 Operating phase

9.5.2.1 Ecosystems-Flora

Due to the nature of the project, after the completion of the construction works and throughout the operation of the project, no aspect of the ecosystems and flora of the area will be adversely affected. The minor loss of flora at the locations of the A/G platforms, and the new road will be restored in accordance with the Phytotechnical Study to be carried out prior to the commencement of works. This will allow for the natural repopulation and habitat use of almost the entire area disturbed and not occupied by engineering works. It should be noted that the above-mentioned technical works occupy a small part of the total area of intervention and that the access roads are earth roads.

Therefore, during the operational phase the project has a neutral impact on the flora and ecosystems of the area.

9.5.2.2 Forests and woodlands

No impacts on forests and woodlands are expected during the operation of the proposed ESDP, apart from the permanent occupation of the sites of the main and accompanying works, as already mentioned in the previous paragraph. The opening of roads for the transport of the equipment, in addition to the nuisance, will contribute to better surveillance of the area by the competent authorities, as it can be used by them to organise patrols to control illegal hunting, fire safety and fire-fighting. In addition, the presence of project staff for maintenance work and the existence of fire protection systems can contribute to preventing the spread of forest fires. In other words, it will have a positive impact on the protection of forest areas.

9.5.2.3 Fauna (excluding avifauna)

As regards the operational phase of the project, in no case will the ecology, reproductive habits or fertility of mammal, reptile, amphibian and invertebrate species be affected. Such a correlation is not mentioned in the relevant international literature, while experience from the installation of similar wind farms in Greece and abroad shows that these species are indifferent to wind turbines.

It should be stressed that the wider wind farm area is not fenced off. Thus, the wind farm does not constitute an artificial buffer for the movement of animals (but also for the spread of plants) and there is no significant loss of space and habitat for the fauna of the area. The habitat lost is only that of the plazas, control centre and roads, which is a very small area. And because of the distances between the A/Gs and the absence of fencing, the land in between remains untouched as habitat.

<u>Manikins</u>
Although potential sources of disturbance and their effects on bats and their populations are not yet fully understood, it is clear that bats can be disturbed by human activities, especially large projects. However, even during the operational phase no significant impacts on chimpanzees are expected, provided appropriate measures are taken.
<u>In conclusion, no impacts on fauna are expected.</u>

9.5.2.4 Birdlife

The potential impacts of the project and their significance are considered in accordance with the European Commission's guidance (European Commission, Guidance document on wind energy developments and EU Nature Legislation, 2020), for the ornithofauna species hosted and protected by the SPA - GR008, and are identified as follows:

<u>Impact</u>
Loss of people is also considered during the operation of the wind turbine mainly by bird impact with the blades of the turbines, and secondarily with the pylons, the spindles and the infrastructure (Dimalexis et al. 2010). Impact means the collision of a bird with the

above wind turbine data. Vulnerable species to such an event are mainly large and endangered predators (Dimalexis et al. 2010).

There are many reports in the international literature on the impact rate of birds, especially raptors, on wind turbines. As an example, a survey of 13 wind farms in southern Spain showed an average Ornithological fatality rate of 0.186 birds/AY/year (Manuela de Lucas 2012).

In Greece, a survey in which 88 wind turbines in 9 NPPs were monitored in 2008-2010 by WWF in the area of the wider National Parks and SPAs of Thrace found 9 dead raptors and 73 other birds (Dotau et al. 2011).
88 wind turbines were checked every day of the week except Saturday. Monitoring results of the 88 operating wind turbines at the nine wind farms in the region showed a **mortality rate of between 0.150-0.173 raptors/wind turbine/year** according to two calculation equations. This means that, respectively, using this index for the NPP in this study, a mortality rate of 11x0.150=1.65 with 11x0.173=1.90 is expected, **i.e., approximately two raptors per one to two years.** Both estimates, although indicative, **suggest little impact on predator populations.**

It should be noted that although this mortality index was calculated in a region with relatively different local conditions and different predator species composition, it is comparable to other studies (Barrios & Rodriguez 2004, Cárcamo et al. 2011) and therefore can partly give an approximate/indicative picture in this study as well. Furthermore, the area for which it was calculated has a high number of A/C, which is not the case in the immediate project area, as will be discussed below.

It should be noted that the design option of the wind farms under study with fewer and larger turbines, spaced further apart than most of the wind farms in the literature (especially the older ones), may be preferable to designing with many, densely stacked, small turbines (May, 2017 and European Commission, 2020). The effectiveness of wind turbine design is supported by some empirical evidence (e.g. Loss et al. 2013), but the influence of increasing rotor diameter (impact risk margin) and reducing rotor speed may, in some intermediate combination, only reduce impact risk. However, it is not yet clear whether species flying at higher altitudes, for example during seasonal migration, are affected. Certainly, for the project area, the risk seems to be mainly for local raptor species and only secondarily for migratory species. The general rule of thumb for the wind farm area seems to be that the risk is mainly for local predator species and nesting species and secondarily migratory (De Lucas et al. 2004). In addition, it is noted that according to a 13-year study (Ferrer et al., 2022) which will be analysed in the next chapter, the implementation of an A/C cessation system reduced the incidence of vulture mortality by 92.8%.

An assessment is then made based on the specific characteristics and specific environmental conditions prevailing in the protected area, as derived from fieldwork, the history of the specific area and observations of avifaunal features (such as critical habitat) and recorded in the previous chapters.

During the fieldwork of the present study team, the presence of 4 vultures was recorded once. Based on the above, it is estimated that **the immediate project area at the**

"Warrior" is not a core area or core area of the species. Therefore, the likelihood and significance of any collision (and loss) of vulture individuals to the projects during operation is low and **the impact is not significant to the population of the wider area or the commuter**. However, <u>measures will be proposed to further reduce the likelihood of collision and loss of individuals</u>. The conservation objective for the Vulture in the SPA is 300 pairs, therefore the loss of only 1 individual every 6-7 years is unlikely to affect the population (see Section 5.1 - **Error! Reference source not found.** of the ERA).

Black vulture was observed in the SPP in 2007 by the EEA and 8 individuals were recorded. It was not observed during fieldwork and thus it is estimated that its critical habitat does not include the project area, so no significant impacts from impact are expected. In addition, the absence of the species in the area is confirmed by the Black-backed Gull Sensitivity Map for the area as published in Vasilakis et al. (2017) and shown in the figure below.

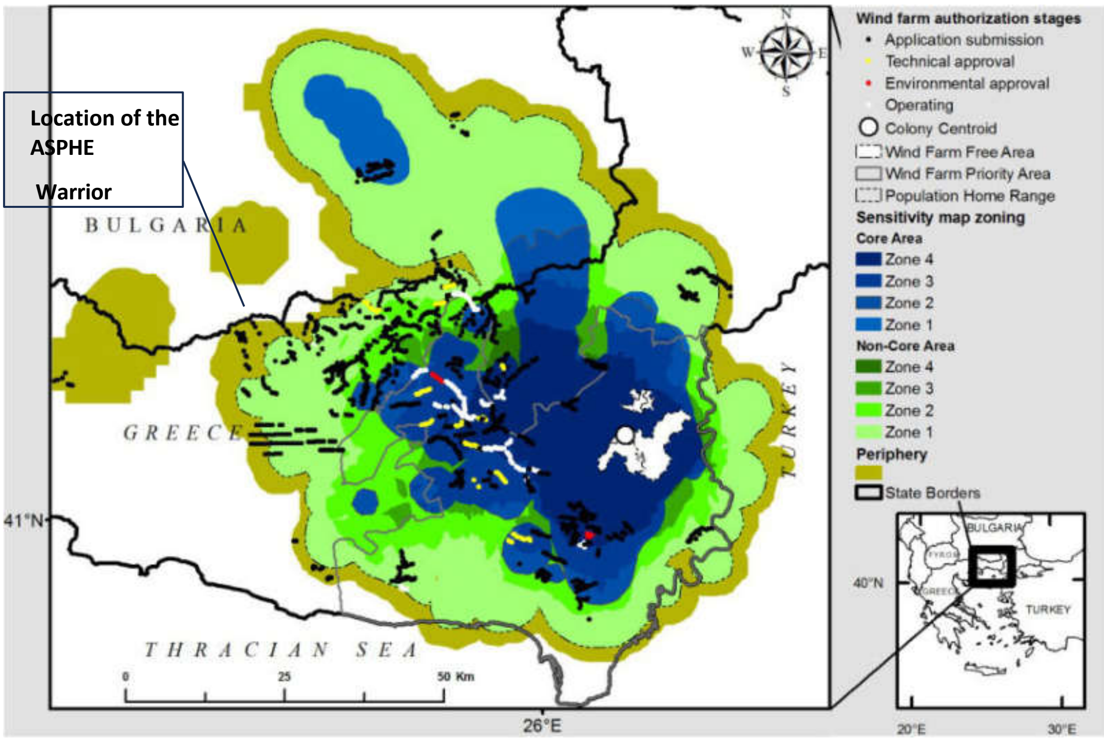

Figure 9.5- 4: Map of the sensitivity of the Black-tailed Godwit in Eastern Thrace (Vasilakis et al., 2017).

The **Golden Eagle** has one record of one or two individuals in 2000-4 (EEA website), and was not observed during any field visits of this study. It is estimated that due to its uncertain, infrequent and non-permanent presence, there may be no significant impact to the species from impact.

The (Eastern) **Kingfisher** has one record of two individuals in 2000-4 (EEA website), and was not observed during any field visits of this study, so it is estimated that there may be no significant impact on the species from impact.

Snake Eagle has one record of 10 individuals in 1995 (EEA website), observed only twice in the south of the study area, one individual in March and one in June. It is anticipated that due to its infrequent and non-permanent presence in the CIP, there would be no significant impact to the species from impact. In addition, the conservation objective for the species in the SPA is 300 pairs (Chapter **Error! Reference source not found.**) and any loss of 1 individual per year despite protection measures is not expected to have a significant impact.

The **Kittiwake** has one record of two or three individuals in 2000-4 (EEA website), and was not observed during any field visits for this study, so it is estimated that there may not be significant impacts to the species from impact.

Egyptian Vulture 2000-4 has one record of two individuals in 2000-4 (EEA website), and was not observed during any field visits of this study, so it is estimated that it cannot there would be a significant impact on the species by impact. These results are confirmed by the figure below which shows the active territories of the species in 2018 (Saravia et al. 2019) and it is clear that there are no longer any in the vicinity of the project.

Figure 9.5- 5: Active territories of the Egyptian vulture in 2018 (blue pin) and formerly active territories in 2013 (pink dots).

The **Xeroptera** was observed quite a bit in the area during fieldwork with a total of six individuals in 3 of the 4 months of observations. It is judged that there is a territory to the west of the project within half a kilometre however, as it is an abundant species and is not an Appendix I species, it is judged that there would be no significant impact on the species.

The Hawk was the main predator observed in the study area with a total of 39 individuals. It is judged to occupy 2 territories within the project polygon and to be very common in the area. However, as it is not a threatened but abundant species in Greece and is not an Appendix I species, it is judged that there will be no significant impact on it, always after the protection measures proposed.

Therefore, taking into account the international and Greek literature and the specific characteristics and conditions of the protected area, it is assessed that the placement of the ASPEO is appropriate, as it avoids the critical habitats of the characteristic species of the SPA and especially predators, such as the vulture. Thus, as can be seen from the above analysis, **the**

The **significance of raptor and other bird impacts on the project's A/C elements is low and impacts on populations are not significant.** In any case, **mitigation measures are proposed to reduce** any impacts, as will be shown in the next section.

Another source of risk of bird deaths from impact, but also from electrocution, is power lines, according to international literature.

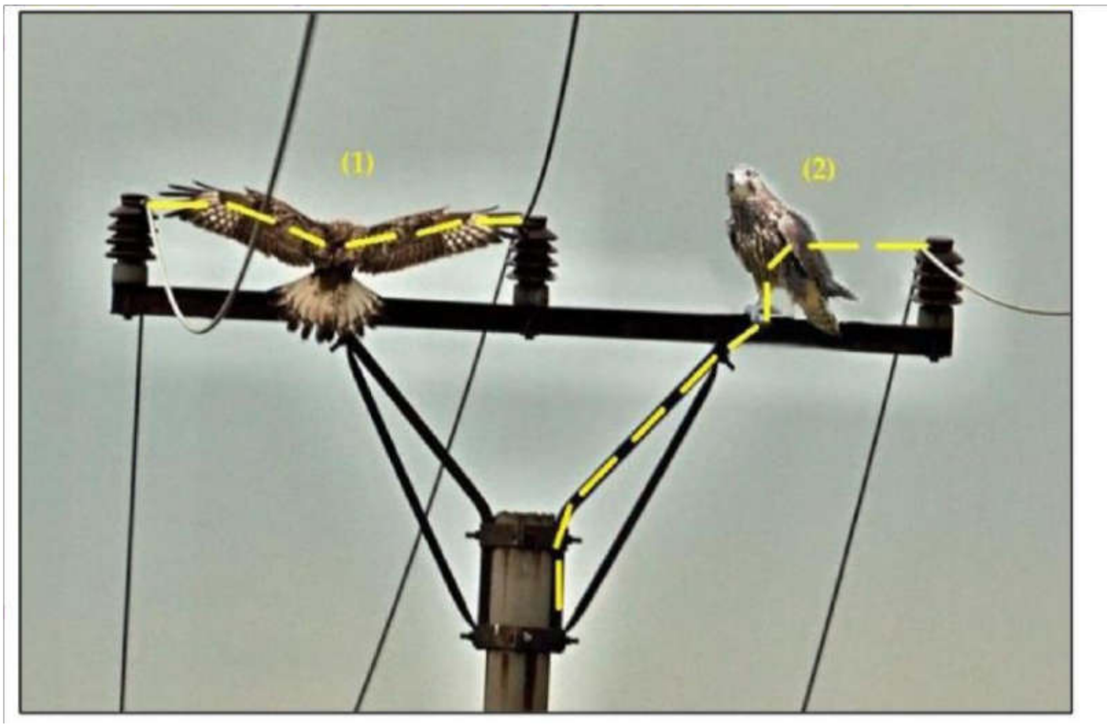

Figure 9.5- 6: Typical cause of electrocution on medium voltage poles (Raptor Protection of Slovakia, 2019)

From 2009 to 2013, electrocution on electricity transmission poles was responsible for the deaths of 67% of the marked Basileans in Bulgaria. In Sudan, the infamous power transmission line that runs from Port Sudan to the Red Sea coast is estimated to have killed hundreds or even thousands of Egyptian vultures since it was built in the 1950s (https://old.lifeneophron.eu/gr/news-view/305.html).

However, the connection of the generators to the substation is made by underground wiring, so there will be no impact on the birds of the area.

<u>**Nuisance and displacement**</u>

During the operational phase, impacts may be caused by the noise from the operation of the A/Cs.

One parameter for assessing the effect of disturbance on birdlife is the distance from the source, which again is different for each species. According to the literature, these distances vary considerably depending on the local conditions and the species present in the area of the disturbance. These disturbances usually affect a radius of a few tens or a few hundred metres.

As mentioned during construction, for raptors, it was estimated that a threshold for anthropogenic annoyance with traffic noise is a noise level of Leq24h = 40 dB(A) (Esther Ortiz-Urbina, 2020). This assessment can be extended with reasonable certainty to noise from other anthropogenic activities, such as wind turbine operation.

In the case of the Warrior NPP, the assessment of the operational noise is presented in chapter 9.11, where it is shown that the noise is reduced to levels below 40 dBA at a very short distance from the Gensets. No predator nesting was observed at this distance.

No lighting disturbance is expected during operation as there will be no strong lighting.

Barrier impact

The issue of the impact of the operation of A/Cs during their operation as a barrier to bird flight has been of concern to the research community. Although many concerns have been raised about the barrier function, this assessment has not been well documented and is certainly different for different bird species and for each type of project (topography, layout, height and density of A/Vs, etc.). Recent research work on the Ebro region has shown, despite the density of vulture use of the area and the density of A/Vs, that they do not have a negative effect as a barrier on vulture movement[2] . This project at this location does not have features that could adversely affect as a barrier to a significant degree nor other raptors and characteristic species in the area, even after impact avoidance measures are taken.

In conclusion from the above, the project is expected to have a minor impact on the avifauna of the area, on a local scale that cannot affect the population and reproduction of the species, while with the implementation of measures it can be further mitigated.

2 *Sidiropoulos, L., Chatzinikolaou, G., Kret, E., Kapsalis, E., Zakkak, S., Arkumarev, V., Dobrev, D., Stamenov, A., Stoychev, S. & Vasilakis, D. 2022. The effects of industrial wind farm development in three priority raptor species in Thrace: cumulative collision mortality and displacement of Cinereous and Griffon Vultures and Golden Eagles. The Society for the Protection of Biodiversity of Thrace. Dadia-Soufli, 92 pp.*

9.6 EFFECTS ON THE MAN-MADE ENVIRONMENT

9.6.1 Spatial planning and land use

According to the conclusions of Chapter 5, the project incorporates the main directions, priorities and options of the current Spatial and Urban Planning at National, Sectoral and Regional level, while it shows compatibility and compliance with the institutionalized spatial and urban planning commitments at local level.

The proposed project does not conflict with the provisions and guidelines of the specific plans, nor the land use plan, and therefore would not result in significant impacts.

Regarding land use, the project is located outside the boundaries of settlements and at a distance of more than 8.1km from the nearest settlement of *Drimi*. It is also located outside the town plan. The area on which the proposed project is developed is publicly forested, mountainous, with the presence of scrubby hardwood vegetation and is not expected to change the current land uses of the area.

The construction and operation of the plant will change the land use in a polygon of a total area of 3761 hectares and will be converted from the existing forest use to a power generation site. The percentage of land occupied by the land in relation to the total area of the municipalities is minimal. In particular, the polygon occupies 0,4697% of the Municipality of Komotini and 0,0990% of the Municipality of Arrianon (due to the extension of the polygon in the Municipality of Organi). The area occupied by the squares of the A/G is considerably smaller, about 50,3 ha..

As far as agricultural use is concerned, there is no evidence that wind farms are detrimental to agriculture or livestock farming. Given that about 99% of the land hosting a wind farm is available for other uses, it is understood that agricultural activities can continue after the wind farm is installed. The usual locations of wind farms are in mountainous areas with bushy low and sparse vegetation precisely because of the high wind speeds that favour their installation, as is the case with the proposed station. In these areas, land use is mainly for grazing sheep and goats. Although this use has not been documented within the boundaries of the A/C polygons, grazing is a use and is not prevented due to the installation of the AECS. Typically, in some wind farms it has been observed that, the turbines become an attraction for sheep and goats that benefit from the cool shade offered by their towers.

Also, all of the electromechanical equipment is inaccessible and protected and therefore all of the existing functions of the site can be practiced without obstruction.

Therefore, according to the current legislation, the construction of RES projects is allowed within the area.

Therefore, the land use and urban characteristics of the area are not expected to be affected by the construction and operation of the project.

9.6.2 Structure and functions of the man-made environment

The site of the station is located at a sufficient distance (significantly more than 500 m) from neighbouring settlements.

No tourist accommodation is identified in the wider area and, due to the nature of the project, there will be no need to construct new buildings, so the built environment of the area will not be substantially affected. The wind farm site does not directly interfere with areas of the built environment. There is therefore no question of altering the architectural character of the wider area where the wind farm is to be built.

The built environment of the wider study area will not be significantly affected during the construction and operation phase of the project. Both the construction activities and the operation of the project will not pose any risks to human health, provided that construction activities are carried out in accordance with strict health and safety regulations and public awareness of activities in the area to prevent public access to the site during the construction phase.

In addition, the distances from residential activities as defined in the EIAAP are met. It is therefore understood that the installation and operation of the A/P will not have any impact on the structure and characteristics of the built-up area, nor will it cause problems of fragmentation of the urban fabric of the area.

Therefore, during the construction phase of the project, minor impacts on the functions of the man-made environment are expected, but are fully reversible with the implementation of good practices and site organisation measures.

During the operational phase of the project, positive impacts are expected from the project, as an improved rural and forest road network will be delivered. Therefore, no changes in the structure and functions of the man-made environment are expected.

9.6.3 Cultural heritage

One of the particularities of Greece, compared to other countries that promote the participation of wind energy in electricity production, is that Greece has a wealth of archaeological monuments and sites of all prehistoric and historical periods, the protection and preservation of which is an important priority. Law 1650/1986 "for the Protection of the Environment" and Law 3028/2002 "for the protection of antiquities" set the framework and the basic regulations regarding the protection of monuments.

There is often talk about the indirect "damage" that a wind farm can cause because of its positioning by a monument. The EIAAP for RES sets clear limits on the minimum distances of a wind farm from an archaeological site, thus ensuring that no direct damage or destruction of any monument will be caused. In particular, it sets two criteria for the integration of a wind farm into the landscape, which through the calculation of specific quantities (density of wind turbines within a circle centred on the monument and percentage of visual horizon coverage by the turbines) set the maximum limit of wind turbines that can be placed around a monument.

The proposed ESDP is located outside declared archaeological sites at a distance of at least 1.4 km from sites of archaeological interest. Furthermore, the accompanying works will be constructed at an equally significant distance from sites of archaeological interest, so there will be no change or destruction of an archaeological site during the construction phase.

In addition, the competent Ephorates and Services will be aware of the dates of the works, and in the event that any archaeological finds are detected, they will be informed immediately for their subsequent actions.

Therefore, the project will not have an impact on the cultural environment either during construction or during operation.

9.7 SOCIO-ECONOMIC IMPACT

9.7.1 Population concerned

Due to the nature of the project (short duration of park construction) and the limited interaction of activities with the local population, no changes in the settlement, dispersion, density, or rate of human population growth in the project area are expected during both construction and operation of the project. The project does not is expected to affect existing housing, or create the need for additional housing in the project area.

9.7.2 Economy and employment

Jobs are expected to be created during the construction phase of the project, which will be mainly filled by the local community. This implies a small short-term improvement in the local economy. The construction projects are expected to have a positive economic impact on the neighbouring areas of the project, from the income generated by the demand for services (purchases of raw materials, etc.).

During the operation of the park, electricity generation will come from the use of the available and renewable natural resource "wind". All the electricity produced will be exclusively supplied to the Transmission System. Therefore, during the operation of the wind farm a significant socio-economic benefit will be provided.

The opportunity is given to the municipalities concerned to finance environmental actions and local development and social support projects through the financial benefits resulting from the payment of 1.7% of the pre-VAT electricity sales price, in accordance with Article 25 of Law 3468/2006, as in force. The operation of the project will provide a permanent annual income to the Municipality of Komotini through the contribution fees.

A percentage of 1% of the pre-VAT electricity sales price is passed on to household consumers through their electricity bills. The beneficiaries of the above amount are the residential consumers located within the administrative boundaries of the municipal or local community of the municipality where the Wind Farm will operate, in accordance with Article 25 of Law 3468/2006, as in force.

Specifically, with Law 3851/2010 they were defined :

- The 1% is paid directly to the domestic consumers of the district or municipality where the A/P is installed: at a price of 5.5 ct/kWh, this results in 56,178 euros per year corresponding to the 1%.
- 0.3% is allocated to the Green Fund: 16.850 €/year
- 1.7% is paid directly to the respective local authority where the A/P is installed: 95,502 €/year. In particular, 80% (€76,402/year) is attributed to the first-tier local authority hosting the A/P and the remaining 20% (€19,099/year) is attributed to the local authorities where the connection line of the A/P passes.

In conclusion, it is estimated that the impact of the operation of the project on the economy will be very positive and long term.

9.8 IMPACT ON TECHNICAL INFRASTRUCTURE

9.8.1 Construction phase

For the interconnection of the wind turbines of a wind farm (internal road construction) new roads will be built with an average road width of 5m, an average width of 8.5m and a maximum gradient of 14%. They will be constructed in accordance with the criteria of the current legislation governing forest and/or rural roads (class C forest roads). It should also be noted that the new roads will be surfaced with suitable crushed material on completion of the construction work.

During the construction phase of the project, a small increase in traffic is expected in the area, which will be temporary and will last as long as the construction works. This increase in traffic is mainly due to:

(a) the transport and disposal of materials

b) the transport and installation of the equipment; and

c) the transport and movement of labour.

From the design of the project, care has been taken to ensure that the movement of vehicles and machinery takes place outside the settlements and to make maximum use of the existing road network.

No impacts on the technical infrastructure of the study area are expected. Due to its location and nature, the project will not result in changes to utility systems (e.g., communications systems, water supply, solid waste, etc.) and technical infrastructure.

In general, during the construction of the project, minor and localised impacts on the technical infrastructure are expected, reversible after the end of construction.

9.8.2 Operating phase

The project will bring a positive balance to the country's energy infrastructure, including the region.

As **positive impacts** of the operation of the wind farm under study can be considered:

- Improving the security of electricity supply and better addressing the costly energy losses faced by the local electricity network (losses, which in Greece amount to 7% on average).
- Smoothingload peaks andreducing the overall cost of power generation.

As an important indirect social positive impact, the contribution to the reduction of electricity production from the lignite power plants operating in various parts of the territory (with the majority of them concentrated in Kozani and Arcadia) can be mentioned, through the substitution of electricity produced from lignite with electricity produced by wind turbines.

Furthermore, the **strengthening of the road network** in the area, given that the access roads are rural and forest roads and can contribute to the fire protection of the area, is assessed as a positive impact. Finally, during the operational phase of the wind farm under study, there will be no impact on the road network, as any impact from vehicle movements for maintenance or repair work is considered to be negligible.

9.9 CORRELATION WITH ANTHROPOGENIC PRESSURES ON THE ENVIRONMENT

During the construction and operation phase, the project is not significantly associated with anthropogenic pressures on the environment as presented in Chapter 8 and will certainly not have a synergistic effect on them.

9.10 EFFECTS ON AIR QUALITY

9.10.1 Construction phase

During the construction of the A/P there are minor pollutions in the atmosphere due to:

A) dust production from vehicle traffic and the handling of materials and earthworks (excavation work, dredging, loading and unloading of soil and aggregates, etc.),

B) the production of exhaust gases from the movement of vehicles on the project site,

C) the production of exhaust gases from the means of transport that will transport the construction materials to and from the construction sites.

During the construction works, low emissions of air pollutants are expected from the traffic of vehicles and machinery in the area of the works, resulting in exhaust and particulate emissions from the earthworks.

In Chapter 6, the quantities of exhaust emissions for a typical composition of vehicles and site machinery were calculated for a worst-case scenario. The maximum hourly pollutant concentrations are then calculated and compared with the current legal limits, using the air dispersion calculation tool ScreenVIEW
3.5 The model that applies the methodology for calculating atmospheric dispersion in practical applications is based on Gauss' plume equation. The average wind speed was taken 3.5 m/s (6.9 knots) based on the project design data. Terrain relief was not taken into account (safety aspect). A slightly unstable B atmosphere condition according to Pasquil - Gifford was also assumed based on the average weather conditions and the adverse case of low sunshine, according to the following table (WHO, 1989).

Surface Wind Speed (at 10 m)	Day			Night	
	Incoming solar radiation				Thinly overcast or
knots	Strong	Moderate	Slight	>4/8 Low cloud	<3/8 Cloud
< 3.9	A	A – B	B		
2.9 – 5.8	A – B	B	C	E	F
5.8 – 9.7	B	B – C	C	D	E
9.7 – 11.7	C	C – D	D	D	D
> 11.7	C	D	D	D	D

* A – Extremely unstable, B – moderately unstable, C – slightly unstable, D – neutral, E – slightly stable, F – moderately stable (WHO, 1989).

Most of the pollutants emitted into the atmosphere come from combustion, which results in a higher temperature than the environment and the smoke rises. Therefore, the effective height of the chimney H is greater than its natural height h. The plume rise due to thermal buoyancy is called thermal rise. Still, the gases when leaving the stack have a high initial velocity (not uncommon velocities of 20 ms^{-1}), which also contributes to the plume lift (initial momentum). This effect is generally short in range (the time of action is about 30-40 seconds) and is usually of secondary importance compared to thermal rise. An empirical rule states that if the temperature of the gases exceeds that of the air by 10-15^o K then the thermal lift is greater than that due to momentum. Therefore, the two previous observations also apply in the case of exhaust gases from machinery, with the result that the emission height is not that of exhaust, but higher. The factor of increase of the effective height in the literature can range from 2 to 10 times the emission height. In the present study it is assumed that the active height is equivalent to 4 times the emission height, as the heat and the initial velocity of the exhaust gases are very high.

For PM_{10}, the total emissions from both exhaust and earthmoving operations were taken as calculated in chapter 6. According to the model results, the maximum hourly concentrations of each pollutant are shown in the tables below, at a level 1.8m from the ground. The distance of the maximum concentration is reported downstream of the work sites on the NE-SW axis.

Table 9.10- 1: Maximum hourly pollutant concentration at a height of 1.8 m above ground during road construction/improvement works

PRESS	MAXIMUM MATURE CONCENTRATION μg/m3	DISTANCE MAXIMUM Gathering m	LIMITS OF LEGISLATION	ANGEMENI CONCENTRATION ON THE TIME SCALE OF THE LEGISLATION
CO	148,3	25	10 mg/m³ (8hr)	**0.098 mg/m³ (8hr)**
SO_2	222,5	25	350 μg/m³ (1hr)	**222.5 μg/m³ (1hr)**
NO_2	142,4	25	200 μg/m³ (1hr)	**142.4 μg/m³ (1hr)**
PM_{10}	**66,7**	**25**	**50 μg/m³ (24hr)**	**26.3 μg/m³ (24hr)**

To convert the NOx concentration to NO_2, the relationship (Romberg et al., 1996) was applied:

$$NO2 = \frac{A \times NOX}{NOX + B} + C \times NNOX$$

The values of coefficients A, B, C are 43, 10 and 0.151 respectively in the case of maximum hourly concentrations (Bächlin & Bösinger, 2008).

Based on these values and the limits set by the Greek legislation (KYA HP 14122/549/E103/11), there are no exceedances of the limits. It is noted that these concentrations are derived from an adverse scenario where all road construction phases are carried out simultaneously. The concentrations of pollutants from the construction works are well below the legal limits. Therefore, no significant impacts are expected during the construction phase of the project, considering that the nearest settlement to the project is more than 520m away.

Dust emissions (PM10) during crusher operation

The USEPA's Gaussian SCREENVIEW pollutant dispersion model was applied to calculate PM10 concentrations in the immediate project area. The model assumptions and results are presented in the following table

Table 9.10- 2: Assumptions and results of the SCREENVIEW model application

Parameter	Price
Application of the model	
Type of source	Marching
Construction site emission	0,0000555 gr/sec/m^2
Wind speed	3.0 m/sec
General state of stability of the atmosphere	Neutral (D)
Topography of the area	Flat
Receiver altitude	1,80 m
Results	
Distance from the crusher	**Gathering**
50	91,8 μg/m^3
100	117,7 μg/m^3
132	128,3 μg/m^3
200	105,6 μg/m^3
300	74,9 μg/m^3
400	56,4 μg/m^3
500	43,6 μg/m^3
600	34,4 μg/m^3
700	27.7 μg/m^3
800	22,8 μg/m^3
900	19.1 μg/m^3
1.000	16,2 μg/m^3

The next figure shows the distribution of $_{PM10}$ concentration as a function of distance.

Automated Distance Vs. Concentration

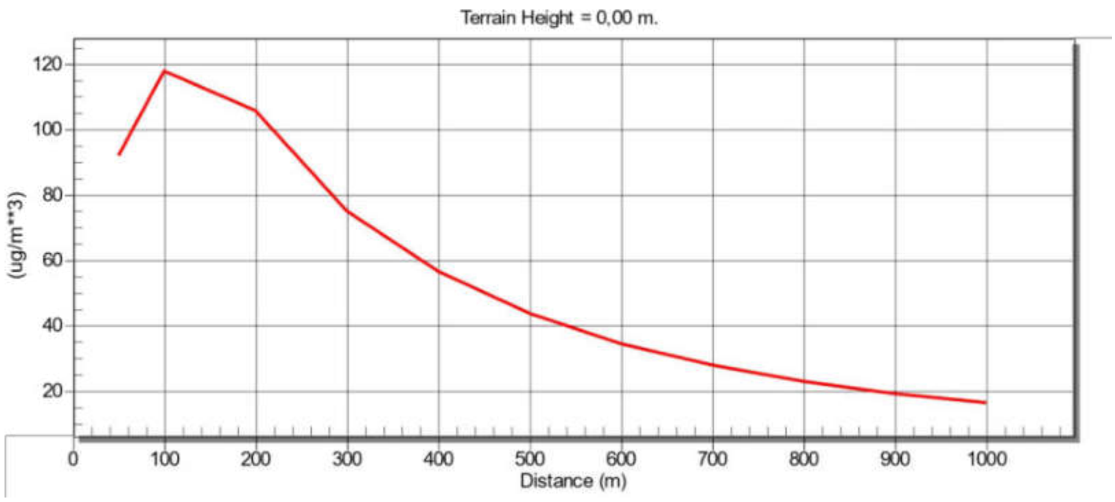

Figure 9.10- 1: Distribution of PM10 concentration as a function of distance

Based on the above, the dust concentration in the nearest settlement (Sarakini), which is 1,000 m is 16.2 μg/m^3 , a value below the limit of 50 μg/m^3

Taking into account the short period of operation of the crusher and the distance from residential areas, it is estimated that the impacts will be negative, low intensity, short term, reversible after measures are taken.

Based on these values and the limits set by the Greek legislation (KYA HP 14122/549/E103/11), there is no exceedance of the limit for PM10. The dust concentration is very low and therefore no significant impacts are expected during the operation of the crusher, considering that the nearest settlement to the study project is more than 1,000 m away.

9.10.2 Operating phase

As presented in paragraph 9.2.2 the project does not pollute the atmosphere with emissions. On the contrary, significant benefits to the atmospheric environment are expected from its operation and a particularly positive effect on climate change.

In conclusion, the project under study will have indirect significant positive indirect impacts on the atmospheric environment on a nationwide scale (and on the global environment in proportion). At the local level there will be no negative impact.

9.11 EFFECTS OF NOISE OR VIBRATION

9.11.1 Construction phase

The main sources of noise during the construction of a wind farm are:

- machinery used on the construction site, whether mobile or stationary, such as excavation or soil loosening machinery, loading of excavated material, spreading and compaction of materials, punching machines and aggregate and concrete production machinery.
- any use of explosives to loosen soils if they are rocky or very cohesive. Blasting causes a loud bang, but also vibration of the ground.
- the movement of heavy vehicles transporting excavation materials to the disposal sites, aggregates from quarries, ready-mixed concrete or asphalt concrete from the production plants and any other material needed for the construction of the project as well as the components of the A/C. Noise from these vehicles may also affect areas far from the construction site, for example along the roads that these vehicles follow to and from the site.

However, these effects are temporary, short-lived, mainly small in scale and reversible.

Another characteristic of noise during the construction of such projects is its variation over time. Construction sites usually operate from 7 am to 5 pm and therefore there is no problem in the evening and night hours. Usually, unless there is a need to expedite work, no work is performed at a wind farm construction site on weekends.

The expected impact on the acoustic environment will not cause significant disturbance to the settlements in the study area, which are located at a sufficient distance (>800m).

As assessed in paragraph 6.4.9, the equivalent noise level during the construction phase at the nearest residences of the Sarakini settlement is less than 60dB(A) (and even lower in other settlements), even for the most conservative scenario of simultaneous operation of several machines[3] . In accordance with BS5228-1:2009+A1:2014 Annex E, in residential areas the noise level within 1m of the receptor should not exceed 65 dBA during the daytime to ensure minimal disturbance to residents,

[3] In accordance with BS5228-1:2009+A1:2014 Annex E.

if the background noise is less than 65 dBA. 65 dBA shall not be exceeded even at the operating positions of the machinery.

Vibrations during the construction phase are expected during the compaction phase of the pavement layers.

The threshold of vibration perception for humans is usually in the PPV (peak particle velocity) range from 0.14 mm/s to 0.3 mm/s. Vibrations above these values may cause discomfort or interfere with work activities (BS5228-2:2009).

As calculated in paragraph 6.4.9 and assuming a hypothetical receptor distance of 60 m, a particle velocity of v = 0.74 mm/s is obtained from the roller operation.

This speed is less than the limit of 1 mm/s set by BS5228-2:2009+A1:2014 and the limit of 1.5 mm/s set by Eurocode 3 for a working time of 6-26 days for disturbance to humans. It is also well below the 20 mm/s limit set by BS5228-2 for protection of residential buildings.

Therefore, the impacts on the acoustic environment from the construction of the proposed projects are assessed as negative in nature, minor in intensity and magnitude, non-significant and fully reversible with mitigation measures.

9.11.2 Operating phase

The noise emitted by a wind turbine is divided into aerodynamic noise and mechanical noise. Aerodynamic noise is related to the speed of the blowing wind and the aerodynamic design of the blade. Aerodynamic noise must be addressed at the design and construction stage of the engine, and consists of rotational noise and turbulence noise[4] . Rotational noise includes all noise which has discrete frequencies and is generated at multiples of the harmonics of the frequency of the blade passage, (i.e. the product of the number of blades times the value of the angular velocity). The rotational noise level increases with a reduction in the number of blades, higher tip speed and aerodynamic loading of the blades (increase in power absorbed). The turbulence noise is associated with the turbulence in the

[4] S. Oerlemans, P. Sijtsma, B. Méndez López. location and quantification of noise sources on a wind turbine, *Journal of Sound and Vibration* 2007; 299: 869-883.

the leading edge of the wingtips and the general turbulent field behind the wingtip. In order to reduce the turbulence noise, the speed of the blades must be reduced, while at the same time limiting the delivered wind power. In the last fifteen years, particular attention has been paid to the design of the blades of A/Cs in order to reduce aerodynamic noise, with very good results. It is typically reported that the latest generation of wind turbines produce noise levels of less than 10% of the noise levels produced by wind turbines built in the 1980s.

Mechanical noise is caused by the moving electromechanical parts of the wind turbine. The main sources are the transmission box, the generator and the support bearings. Mechanical noise is dealt with either at the source or in its path. Mechanical noise at the source is reduced either by interfering with the noisy components (e.g. by using helically toothed gears in the transmission box instead of straight teeth) or by internal sound insulation in the shell of the structure. In addition, mechanical noise is also dealt with in its path by using sound-absorbing pedestals as well as anti-vibration mounting pads.

The sound emission from wind turbines now comes mainly from aerodynamic noise.

In this paper, an assessment of the noise levels for the layout of the studied LSEE was carried out, resulting in the isothermal curves (**Figure 9.11-1)**. The maximum permissible limit of emitted noise from wind turbines in residential areas in Greece is 45 dB. The Lp at the nearest residence to the project under permit was calculated to be less than 40 dB(A) and therefore lower than the 45 dB(A) limit, while the noise level in the other settlements in the ASPHE development area is well below the 40 dB(A) level. Within the 45 dBA limit, only agricultural crops and forest areas are located. This noise level is the maximum level as it refers to wind speeds at rotor height greater than 9 m/s. These speeds are expected to occur less than 19% of the year based on the wind design data for the project.

Measurements taken, in the context of the investigation of the noise caused by wind farm installations, at the wind farm installed by the Public Power Corporation in the area of Ag. Triada of Samos, showed that at a distance of 50 meters from the wind farm the noise level was 48.9 dB(A), while at a distance of 300 meters it was 45 dB(A). The results of this research were announced at the 5th Environmental Technology Conference held in 1997 in Lesvos, under the auspices of the University of the Aegean.

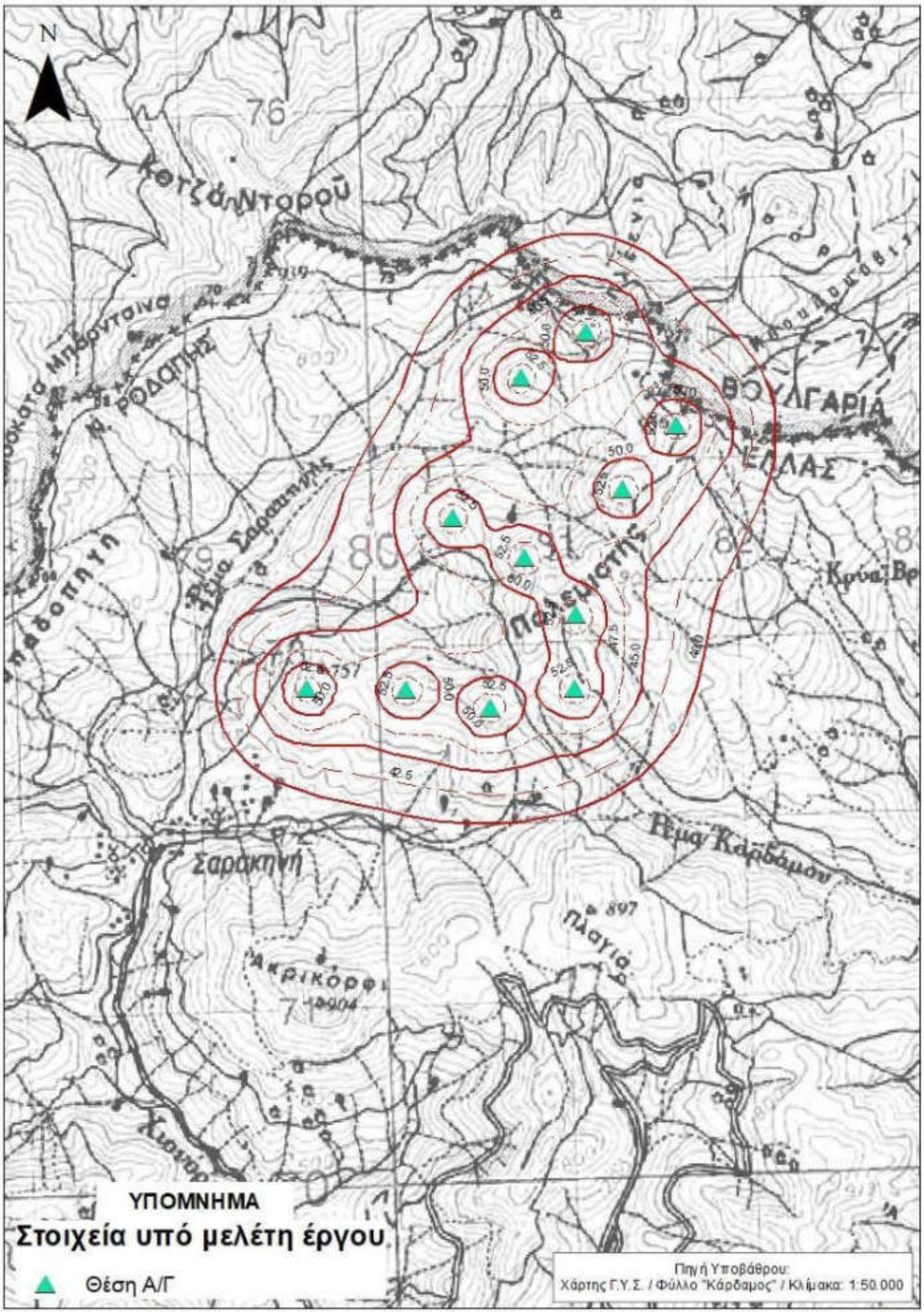

Figure 9.11- 1: Equilibrium curves for the project under study

In conclusion, it is estimated that the operation of the project is expected to have a **minor, permanent but not significant impact on the acoustic environment**.

9.12 EFFECTS RELATED TO ELECTROMAGNETIC FIELDS

9.12.1 Construction phase

During the construction of the project no emissions of electromagnetic radiation are expected, as no fixed installations or machinery that will emit EM radiation will be used.

9.12.2 Operating phase

The only subsystems of A/Cs that potentially emit low-level electromagnetic radiation are the generator and the medium-voltage transformer. The electromagnetic field of the generator is extremely weak and is confined to a very small distance around its shell, which is placed tens of metres above the ground. For this reason, there is no real issue of exposure to electromagnetic radiation even at the base of the turbine. Moreover, the transformer is located at the base of the wind turbine within the pylon and as a result the level of electromagnetic radiation is negligible (Binopoulos and Haviaropoulos, 2009). Besides, the rotor blades of the wind turbines under study are made of low reflection material in order to further reduce similar phenomena. Besides, no other activities or settlements are located around the A/Cs and the voltage step-up substation, which could suffer even minor impacts.

The potential sources of EM radiation are the Medium Voltage network with a voltage level of 20 kV. Since the interconnection line will be underground, it will only produce a magnetic field, and this field will be of very low intensity (Greek Atomic Energy Commission. 'Low noise electric and magnetic fields', 2005). In areas outside the high voltage substation, the electric and magnetic fields are generated exclusively by the lines connected to them and not by their equipment (EEAE, 2005). Measurements carried out by the Non-Ionizing Radiation Office of the EEAE have shown that on the outer sides of substations where no lines pass through, the levels of electric and magnetic fields are practically the same as they would be without the presence of the substation (even very close to its enclosure). On the other sides of substations where lines pass through, the typical values of electric and magnetic fields in the vicinity of these lines are present. Given this, therefore, the impact will be negligible. From both of these sources, the intensity of the radiation emitted will be very low and well below the limits set by Joint Ministerial Decision No 3060 (ΦΟΡ) 238 (Government Gazette 512/B/25-04-2002).

Therefore, no impacts on the environment are expected from the operation of the project.

9.13 EFFECTS ON WATER BODIES

9.13.1 Construction phase

The proposed ESDP is not expected to have any impact on the quantity and quality of surface and groundwater.

During the construction phases of the project there will be drinking water needs for workers estimated at approximately 0.3 m^3 /day and water needs for the wetting of materials. Drinking water needs will be met by commercial (bottled) water, while construction needs will be met by licensed water carriers. Therefore, no impact on the surface water of the study area from water withdrawals during the construction phase of the project is expected.

In relation to the impacts of the construction of the project in relation to the existing $1^{η}$ Revision of the River Basin Management Plan (RBMP) of the Thrace Water Department (EL12), the project site is located outside the inland, coastal and transitional water bodies of the study area, as well as outside protected areas for water.

The disposal of the small quantities of solid and liquid waste generated by the project during the construction phase at approved sites will not affect surface and groundwater quality. Temporary landfilling until reuse on fill or delivery to an MSW system, will be within the APEI polygon and away from streams and rivers.

The construction works are not expected to alter the hydrographic network, nor will there be any water abstractions, nor will they alter the hydrological status of the watercourses, nor will there be any risk of water pollution. The small surface intervention in the topography of the intervention sites follows the topography of the area, while there is no change in the direction of movement of surface water and groundwater or in the rate of infiltration and run-off.

9.13.2 Operating phase

During the operation phase of the project, the impacts on the quality of water resources can be considered practically non-existent, since the operation of the wind turbine transformers does not require regular oil changes, as they are usually dry type. However, even if oil transformers are used, they will be of modern technology and no oil change is required even after many years of operation (Papastamatiou

In any case, the management of the used mineral oils will be carried out in accordance with the provisions of P.D. 82/25.02.2004 (Government Gazette 64/A/02.03.04) on "Determination of measures and conditions for the management of the used mineral oils", as replaced by KYA 98012/2001/96.

The hydrographic network in the immediate area of the ASPEO has little development and is presented in the form of half canyons, which, however, have been taken into account in the design of the project. In particular, the design of the road works has included the construction of new pipe culverts for the drainage of surface runoff.

It is also noted that the medium-voltage transmission line is designed to be installed on the existing road network (rural-forestry), so in any sections where it runs alongside local streams, it will not affect their diet and will generally have no impact on these systems.

Therefore, the project during its operation will have no impact on surface and groundwater in the area.

9.14 ASSESSMENT OF THE EFFECTS OF THE VULNERABILITY OF THE WORKS TO MAJOR ACCIDENT OR DISASTER RISKS

During construction, no emergencies are expected that could pose a risk to the environment.

It should be noted that the requirements of KYA 1915/2018 (Government Gazette 304 B), which harmonizes the national law of the country with European legislation through the incorporation into national law (Law 4014/2011, KYA 48963/2012, KYA 16756/2013 and YA 170225/2014) of the (amending) Directive 2014/52/EU "amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment", are also included in this section.

It is underlined that the project under study is an energy infrastructure and does not fall under the provisions of the KYA 172058/2016 "Determination of rules, measures and conditions for the response to major accident hazards in installations or units, due to the presence of hazardous substances, in compliance with the provisions of Directive 2012/18/EU "on the control of major-accident hazards involving dangerous substances and on the amendment and subsequently repealing Council Directive 96/82/EC" of the European Parliament and of the Council of 4 July 2012 Directive 2012/18/EU", as well as Council Directive 2009/71/Euratom "on the contained use of genetically modified micro-organisms" (GMMs), since on the one hand there is no production process, use and/or storage of hazardous substances in the project, as well as the use of GMMs. Therefore, there is no risk of leakage or release of hazardous substances or genetically modified micro-organisms into the environment in the event of an accident/natural disaster.

Therefore, a) the nature of the project excludes the possibility of an environmental accident with irreversible, long-term, extensive negative impacts on the natural environment, society and health, b) the design of the project minimizes the vulnerability of the project to natural disasters, accidents and climate change, so that no additional conditions, measures and restrictions are required for the compliance of the project with the provisions of YA 1915/2018.

In line with the revised European Directive 2014/52/EE on the environmental impact assessment of projects and activities should be taken into account:

- The capacity of the project to cause accidents resulting in impacts on public health, cultural heritage and the environment
- The sensitivity of the project to potential disasters/accidents.

The vulnerability of the project to the risks of major accidents or natural disasters shall be examined. During the **construction phase of** the planned projects, the potential risks of major accidents or disasters in the immediate and wider project location area include:

- Accident risks from the movement of machinery, vehicles and pedestrians.
- Risks from the use of staff equipment (injury, drowning, suffocation, suffocation, etc.).
- Slope collapse, subsidence.
- Thule.
- Earthquakes.

The above risks may arise from the various construction activities (excavation, construction of facilities, etc.) and the operation of the construction sites, as well as from natural causes. The type, probability of occurrence and degree of vulnerability of the project to the above hazards are presented in **Table 9.14-2,** based on the assessment criteria in **Table 9.14-1.** A qualitative assessment of the potential risks and vulnerability of the project was carried out for both the construction and operation phases based on the project design, international experience and practice, and applicable national and EU legislation.

Table 9.14- 1: Criteria for assessing potential risks or accidents during the construction and operation phases of the project.

Parameter	Symbol
Type of risk	
Physicist Anthropogenic (from the project). It concerns the cause of the hazard or accident	F A
Probability of risk occurrence	
Refers to the probability of occurrence of the risk in question	Small Big
Zone of influence:	
It refers to the zone of influence of the risk in question. Local refers to the immediate area of the intervention site, wider refers to a larger zone of influence with a radius of up to 1 km from the project.	Local, Greater
Vulnerability of the project:	
Small Mediu m High	1 2 3
Preventability/avoidability:	
It concerns the possibility of prevention, avoidance of the risk in question.	Yes No Perhaps

Table 9.14- 2: : Assessment of potential risks of accidents or disasters and the project's vulnerability to them during the construction phase

Danger	Type of Risk	Probability of Occurrence	Zone of influence	Project vulnera bility	Preventabili ty /avoidance/ restriction
Traffic accident risks machinery and vehicles	A	Small	Local	1	Yes

Risks from the use of equipment (injury, electric shock, etc.)	A	Small	Local	1	Yes
Slope collapse/ detachment, subsidence	A/P	Small	Local	2	Yes
Falls-displacements of materials and objects	A	Medium	Local	2	Yes
Exposure to noise and dust	A	Small	Local	1	Yes
Floods	Φ	Small	Local	1	Yes
Earthquakes	Φ	Small	Greater	1	Yes
Stormy	Φ	Small	Greater	2	Yes

In the following, the above risks and their probability of occurrence during the construction phase of the planned projects are described in more detail. The potential risks from natural causes also apply during the operational phase of the development.

Risks of accidents caused by the movement of machinery and vehicles relate to the possible collision of construction machinery and vehicles due to human error, eccentric loading, damage, unorganised traffic within the work area, insufficient space for work and manoeuvring, etc.

The adoption of traffic management/signalling measures within the construction sites, the priority implementation of the works in sections so that there are no competing parallel operations over a long length of the works, low speeds, limiting unnecessary movements and the planning of the works will additionally contribute, in conjunction with the RAP, to avoiding the occurrence of such accidents.

Risks from the use of construction equipment and materials, in particular from the movement, overturning or damage of machinery, etc. The above risks are not hazards that occur frequently and can be avoided in all cases by implementing the measures in the SMS.

Slope collapse/detachment and subsidence during construction of road improvements and foundation works for the A/C. The likelihood of such an eventuality is very low due to the height of the slopes created. However, even in the event of occurrence, it is not considered that there is a risk of injury to workers or damage to equipment. The only risk is the collapse of the construction and the prolongation of the implementation time of the works.

Risks from falling-displacement of materials, debris from transported loads of materials or even the A/C itself. Possible causes of such accidents are unsuitability/inadequacy/malfunction and overloading of transport machinery, machine deviation or insufficient machine grip, incomplete or eccentric loading of machinery, load collision, bulk material discharge and overloading, overloading of raw materials. As discussed in Chapter 6, these types of accidents are likely to occur, but the consequences are limited in extent and intensity and can be successfully predicted.

Exposure to noise and dust. The implementation of the prescribed Health and Safety Plan (HSE) by the contractor (use of masks, uniforms, headphones, etc.), the application of the prescribed measures for dust and noise (wetting of materials, low-noise machinery, etc.) will ensure the prevention of such accidents.

Flooding. The likelihood of flooding in the work area is low and could be primarily due to the works being carried out during periods of high rainfall or the blockage/obstruction of half-canyon streams by the works etc.

Earthquakes. According to the Greek Seismic Regulation, the country is divided into three seismic risk zones I, II, and III, the boundaries of which are defined in the Seismic Risk Map of Greece. Each zone is assigned a value of seismic ground acceleration as follows: Zone I - A=0.16g, Zone II - A=0.24g and Zone III - A=0.36g. The proposed values have a probability of being exceeded by 10% in 50 years, i.e. the corresponding earthquakes have an average return period of T= 475 years.

According to the New Seismic Hazard Map of Greece, the project area belongs to Seismic Hazard Zone I (ground acceleration 0.16g). Given the low probability of occurrence of such an earthquake and the design of the foundation of the A/C, it is considered that the vulnerability of the project to earthquakes is low.

Storms. The probability of storm occurrence in the study area is low, but even for lower winds, the vulnerability of the project is increased, especially during the construction phase of the wind turbines. The risk can be prevented, however, by scheduling the construction works on days with low wind intensity.

During the operational phase, the potential risks of serious accidents or disasters in the immediate and surrounding area of the project site include:

- Breakage / failure of technical work,
- Flooding,
- Storms,
- Earthquakes and
- Fires.

The above risks may arise from any project failures as well as from natural causes. The type, probability of occurrence and degree of vulnerability of the project to the above hazards are presented in **Table 9.14-3.** The qualitative assessment was carried out based on the project design, international experience and practice, and applicable national and EU legislation.

Table 9.14- 3: Assessment of potential risks of accidents or disasters and the project's vulnerability to them during the operation phase

Danger	Type of risk	Probability of occurrence	Zone influence	Project vulnerability	Prevention/ avoidance/r eduction potential
Technical project failure	A	Small	Local	2	Yes
Floods	Φ	Small	Greater	1	No
Stormy	Φ	Small	Greater	2	No
Earthquakes	Φ	Small	Greater	1	Yes
Fires	Φ	Small	Greater	1	Yes

The above risks and their probability of occurrence during the operational phase of the project under consideration are described in more detail below.

Technical project failure. There is always a risk that a technical project will fail, i.e. that it will not work as planned. In NPPs, failures relate to the structural construction of the sections of the A/C and the way in which they are founded. International experience to date has not shown this to be the case, but in recent years this factor has been significantly reduced with the development of technology and the experience gained from previous years. Therefore, the probability of occurrence is considered low, but the vulnerability of the project is increased. Prevention can be achieved by adherence to construction specifications at all stages and by detailed design.

Flooding. The project, main and accompanying project do not fall within a designated high flood risk zone, according to 1η Review of the Preliminary Flood Risk Assessment for the 14 Water Divisions of the country[5] and therefore the likelihood of flooding is low. Therefore, the project's vulnerability to flooding is very low, given that it is located in

[5] 'IMPLEMENTATION OF DIRECTIVE 2007/60/EC, 1η REVIEW OF THE PRELIMINARY FLOOD RISK ASSESSMENT', GENERAL SECRETARIAT FOR THE NATURAL ENVIRONMENT & ENVIRONMENT POLICY WATER, ATHENS 2019

ridge, where any flooding is manageable and does not pose a significant risk to the project.

Storms. The occurrence of gusty winds in the area is low, as is the vulnerability of the project. The wind turbines are equipped with a "brake" system for when wind speeds exceed 25m/s to prevent damage to the rotor. However, even for any wind speed, the rotor rotation speed is adjusted by means of the blade pitch to optimise the rotor wear - power generation ratio. Even if the rotor braking system fails, the project control centre can now be informed by the telemetry system and act accordingly.

Earthquakes. As mentioned in the paragraph on the construction phase, according to the New Seismic Hazard Map of Greece, the project area belongs to Seismic Hazard Zone I (ground acceleration 0.16g) with an average return period T = 475 years. Given the low probability of occurrence of such an earthquake and the design of the A/C foundation, it is considered that the project's vulnerability to earthquakes is low.

Fire. The risk of fire from the operation of an A/P was greater in previous decades. In recent years, both the development of technology and systems and the materials used have minimized this risk. Fire can be caused by overheating of the systems and simultaneous failure of the cooling system, or by lightning. In the case of lightning, the project design provides for lightning protection and grounding of the systems, which reduces the risk of fire. Therefore, the likelihood of a fire is now low, and even if it does occur, the impact is limited to the project itself, due to the height of the fuselage from the ground.

9.15 CUMULATIVE - SYNERGISTIC EFFECTS

This section considers the potentially significant cumulative or synergistic impacts of the project, either between the various project components or with other existing and planned projects and activities of similar scale in the study area.

In the immediate area of the Rhodope mountain range in northeastern Komotini (and northwestern Arrianoi), the construction and operation of the "Warrior" ASPHE is expected. According to the data, the area occupied by the project with 11 Gensets, amounts to 140,681.83 m^2 . In the area near this project, there are no other existing ASPHEs. A total of 16 wind farms with installation permits and a total of 180 wind turbines have been licensed in the SPP at a distance of more than about 10 km. All projects are concentrated in the central and eastern area of the SPP. Thus, because these wind farms are widely spaced there will be no cumulative or synergistic impacts. However, there are also 3 wind farms with 11 wind turbines at a distance of more than 3.5 km and less than 10 km that while they only have a Production Licence, they also have an AEP and so are more likely to be licensed. Thus, if all these projects are implemented, there will be a total of 22 Gensets in the immediate study area. Based on the mortality rate reported in the EIA (22*0.150 to 22*0.173) it is estimated that 3-4 raptors per year will die on impact in the entire SPA. However, with protection measures as described below, the impact, if any, would be even more limited and the mortality rate could be much lower, almost negligible.

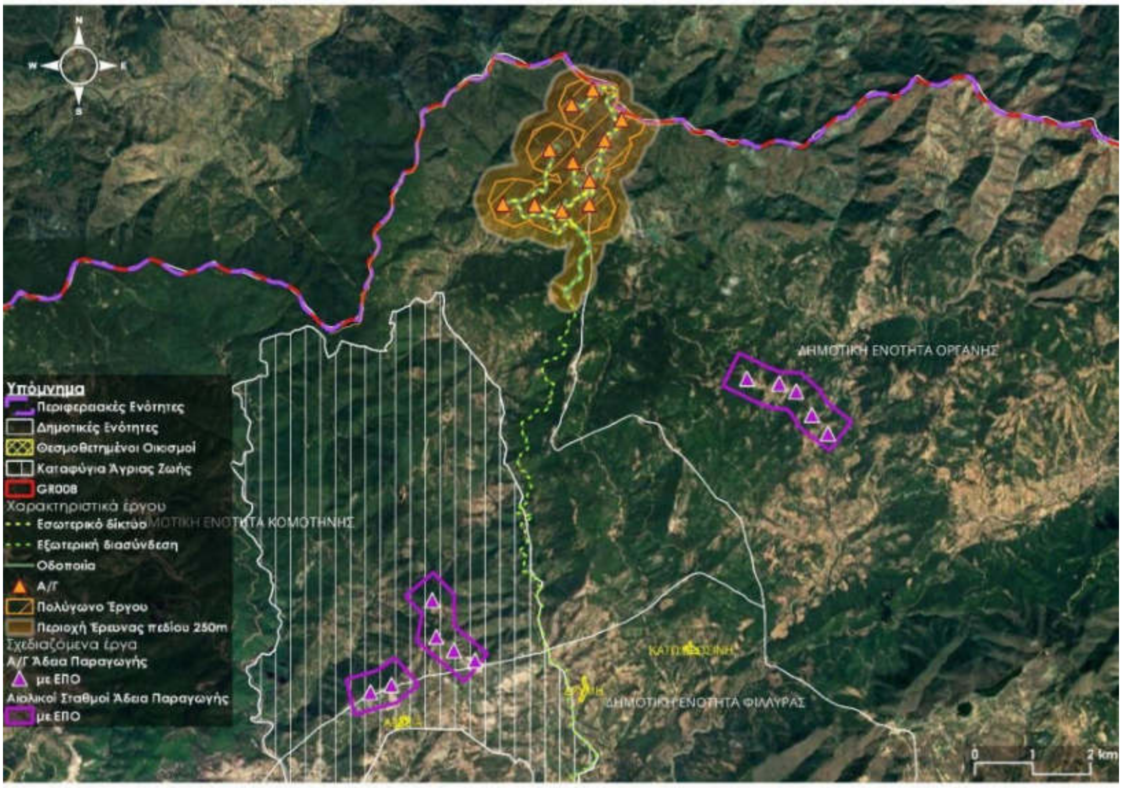

Figure 9.15- 1: Map of synergistic impacts with planned Wind Farms in the wider project area (up to 10 km)

Considering the cumulative-synergistic impacts at the level of the GIS, with the implementation of the project under study, a total of 191 wind turbines will be installed. Based on the mortality rate mentioned above (191*0.150-191*0.173), it is estimated that 28-33 raptors per year will die on impact in the entire SPP. Although this number is not insignificant, it is estimated that the project under study does not contribute substantially to its increase for the reasons that it is located far enough away from other projects (thus not contributing to a potential barrier or habitat fragmentation), its location is on the edge of the SPA, its area is not a nesting site for raptors-except for the Hoopoe, and with protection measures as described below, impacts would be even more limited and the kill rate would be much lower.

As regards projects with a Generation Licence, these are not taken into account in the assessment of the cumulative-synergistic impacts, as the Electricity Generation Licence does not in any case ensure the implementation of a RES project, as it is essentially a feasibility licence. In other words, it is assumed that when the EU guidelines state that proposed projects (with a request for authorisation/approval) should also be taken into account, they mean the environmental permitting process and final approval of projects by the competent body (Ministry of Environmental Protection or local Decentralised Administrations and so on), and not the producer's certificate which is essentially given by another regulatory authority (RAE) with no environmental control. Therefore, it is not appropriate and of no value to consider projects that only have a producer certificate since they are at a very early stage of final licensing, and projects in a changing licensing landscape. There is no point in comparing projects with an environmental permit or even installed projects with only a producer certificate. The former with considerable certainty will be built. The latter have not even applied for an environmental permit or, when they do, there is a very serious chance that they will be rejected, as when they received the producer certificate their file was not environmentally verified. According to ELETAEN data, the implementation rate of projects with a production licence or producer certificate is only 3%. However, even this percentage is not specified in the field which projects are licensed out of the total, so it is not possible to take these projects into account in the synergistic cumulative impact.

Examining the images showing the distribution and areas of habitual flight of the SPP species found in chapters 4.2 and 5.1 of the EOA, we observe that the A/Cs of the Warrior SPA are located outside the core territory of predators in the area (with the exception of the common Goshawk) and furthermore, no nesting is detected within the polygons. **These data support the assessment that the wind farm of this study will not have cumulative negative impacts in terms of risk of predator collision with other projects in the region** beyond those expected from the Warrior AWS itself (as discussed in the previous subsections), either during construction or operation. It will also not have a cumulative effect on impacts from various projects in Bulgaria, as the area near the project and on the territory of the neighbouring country is an EPZ and does not host raptors and other birds protected and sensitive to impacts. In addition, as this study's ESCO has no overhead power line sections but only underground network connected to the voltage step-up TS, it cannot contribute cumulatively or synergistically to an increase in risk of collision with cables or electrocution.

Regarding the landscape, cumulative impacts are expected only for the easternmost settlements (Upper Kardamos, Kardamos) of the study area which are located closer to the other ESDPs and there is a possibility that a number of the A/C of these projects may be visible. It should be noted that this assessment is highly maximalist (worst case) as it implies that the other LDCs will also be built eventually, which practice does not confirm.

The intensity of these cumulative landscape impacts is estimated to be minor, given that as shown in the landscape study for the proposed project, much of the A/C is not visible overall, or even visible at the same intensity. Besides, from the analysis carried out in Chapter 5, regarding the project's compatibility check with the EIAAP for RES, and in particular from the check of the landscape integration criteria, it was found that the maximum density criterion for settlements is not exceeded. Furthermore, there are no sites of interest of increased importance such as traditional settlements or archaeological sites in the study area.

Therefore, any negative cumulative impacts are small in scale relative to the scale of the siting of the projects and are not significant. In addition, there will be significant positive synergistic impacts on air quality and climate change mitigation from the sum of the electricity generated by the GHPs and the cumulative reduction in air pollutants.

9.16 SUMMARY OF THE EFFECTS OF THE PROJECT IN TABLES

The summary of the project impacts in tabular form is given in

Table 9.16-1 for the construction phase and **Table 9.16-2** for the full operation phase of the project. The following evaluation criteria are used to determine the properties of each impact:

	Parameter	Symbol
1	**Likelihood of occurrence:**	
	Small, Big. It refers to the probability of the occurrence of the incidence in question.	Small Mediu m Large
2	**Type and intensity of impact:**	
	Positive (+), Neutral (O) or Negative (-). When the impact is identified as positive, the symbol "+", "-" when negative, and "O" when there is no impact on this criterion.	+, O, -
	The intensity of the impact scales in three levels: Low (+/-), Moderate (++/--) and High (+++/---).	+/- ++/- - +++/---
3	**Extent/geographical area of impact:**	
	Local or Wider. It refers to the spatial distribution of the environmental impact-change and/or the size of the affected population. Wider indicates impact at the level of a wider area, while Local indicates impact locally on the proposal's application property.	Local, Greater
4	**Time horizon of incidence:**	
	Short, Medium or Long term. It refers to the time expected to elapse between the implementation of the project and the occurrence of the environmental change (on the basis of which the impact is classified as immediate - short-term, medium-term or long-term).	Short-term, Medium-term, Long-term
5	**Duration/repeatability of impact:**	
	Permanent or Temporary. It concerns the length of stay, i.e. whether it is a temporary or permanent effect.	Permane nt, Temporary
6	**Preventability/avoidability:**	
	Yes, No or Maybe. It refers to the ability to prevent, avoid, reverse or substantially minimising the impact. For positive impacts, the existence or otherwise of potential for further improvement is presented.	Yes, No, May be
7	**Synergistic/ cumulative action**	
	Yes, No or Maybe. It refers to the possibility of synergistic or cumulative action of the impact with other impacts from the same project or from other projects in the Area.	Yes, No, May be

Table 9.16- 1: Summary of the intensity and characteristics of impacts on individual environmental parameters during the construction phases

Environmental parameters	Impact						
	Πιθανότητα εμφάνισης	Είδος και Ένταση	Έκταση-γεωγραφική περιοχή	Χρονικός ορίζοντας εμφάνισης	Διάρκεια / επαναλη-πτικότητα	Δυνατότητα πρόληψης / αποφυγής	Συνεργιστική / αθροιστική δράση
Climatic and bioclimatic characteristics	Small	-	Local	Short-term		Yes	
Morphological and landscape characteristics	Small	-	Local	Short-term	Provisional	Yes	No
Geological, tectonic and soil characteristics	Small	-	Local		Permanent		No
Flora- ecosystems		O					No
Fauna (excluding avifauna)	Small	-	Local	Short-term	Provisional	Yes	No
Avifauna (SPA GR008)	Small	-	Local	Long-term	Permanent	Yes	No
Areas of the National. National System of Protected Areas		O					
Forests and woodlands	Medium	-	Local	Short-term	Permanent	Yes	No
Spatial planning - land use	Small	-	Local	Short-term	Permanent	No	No
Structure and Functions man-made environment		+	Local	Short-term	Permanent		No
Cultural heritage		O					
Socio-economic impact	Medium	++	Greater	Short-term	Permanent		No
Technical infrastructure	Small	-	Local	Short-term	Provisional	Yes	No
Correlation with anthropogenic pressures		O					
Air quality	Small	-	Local	Short-term	Provisional	Yes	No
Noise/vibrations	Small	-	Local	Short-term	Provisional	Yes	No
Electromagnetic fields		O					
Inland waters		O					

Table 9.16- 2: Summary of intensity and characteristics of impacts on individual environmental parameters during the full operation phase

Environmental parameters	**Impact**						
	Πιθανότητα εμφάνισης	**Είδος και Ένταση**	**Έκταση-γεωγραφική περιοχή**	**Χρονικός ορίζοντας εμφάνισης**	**Διάρκεια / επαναλη-πτικότητα**	**Δυνατότητα πρόληψης / αποφυγής**	**Συνεργιστική / αθροιστική δράση**
Climatic and bioclimatic characteristics	Small	++	Greater	Medium-term	Permanent		Yes
Morphological and landscape characteristics	Small	-	Local	Long-term	Permanent	Yes	No
Geological, tectonic and soil characteristics		O					
Flora- ecosystems		O					
Fauna (excluding avifauna)		O					No
Avifauna (SPA GR008)	Small	-	Local	Long-term	Permanent	Yes	No
Areas of the National. National System of Protected Areas		O					
Forests and woodlands	Medium	-	Local	Short-term	Permanent	Yes	No
Spatial planning - land use		O					
Structure and Functions man-made environment	Medium	+	Local	Long-term	Permanent		No
Cultural heritage		O					
Socio-economic impact	Medium	++	Greater	Long-term	Permanent		No
Technical infrastructure	Small	+	Local	Short-term	Permanent		No
Correlation with anthropogenic pressures		O					
Air quality	Medium	++		Long-term	Permanent		Yes
Noise/vibrations	Small	-	Local	Long-term	Permanent	No	No
Electromagnetic fields		O					
Inland waters		O					

CHAPTER 10: ADDRESSING ENVIRONMENTAL IMPACTS

Contents of the Chapter

10 ADDRESSING ENVIRONMENTAL IMPACTS

10.1 MEASURES FOR CLIMATE AND BIOCLIMATIC FEATURES

10.1.1 Construction phase

As discussed in Chapter 9 (Section 9.2.1), during the construction phase of the project, emissions of air pollutants are expected to occur due to the movement of heavy vehicles and the operation of construction machinery (direct emissions) and the energy consumption of the construction sites (indirect emissions). The climate impact of these emissions is minor, but in the context of implementing good practices and minimising the carbon footprint of the construction phase of the project, the following prevention measures are proposed:

- Limiting the movement of heavy vehicles and construction machinery to the absolute minimum.
- Use of heavy-duty, low-emission vehicles and their regular maintenance and inspection.
- The above vehicles and machinery must have the appropriate permits (MOT) and comply with the European Eurostage regulations depending on their horsepower, type and date of manufacture.
- Regular maintenance and inspection of the mechanical equipment of the construction sites.

10.1.2 Operating phase

During the full operation phase of the project, no GHG emissions are expected, while, on the contrary, very positive impacts are expected due to the project's contribution to the reduction of GHG emissions compared to the production of energy from fossil resources.

10.2 MEASURES FOR MORPHOLOGICAL AND LANDSCAPE FEATURES

10.2.1 Construction phase

Landscape disturbance caused by earthworks and landscaping during construction of the project will be short-term, minor and localised in nature, as indicated in the impact analysis. The following measures are therefore proposed to minimise and prevent these impacts:

- Adherence to the planned schedule of the project construction phases.

- Restricting excavation and vegetation clearance strictly to the intended locations of the works. Excavation will be carried out to the depth and volume absolutely necessary and foreseen, with controlled disposal of surplus materials in the temporary storage area provided at the A/C installation sites, as described in Chapter 6.
- Any storage or deposition, even temporary, of materials outside the designated site areas, where excavated materials will also be temporarily deposited until their reuse or disposal through a SEMS, is prohibited.
- Immediate implementation of the planned planting of local species after the partial completion of the construction of each phase.
- Correct planning of the work so that there is immediate reuse of excavations and the shortest time of staying open trenches.
- Any site installation shall be removed at the end of construction and the site shall be immediately restored.

10.2.2 Operating phase

The operation of the project will result in minor and permanent impacts on the landscape of the area. No additional measures are required.

10.3 MEASURES ON GEOLOGICAL, TECTONIC AND SOIL CHARACTERISTICS

10.3.1 Construction phase

As discussed in the corresponding section of the impacts, no impacts on the stability of the formations are expected. However, when excavating the foundations or slopes of various projects (buildings, roads, etc.), appropriate retaining measures should be taken when necessary. All excavation work should be carried out with due care and all necessary safety measures should be taken.

- Construction sites should have closed waste bins and open or closed containers for the temporary storage of non-hazardous solid waste. Construction sites shall also have chemical toilets with adequate capacity waste water holding tanks.
- The contractor should implement sound management practices for hazardous waste that may be generated during construction activities. Any kind of waste

materials should be collected and disposed of in accordance with the provisions of Law 4042/2012, as in force.

Hazardous waste should be collected separately in special bins within sealed areas of the construction sites and disposed to companies that have a relevant license for the management of hazardous waste in accordance with Law 4042/2012.

- Maintenance and cleaning of site machinery and vehicles will be carried out in specially licensed areas. No mineral and petroleum products will be handled on site at the project.
- The removed vegetated land will be properly preserved to be used in restoration work to restore the surrounding area,
- The temporary deposition of the earthworks to be reused for the embankments should be done in a way (shaping of materials on slopes of gentle slopes, covering of materials with plastic covers, wetting of soils) so as not to allow erosion or leaching of these materials.
- Excess excavated material that will not be reused in the project will be disposed of through a CCSDS for further management.
- It is recommended that the accumulation of large volumes of excavated material be avoided and that any storage, even temporary, of materials outside the project's designated temporary storage bins be prohibited.
- The aggregates required in each phase of the project construction will be provided by legally operating aggregate production facilities in the area, under the responsibility of the project proponent.
- All site facilities shall be removed at the end of each phase of construction and the site areas shall be restored and landscaped as required by the project design.

10.3.2 Operating phase

No impacts on the soil, geological and tectonic characteristics of the area are expected during the operational phase of the projects and therefore no specific mitigation measures are proposed.

10.4 MEASURES FOR THE NATURAL ENVIRONMENT

10.4.1 Construction phase

The general measures to prevent and mitigate impacts on ecosystem categories, fauna (excluding avifauna) and flora during construction of the project are summarised as follows:

- The project developer will obtain all the required permits from the Competent Forestry Authorities, before starting the works in the small forest areas (for the opening of small new road sections).
- Proper organisation of the construction stages for faster completion of the project. Use of the minimum number of machines and the fewest number of routes, in order to minimise disturbance to the fauna of the area.
- For the entire project during the construction phase, the occupation and work zones (A/C, transmission lines, roads) will be delineated in accordance with the intervention approval areas, so that any excavation of foundations and technical works that will be carried out will be limited to the absolutely necessary and to avoid unnecessary excavations, excavations and deforestation.
- Access and movement of machinery will be made as far as possible from existing roads or from roads that are to be opened as part of the permitting of the projects in this EIS.
- A maximum speed limit will be set for construction site vehicles and vehicles travelling along the work zone (normal practice is to apply a speed limit of approximately 20-30 km/hr), in order to reduce the risk of killing fauna species.
- Temporary construction facilities will be located on land of low ecological value.
- During earthworks, methods to reduce dust dispersion, particularly during dry and windy periods, by wetting the soil piles and covering the transport vehicles will be applied.
- The environment that will be altered by the whole operation and after the completion of the works, which will not be covered by infrastructure works, will be properly restored.
- Fire protection measures will be taken to protect the vegetation in the vicinity of the works to be constructed. In this context, the developer will follow the relevant instructions of the competent forestry department, which will be given to him in writing.
- Passages/egress ramps for wildlife species will be maintained throughout the work zone as much as possible during construction, and passage restoration will be conducted immediately following completion of construction. Similarly, apply to the installation of

construction site facilities that will be in such a way that the free passage of fauna species in the area will not be impeded.

- It is prohibited, even temporarily, to deposit materials in protected areas, streams, torrents, irrigation ditches, and forested areas, outside the defined areas of the project area.
- Excavation and demolition works during the construction of the project will be carried out in the mildest possible manner and preferably with the minimization of the use of explosives, if possible.
- In relation to disturbance from lighting of project elements and construction sites during construction should be kept to a minimum. Where this is required for safety (such as site areas, facilities, etc.), non-diffusing lighting will be used. During operation, lighting shall be intermittent with an appropriate frequency and with colours that do not attract birds and nocturnal birds, in accordance with the literature.

10.4.2 Operating phase

No significant impacts are expected during the operational phase of the project. Proper maintenance of the A/C equipment to ensure that they operate properly without emitting high levels of noise is sufficient, as nuisance is caused by noise alone.

Furthermore, for the fire protection and fire safety of the area, all the necessary lightning protection and fire fighting measures will be taken and implemented for the Gensets and the Voltage Booster Station.

Although no significant impacts on avifauna are expected from the operation of the project, it is proposed that precautionary and mitigation measures be taken to further reduce any impacts, even those that are not significant. It is noted that many of the measures proposed in the above sections are measures to avoid the loss or degradation of avian habitat, as well as measures to avoid disturbance / disturbance of avian habitat.

The studied G/G and the ASPEE have the following technical characteristics that further mitigate the impacts from the possibility of impact, i.e. **impact prevention and avoidance measures are already integrated in the project design**:

- Locating all the A/C outside protected areas and at a sufficient distance from them. The A/C of the proposed project are located outside Natura sites

2000. This automatically implies a measure to avoid adverse effects on birdlife.

- Slow blade rotation. The A/Cs under study, having a large diameter rotor, ensure slower rotation than the older smaller A/Cs.
- Large pylon height. The large pylon height implies that the minimum rotor sweep height is 125-75 = 50m from the ground. This height is high enough for small birds to fly without any particular risk of impact.
- Fewer and larger units instead of many and small ones. Most of the bird deaths that have been recorded have been in smaller S/S. At least for large raptors, the size of the units acts as a warning so that they can change their flight path before approaching (Rogers et. al., 1977).
- Increased distance between the A/Cs. Greater distance is a factor in fewer collisions. Larger gensets are placed more sparsely, leaving more free space on the horizon.
- Use of underground power transmission lines. As already mentioned (described in detail in Chapter 6), an underground line is foreseen to connect the gensets to each other and up to the existing TSO.

In addition, the following measures are proposed:

- Removal of dead animals from the vicinity of the wind farm, which could act as a potential attraction for birds of prey. Dead animals (dogs, sheep, goats, horses, cows, etc.) found within a 400 m radius of the wind turbine base will be removed away from the wind farm (for example to organised supplementary feeding areas indicated by the competent authorities), while remaining available to scavenging birds. This will reduce the risk of scavengers colliding with the wind turbines when they spot each dead animal, while preserving the food available to them. Responsibility for the collection and transport of dead animals will be the responsibility of the project operator and staff employed on the project will have, as part of their duties, the responsibility for the removal of such potential food that could attract predators, particularly scavenging species.
- Installation of a system to detect the movement of large birds and pause the impeller to avoid collision with large birds, such as raptors.

It is worth noting that further measures to address the impacts on the natural environment, and more specifically for avifauna species, are also proposed in the Special Ecological Assessment Study, which is an integral part of this EIA. Due to the nature of this study, the measures proposed tend to enhance the protection of the environment and the optimal avoidance of the impacts of the considered ESPO, both during the construction and operation phases.

10.5 MEASURES FOR THE MAN-MADE ENVIRONMENT

10.5.1 Spatial planning and land use

The project, according to the preceding analysis, is compatible with the zoning regulations and established land uses in the study area and does not result in significant impacts from the loss of forest area, because the forest areas to be used for the installation of the project are a very small percentage (in area) compared to the total forest area in the municipality where the project is located.In addition, as mentioned in Chapter 9, it is concluded that overall the local changes in land use will have positive impacts on the wider area. Accordingly, it is considered that no additional protection measures are required in this area.

10.5.2 Structure and functions of the man-made environment

In order to avoid/minimize any disturbance to the man-made environment, in addition to the proposed measures for landscape, soil, natural environment, noise and air, additional measures are proposed:

- Placement of information signs and appropriate road signs and signage during the transportation of equipment to the project area, in order to reduce nuisances (traffic congestion, noise, emissions) and not to interrupt the normal life of residents.
- Regulation of the speed of construction vehicles passing near the boundaries of settlements, in order to reduce nuisances (noise, emissions) and not to interrupt the normal life of residents.
- Creation of alternative access routes to the adjacent agricultural land adjacent to the A/Cs where access may become difficult throughout the construction phase.

- Restoration of any damage to the road network of the area from the movement of machinery immediately and as a priority (action to be borne by the project's funding body).

10.5.3 Historical - cultural environment

Prior to the start of the construction of the project, the competent archaeological services will be notified. All excavation and earthworks will be supervised by archaeologists nominated by the competent Ephorates of Antiquities. In the event that antiquities are found, the works will be stopped and an excavation survey will be carried out with funding from the project funding body. The results of the archaeological survey will determine whether or not the work can continue, in accordance with the legislation on the protection of antiquities.

10.6 MEASURES FOR THE SOCIO-ECONOMIC ENVIRONMENT

Construction activities, which would have a short duration (approximately 16 months), would result in a non-significant increase in localized noise, visual, and traffic disturbance that would last as long as the project construction. The measures listed in the remaining paragraphs are sufficient to prevent and address these impacts and no additional protection measure is required.

The project is not expected to add to the already recorded anthropogenic pressures or create significant and unmanageable new pressures on the environment during both the construction and operational phases. Therefore, no protection measure is required.

The operation of the project will have a positive impact on the socio-economic environment.

10.7 MEASURES FOR TECHNICAL INFRASTRUCTURE

As mentioned in the relevant Impact Chapter, no significant negative impacts on the technical infrastructure of the area are expected. Already at the design stage of the road works, tubular culverts of appropriate cross-section are proposed at the crossing points with half-gullies, so that there is an unobstructed downstream flow of water during all phases of the project. In addition, it is proposed that any damage to the rural forestry road network caused by construction machinery be repaired immediately and as a matter of priority. The road works of the project will improve existing rural-forest roads. Therefore, no additional measures are required.

10.8 AIR QUALITY MEASURES

10.8.1 Construction phase

As stated in the impact analysis for the construction phase of the project, impacts on the air environment are expected to be limited in scale, for the prevention and mitigation of which the following measures are proposed:

- Compliance with current legislation on specific emission limit values for pollutant loads and concentrations in accordance with the applicable provisions
- The operation of machinery during earthmoving operations will be handled with care to limit the release of dust.
- Regular wetting of the vehicle traffic lanes, as well as the dredging - backfilling areas and spoil heaps, especially in case of strong winds in the project area and when it is not possible to stop the work. In addition, the depositing of materials in heaps resulting from excavation work will be carried out from the minimum possible height in order to avoid the creation of dust.
- The trucks transporting aggregates or excavated materials will necessarily carry a special cover in accordance with the existing provisions (Law 4433/1964 on Mining Exploration of the State and other mining provisions, as amended by Law 273/1976 PL 50/A and Y.A. P-5h/F/17402/84ETC 931/B--Regulation on Mining and Quarrying Operations) and will avoid their overfilling.
- Vehicles and machinery of all kinds will move at low speeds on all dirt surfaces to avoid dust generation.
- All machinery and equipment used in construction will be in good condition and will meet the manufacturer's specifications in order to minimize the emission of air pollutants. The maintenance schedule will be reviewed by the employer on a bi-monthly basis.
- The contractor of the construction project is obliged to use machinery with the strictest emission reduction specifications in accordance with Greek and European legislation.
- No burning of any kind of material in the project area. All kinds of waste, scrap materials, old parts, oil, will be collected and

removed from the site and disposed of in accordance with the applicable provisions.

- Selection of routes for transporting materials and vehicles outside the settlements, as far as possible.

For emissions of air pollutants, the following shall be specified:

1. Air quality limit values and guide values are referred to in the following provisions:
   - Y.A. 22306/1075/E103/2007 (FEK 920/B/08.06.2007) 'Setting target values and assessment thresholds for concentrations of arsenic, cadmium, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air, in accordance with the provisions of Council Directive 2004/107/EC "relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air" of 15 December 2004 of the Council of the European Communities".
   - H.A. 14122/549/E103/2011 (Government Gazette 488/B/30.3.11) "Measures to improve air quality, in compliance with the provisions of Directive 2008/50/EC "on ambient air quality and cleaner air for Europe" of the European Parliament and of the Council of the European Union of 21 May 2008".
   - 174505/607/2017 (Government Gazette 1311/B/13.04.2017) "Amendment of Annexes IV and V of Article 8 of Joint Ministerial Decision No. 22306/1075/2007 (920/B) and Annexes I, III, VI and IX of Article 30 of Joint Ministerial Decision No. 14122/549/2011 Joint Ministerial Decision (488/B), in accordance with Directive 2015/1480/EU 'amending certain annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down rules on reference methods, data validation and the location of sampling points for the assessment of ambient air quality' of the European Commission'.
2. For the point source emissions of solids in suspension (dusts) from the construction sites and project facilities, the limit specified in Article 2 (§ d) of Decree 1180/1981 (Government Gazette 293/A/06.10.1981) "On the regulation of issues relating to the establishment and operation of industries, crafts, all kinds of mechanical installations and warehouses and the safeguarding of the environment in general", as amended by Law 1650/1986, applies.

(Government Gazette 160/A/16.10.1986) (§1a, b, d of article 1 were repealed) and the Ministry of Justice 69269/5387/1990 (Government Gazette 678/B/25.10.1990).

- Implementation of good site practice and appropriate scheduling of work. The atmospheric pollution during the construction works of the project is mainly due to the release of dust. As dust is then dispersed into the atmosphere it cannot be controlled after its emission and therefore measures should be preventive and focus on preventing the release of large quantities of dust.

Particular care should be taken when transporting aggregates on roads within or close to settlements to minimise disturbance.

10.8.2 Operating phase

During the operational phase of the NPP no air quality impact is expected and therefore no additional measures are required.

10.9 NOISE AND VIBRATION MEASURES

10.9.1 Construction phase

Based on the assessments in the relevant impact paragraph, the acoustic impact due to construction noise is limited to the location where the machinery is operating and is less than 40 dB(A) at the nearest residences of the settlement '*Sarakini*' to the works, while 65 dB(A) is not exceeded even at the machinery operation locations.

<u>In particular:</u>

- In order to minimize the noise disturbance, the machines that will be used by the Contractor as well as their respective operating times must be selected so that the least possible noise is emitted. This objective is achievable by selecting the most suitable combination of machines, as well as by the general use of silenced machines.
- In addition, it is recommended that trucks and heavy vehicles should not pass through neighbouring settlements and residential areas during quiet hours.

The contractor must comply with the relevant legislation concerning noise from construction sites:

1. KYA 37393/2028/1-10-2003 (Government Gazette 1418/B/2003) on the "approximation of the laws of the Member States relating to the emission of noise into the environment by equipment intended for use in

outdoor use and compliance with the provisions of Directive 2000/17/EC of the European Parliament and of the Council of 8 May 2002'. This CPR establishes noise emission standards, procedures for conformity assessment of marking, technical documentation and data collection concerning noise emitted into the environment by equipment for use outdoors.

2. Ministerial Decision HC 9272/471/2007, Government Gazette 286/B/02-03-2007, which refers to the amendment of Article 8 of Joint Ministerial Decision No 37393/2028/2003 (B 1418), in compliance with the provisions of Directive 2005/88/EC "amending Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors".

10.9.2 Operating phase

During the operation phase, the noise caused by the RES and according to the map of isothermal curves is of low intensity and certainly below the maximum permissible limit for settlements provided for by the Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources. The distance of the project from residential areas ensures even lower noise levels at the boundaries of settlements. In any case, the developer should regularly and diligently maintain the rotating mechanisms and replace as soon as possible any defective or damaged parts to avoid mechanical noise that may arise in the event of a breakdown. Therefore, no additional measures need to be taken.

10.10 MEASURES ON ELECTROMAGNETIC FIELDS

No increase in radiation levels is expected from the installation and operation of the wind farm. The strength of the electromagnetic fields from the operation of the project (step-up substation) will not exceed that found in a typical residential environment. Consequently, no protection-prevention measure is required in this area.

10.11 MEASURES FOR WATER

10.11.1 Construction phase

As discussed in the impacts section, no impacts to surface and groundwater are expected during construction of the proposed projects. Already from the planning stage of the road works, it is proposed to use tubular culverts of appropriate cross-section at the crossing points with half-gullies, so that there is an unobstructed downstream flow of water. However, in order to avoid pollution during construction, the following measures are proposed:

- Prohibition of temporary dumping of excavated material, fill and excavated waste outside temporary storage areas.
- Excavated materials that are not directly reused within the project will be temporarily stored within the temporary stockpiles in rows covered for water protection in the event of a storm. Final disposal will be in licensed receptors under the responsibility of the project operator.
- Solid waste of municipal type of the site personnel to be collected within the site premises in closed bins/containers (closed-type containers) and will be collected regularly.
- Hazardous waste (mineral oils, lubricants, asphalt, concrete, paint, batteries, mechanical equipment, etc.) will be collected separately in special bins within sealed areas of the construction sites and will be disposed of to companies that have a relevant license for the management of hazardous waste in accordance with Law 4042/2012, as in force.
- Installation of chemical toilets for the collection of wastewater from site personnel, which will then be transported by licensed transporters to wastewater treatment plants in the wider area.
- Prohibition of maintenance and repair of construction machinery in the work area. Maintenance and repair will be carried out in licensed workshops. The exception is the repair of damage to site machinery whose removal/transportation (by a third vehicle) becomes practically impossible.
- All waste and refuse resulting from the construction of the project (solid and liquid, hazardous and non-hazardous) will be properly managed to avoid pollution of the area from uncontrolled disposal or spills.
- The site will be equipped with bins for household waste, where urban waste will be collected and which will be periodically disposed of either in the nearest municipal bins from where they will be collected by the Municipality's refuse collection vehicles or in the nearest waste disposal site of the relevant Municipality, after consultation with the relevant Municipality.

- The contractor shall implement a waste management and accidental pollution prevention control programme.
- The management of the used mineral oils should be done in accordance with the provisions of P.D. 82/25.02.2004 (Government Gazette 64/A/02.03.04) on "Determination of measures and conditions for the management of used mineral oils", as replaced by the KYA 98012/2001/96. Waste lubricating oils and fluids should be collected separately by category in suitable tanks or drums and stored temporarily in a covered area.
- The management of hazardous waste should be carried out in accordance with the provisions of KYA 19396/1546/97 (Government Gazette 604/B/18-7-1997) as replaced by KYA HP 13588/725/2006 (Government Gazette 383/B/28-3-2006).
- The temporary storage of hazardous waste on the A/P facility should be carried out using UN-compliant packaging for solid waste and leakage collection tanks for liquid waste. These tanks should be placed in an area with appropriate signage and adequate ventilation.
- Proper and systematic maintenance of the vehicles and machinery on site should be ensured in order to avoid any accidental pollution. The uncontrolled disposal of machinery oil is prohibited.
- The dumping of any materials and waste in the streams of the wider area is prohibited.

10.11.2 Operating phase

No adverse impacts on the water resources of the area are expected during the operation of the project.

10.12 MEASURES TO DEAL WITH RISKS OF MAJOR ACCIDENTS OR DISASTERS ASSOCIATED WITH THE WORK

10.12.1 Construction phase

For all the potential risks and accidents mentioned in chapter 9.14, in addition to the proposed measures listed in this chapter for all the considered parameters of the natural and man-made environment of the study area, it is proposed to the following measures to prevent and avoid accidents related to the project under study:

- Prior to the start of construction works, a suitable and adequate Safety and Health Plan (SHP) will be prepared, which is the main tool for the prevention of human factor accidents during the execution of the project.
- The transport and installation of the towers will start after all the necessary technical works (roads, foundations, etc.) have been inspected and no dangerous situations are foreseen.
- The installation of the gensets will be carried out during periods of low wind or low wind speed according to the construction company's forecasts, in order to avoid accidents during the construction stage of the gensets.
- Workers will use the prescribed personal protective equipment (mainly for welding operators, electric welding operators, etc.) and personal hearing protection equipment (mainly for hoe operators, wheel operators, etc.).
- Compliance with the seismic design regulations and preparation of a geotechnical study for the foundation of the A/C and all technical works.
- Compliance with fire safety measures such as: Existence of all required fire-fighting equipment in readiness, detailed cleaning of vegetation in the squares of the installation of the A/C.

The following points are made with regard to the CIP:

The HSE will include the risk assessment and specific prevention measures, the schedule of works for risk prevention, procedures for safety and health issues during construction. It should be noted that the contractor must take into account everything mentioned in the HSE and modify, adapt and revise it in accordance with the studies carried out and the methodology (safety policy, organisation, equipment, materials, etc.) to be applied to the project in question. The Project Contractor shall also take into account the following:

- The effects of the working environment as it is already configured.
- Health and safety issues directly related to his/her working method.
- Detailed requirements of the Workers' Safety and Health Legislation.
- The environment in which the work will be carried out.

10.12.2 Operating phase

The measures presented below, in combination with the measures proposed for the other environmental parameters considered during the operational phase of the project, aim to prevent and avoid risks during possible subsequent operations - maintenance, cleaning, repair, etc., throughout the lifetime of the project.

Maintenance work will be carried out by qualified personnel - crews specially equipped with the relevant materials and Personal Protective Equipment (PPE), in order to avoid the possibility of an accident.

In cases of extreme weather events (storms, etc.) the staff will evacuate the turbines and no maintenance or other related work will be performed.

Furthermore, for the safety of the operation of the wind turbines, day and night lighting should be installed on the wind turbines of the project in accordance with the instructions of the Civil Aviation Authority (CAA).

Particular reference is made to the **fire safety measures that** will be taken to prevent and respond to fires during the operational phase of the project. It is noted that the proposed A/Cs meet the requirements of the Machinery Directive 2006/42/EC, which stipulates: "*Machinery must be designed and constructed in such a way as to avoid the risk of fire or overheating caused by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery*". As mentioned in Chapter 6 on dealing with emergencies and hazards, measures are taken in the design of the project to provide lightning protection and earthing in the A/Cs, which reduces the risk of fire. Similar lightning protection measures have been provided for the control centres. In the event of a fire caused by a lightning strike, the civil protection service should be informed immediately in order to inform the residents of the surrounding settlements of the possibility of evacuation.

Also to avoid damage from gusty winds, the A/Cs are equipped with a rotor braking system. In the event of a failure of the system, a braking failure notification system must be installed in the control centre of the rotorcraft via telemetry, so that the project operator can immediately inform the civil protection service of the extent of the risk of this accident and take the necessary measures to protect the neighbouring settlements.

10.13 MEASURES NECESSARY AFTER THE DEFINITIVE CESSATION OF THE OPERATION OF THE PROJECT

Section 6.6 of this EIS developed all relevant issues with the assessment of the time or conditions of project shutdown, removal of equipment and materials, their disposal methods, restoration of the soil morphology and occupation of the project sites.

THE EDITOR	PROJECT PROMOTER
For "D. ARGYROPOULOS -Environmental Consultants S.A. Dimitrios Argyropoulos	WPD WIND ENERGY 1 MICRO

CHAPTER 11: ENVIRONMENTAL MANAGEMENT AND MONITORING

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11 BRIEF DESCRIPTION OF THE PROJECT DESIGN

In order to ensure the effective protection of the environment and the implementation of the proposed measures, as presented in chapter 10, this chapter describes the proposed Environmental Management Plan (EMP) of the project, which was prepared in accordance with the requirements of Law 4014/2011, of which the Monitoring Programme is an integral part.

11.1 ENVIRONMENTAL MANAGEMENT PLAN

The preparation and implementation of an Environmental Management Plan (EMP) for the project under consideration aims to accurately and thoroughly identify how the environmental objectives of the project, i.e. the proposed measures, as presented in Chapter 10 of this EIA, will be achieved.

In this way, the effectiveness of all individual actions is ensured and the

"performance" of the overall project, based on the social interest, environmental protection, public benefit and absolute compliance with the applicable provisions of the legislation in force. At the same time, the implementation of the EMS:

- It mobilises the human resources - project workers towards developing an environmental "culture", given that the successful implementation of an EMS, even if it is developed by an external consultant, requires the active participation of the project workers.
  staff-workers of the project.
- It creates "added value" for the project by improving its reputation and
  its competitive position in the market, as it demonstrates that all environmental "aspects" of the project are managed in an effective way,
  taking into account: environmental protection and social and economic needs.

An EMS is essentially a continuous improvement cycle, known as the **"Design-Implementation-Control-Action"** cycle, in which all options and commitments concerning the environmental, economic, time and quality conditions for the implementation-operation of the project are captured and included, with a view to maximising environmental protection and minimising the impacts of the project.

The core of the **design of** the EMS is the full implementation of the environmental measures mentioned in Chapter 10 of this EIA and as they will be finalised through the AEP, i.e. the protection of the natural and man-made environment of the project area. Specific objectives: the harmonious integration of the project into the environment of the area and the enhancement of its natural and cultural elements, the reduction of the use of natural resources, the reduction of carbon dioxide emissions, the reduction of the carbon footprint of the project, the reduction of the environmental impact of the project, the reduction of the environmental impact of the project and the reduction of the environmental impact of the project.

footprint of the project and the management of its liquid and solid waste based on the principles of the circular economy.

In the context of the **implementation of** the EMS and the achievement of its objectives, the environmental monitoring programme (described in the next section of this chapter) is applied, in which the environmental parameters to be monitored have been selected for both the construction and the operation phases, specific monitoring indicators and relevant methodology (frequency of measurements, etc.) are proposed.

The **audit**, an important component of the EMS cycle, has as its ultimate objective the examination of the necessity of possible revision of the EMS implementation, the development and introduction of corrective actions and, in any case, the complete updating of all environmental records, records that are transmitted to the competent Services and Agencies and constitute at the same time key elements of the "social licence" of the project.

The last "step" of the **action** consists in the implementation of the necessary corrective actions and, if required, in the revision of the environmental policy, i.e. the environmental measures - AEPO.

The preparation of this Environmental Management Plan (EMP) starts with the identification of the most significant environmental parameters expected to be affected by the construction and operation activities of the studied ESDP, for which the relevant monitoring programme and the way of evaluating its data and information are proposed.

It is the intention of the project promoter to develop and implement an Environmental Management System according to ISO 14001 or equivalent.

11.2 ENVIRONMENTAL MONITORING PROGRAMME

The environmental monitoring process involves the systematic periodic measurement of key indicators for different environmental parameters that may be affected by the construction and operation activities of the project.

The implementation of the proposed monitoring programme as part of the environmental management of the project will contribute to:

- Compliance with the environmental conditions and measures of the project, as proposed in this EIA
- To provide important information to assess the effectiveness of the measures and conditions proposed by this RIA, depending on the trends in the parameters under monitoring and their expected changes.

- Early notification of potential problems and addressing them at the initial stage, reducing environmental and economic costs and the scale of necessary interventions.

Specifically, the proposed monitoring programme has the following objectives:

- the monitoring of significant environmental parameters related to the impacts of the project (Chapter 9 of this EIA) and the monitoring of the effectiveness of the implementation of the proposed mitigation measures (Chapter 10 of this EIA),
- the recording and maintenance of data documenting the implementation of the proposed measures and allowing their effectiveness to be monitored,
- providing information to public authorities and the public on the basis of the applicable legislation.

For the implementation of a monitoring programme, the existence of baseline data or predefined reference values is a prerequisite for better evaluation of the monitoring data and thus of the mitigation measures applied.

The selection of the proposed indicators was based on the assessment and evaluation of the expected impacts of the project, as developed in Chapter 9 for each monitored environmental parameter, as well as the importance of each parameter to the conservation of the natural environment of the study area.

Table 11.2-1 presents the proposed environmental parameters to be monitored that were considered to be the most important to ensure the protection of the environment and the proper functioning of the project, as well as the proposed monitoring indicators, according to the conclusions of the assessment and evaluation of potentially significant impacts that preceded it.

The following paragraphs present the monitoring methodology, the general objectives and the environmental indicators. Compliance and monitoring of the programme will be the responsibility of the project promoter.

Table 11.2-1: Presentation of indicators for the proposed environmental monitoring programme

Environmental Parameter	Index	Objectives	Project phase	Frequency of measurements
NATURAL LIVING ENVIRONMENT	*Loss of people of birds and bats*	Survey for dead birds and bats at the site of the project and associated works	Function	Monthly field surveys for any dead birds and bats during operation for 3 years
NATURAL LIVING ENVIRONMENT	*Birdlife*	1. Document potential changes in the size, density, and passage rate of populations of important bird species in the CIP during project construction and operation relative to the baseline data in this EIS. 2. Evaluation of the data in relation to the Satisfactory Reference Values and Conservation Objectives for these species at national level to be reflected in the forthcoming implementation reports on the implementation of Directive 92/43/EEC.	Constructi on Operation	Continuous monitoring of the collision avoidance system. Monthly field surveys for any dead birds. Seasonal measurements inside and outside reproductive period (4 per year)
NATURAL LIVING ENVIRONMENT	*Habitat*	Finding of a possible reduction in the area or deterioration of quality of habitats from various causes	Function	Once a year, for three consecutive years
NATURAL ABIOTIC ENVIRONMEN T - SOIL	*Solid waste manageme nt*	1. Control of compliance with environmental conditions and measures of the project during construction regarding excavation waste and waste from site machinery and workers 2. Protecting the soil from erosion, pollution or covering by earthworks	Construction	Seasonal (4 times/year)

11.2.1.1 Index of avifauna

Index of Loss of Birds and Bats

Description. It is a species mortality monitoring indicator, i.e., the survey for dead birds and bats on the project site and associated projects.

Objectives. The main objective of the monitoring is to investigate the potential for birds and bats to impact the project sites.

Methodology. Visual searches for dead birds tend to be most effective in bright light conditions, with a light breeze that can move feathers and down of dead birds, making them more visible, especially when it has not rained recently (rain tends to make feathers stick together). Dead bird searches should be carried out regularly on a monthly basis for the first 3 years of operation. The order of visits should be the same on each iteration so that the sampling interval is the same for each wind turbine. For each dead bird or bat found, the following data shall be recorded:

- The date and time it was found.
- The extent and type of trauma received (if identifiable).
- The species (or the best estimate for the species if it is in very poor condition and cannot be fully identified).
- The coordinates of the location where the dead animal was found (to be used for control/verification purposes).
- Take a digital photograph of the dead animal at the place where it was found.

Index of avifauna

Description. It is an indicator for monitoring important elements of the natural environment of the study area and concerns the species of avifauna listed in Annex I of Directive 2009/147/EC, as well as the endangered species of the Red Book of Greece that are found within the Research Field Area (RIF) of the present ERA. Monitoring of this indicator will utilize baseline data from the EIA fieldwork collected and assessed prior to project construction in the SPA where the project falls.

Objectives.

- Document potential changes in the size, density, and passage rate of populations of important bird species in the CIP during project construction and operation relative to the baseline data in this EIS.

- Assessment of data against the nationally satisfactory reference values and conservation objectives for the species to be reflected in the National Reporting Reports implementing Directive 92/43/EEC.

Methodology. The monitoring methodology for the proposed indicator will involve, in principle, visual observation in the field (line transects, point counts, look-and-see, stopover counts, passage migration counts, etc.) using special equipment (binoculars, telescope, calling devices). In areas that support significant breeding populations according to the baseline data of the EEA and outside the breeding season, monitoring should be carried out using the same methods as those used to collect the baseline data. Also, in addition to visual observation within the EEZ during project operation, direct mortality potentially caused by the wind turbines will be recorded by visual observation of dead birds around the squares of the installed wind turbines and by using new technologies (radar and thermal cameras) which are more accurate monitoring methods in areas of importance for avifauna in the judgement of the study team experts.

Fieldwork should cover at least three years of the breeding season to identify any potential impacts from the operation of the AGs, taking into account the natural variation of populations between years and to distinguish short term from long term impacts. If the results show a significant problem with inter-annual variation, then additional surveys should be carried out to investigate longer-term effects (e.g. repeat surveys after 5 years).

A field survey for any dead birds from impact should be conducted monthly.

Investigations may need to be extended/expanded in the case of increased mortality in order to evaluate the response measures that have been implemented. Data will be stored on specific forms and then digitally stored in the corresponding descriptive and spatial indicator database maintained under the responsibility of the project promoter.

The data will be compared with the baseline data of this ERA. In case deviations from the above-mentioned constants for the EMS are found, appropriate additional mitigation and/or prevention measures will be taken.

<u>**Habitat index**</u>

Description. The indicator relates to monitoring the evolution of habitats in the project CIP. The extent of individual habitats that are important for the characteristic species of birds in the area should be recorded per year.

Objectives. The main objective of the monitoring is to identify any potential reduction in the extent or deterioration of habitat quality from various causes (and not necessarily only from the operation of the project) that are important for birds, so that protective measures can be taken in time to protect birds.

Methodology. The methodology involves visual field observation in the field of the habitats and their mapping. Monitoring and recording will be done once a year for three consecutive years and will be kept in the site database.

Solid waste management indicator

Description. The indicator concerns the monitoring of the soil condition during the construction phase of the project within the MPA and the monitoring of compliance with the measures and environmental conditions of the project. In other words, it should be monitored during construction whether the final disposal of excavated soil or solid waste is carried out in the intended areas, whether the excavations are as planned, whether the planted land is stored and reused, etc.

Objectives. The main objective of the monitoring is to protect the soil from potential erosion, pollution or cover from landfill during the construction phase within the protected area, and from the disposal of liquid and solid waste from construction equipment, transport and site workers.

Methodology. The methodology includes visual field observation in the field of construction works. Data will be stored on specific forms and then digitally stored in the corresponding descriptive and spatial indicator database maintained under the responsibility of the project proponent.

The frequency of inspections may be seasonal with 4 recordings per year. In addition, both during construction and operation, the behaviour of the soil formations, especially on the higher slopes of the road network, should be systematically monitored to ensure that they are always stable.

11.2.2 Data Collection - Processing - Evaluation

The effectiveness of a monitoring programme lies in the reliability and timeliness of the data and the conclusions drawn from it. The primary data from the specific field forms will be collected and also entered digitally into the programme database, and a schedule of work will be kept

Follow-up. The database will be structured in a suitable way to cover all areas of monitoring and to allow for spatial presentation of the data and their processing.

The results of the environmental monitoring will be included in **an annual Environmental Monitoring Report**, prepared under the responsibility of the project promoter by an appropriate team of scientists. The report will be prepared annually and submitted before June of the following year. The report, which will also indicate the progress and success of the implementation of the environmental conditions of the EIA and the environmental monitoring plan for the following year, will be submitted for information to the department that issued the project EIA and a copy will be kept at the project promoter's offices.

CHAPTER 12: CODIFICATION OF RESULTS AND PROPOSALS FOR THE ADOPTION OF ENVIRONMENTAL CONDITIONS

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12 CODIFICATION OF RESULTS AND PROPOSALS FOR THE ADOPTION OF ENVIRONMENTAL CONDITIONS

This chapter presents the Draft Environmental Terms Approval Decision of the project, which includes the environmental conditions and the monitoring programme that are proposed to constitute the necessary condition for the implementation and operation of the project under study, in order to ensure the maximum possible protection of the environment and compliance with the applicable environmental legislation.

The presentation of the Draft Decision on the Approval of Environmental Conditions of the project follows the provisions of the K.Y.A. οικ. 48963/2012 (Government Gazette 2703/B/05.10.2012) "Specifications for the content of Environmental Conditions Approval Decisions (E.E.P.O.) for projects and activities of category A' of the Decision of the Minister of Environment, Energy and Climate Change No. 1958/13-1-2012 (B΄ 21), as in force, in accordance with article 2 par. 7 of Law 4014/2011 (A' 209)'.

The above-mentioned codification of results and proposals aims to enhance the effectiveness of the consultation process with the public concerned and the relevant Services, without binding the competent environmental authority as to the type and content of the decision it will issue.

The AEPO imposes conditions, terms, restrictions and modifications for the realisation of the project, in particular as regards its location, size, type, technology used and general technical characteristics. It shall also impose any necessary remedial or preventive measures and actions to monitor environmental media and parameters, as well as compensatory measures. The conditions shall relate, in order of priority, to the avoidance or minimisation of impacts or to the remediation or restoration of the environment.

The environmental conditions are:

(a) compatible with applicable environmental or other legislation and land-use and urban planning.

(b) adequate for environmental protection

(c) directly related to the specific project and its impact (d) fair and

proportionate to the size and type of project

(e) precise, achievable, binding and verifiable;

The project developer is not exempted from the obligation to comply with the provisions of the applicable environmental legislation, regardless of the existence of an explicit reference in the specific environmental conditions of the project.

DECISION ITEM

Approval of the environmental conditions and restrictions, the application of which is a prerequisite for the construction and operation of the project:

44 MW ASPEE at the location 'Polemmistis', in the Municipal Units of Komotini and Organi, Municipalities of Komotini and Arrianon, Regional Unit of Rodopi, Region of Eastern Macedonia and Thrace

of the company "WPD ΑΙΟΛΙΚΗΙΚΗ ENERGEIA 1 M.I.K.E.", in the Local Communities Kalhantos, Drimi, Ano Drosini, Neou Kallintiriou and Dokou, of the Municipalities of Komotini and Organi, the Municipalities of Komotini and Arrianon, the Regional Unit Rodopi, the Region of Eastern Macedonia and Thrace.

A. DESCRIPTION OF THE ACTIVITY

A.1) Type and size of activity

This is the Wind Farm in the location "Polemistis", which is developed in one (1) polygon and includes a total of 11 wind turbines, each with a capacity of 4.00 MW. The total installed capacity of the ASPHE is 44 MW. Accompanying projects of the Wind Farm include the opening of new road sections as well as the improvement of the existing rural-forestry network. The length of the road network that will be required is 11,182.63m. Furthermore, within the framework of the implementation of the ASPHE, the installation of an MT interconnection line with the existing "Flamburo" substation is foreseen.

A.2) Group, sub-group and type of project

The project, based on YA 1958/2012, as amended and in force (amended and codified by YA DIPA/oik. 37674/2016, subsequently amended by YA οικ. 2307/2018, ΥΠΕΝ/ΔΙΠΑ64001/2029/2018, ΥΠΕΝ/ΔΔΥ/24593/2902/2020 and YPEN/DIPA/74463/4562/2020 and again by YPEN/DIPA/17185/1069/24-02-2022), belongs to the 10η Group "Renewable Energy Sources", with serial number 1.a "Onshore Wind Power Generation". The project, concerns RES-E with a capacity of 6.5 < P ≤ 45 MW and with a High Voltage interconnection line length L < 20 km (only the construction of an underground medium voltage transmission line is foreseen) and is therefore classified in **Subcategory A2.**

Accompanying works (e.g. roads, transport network, etc.) follow the category of the main project, a s indicated in the 'Remarks' column of the relevant Categorisation Table

of the projects in the 10ης group, as none of them are independently classified in a larger category of projects.

In view of the above, the project is classified in Category A and specifically in A2 Subcategory for all interventions.

A.3) Project Implementing Agency

The project is implemented by "WPD Aeoliki Energia 1 M.I.K.E.", based in Vrilissia, Attica.

A.4) Project mapping

The Wind Park at the "Warrior" site is developed in a polygon. It is planned to install 11 wind turbines of the indicative VESTAS V-150, with a nominal power of 4.0 MW each, in forested areas mainly on the Greek-Bulgarian border, north of the settlement 'Drymi'.

The eleven wind turbines that will make up the Wind Farm will be placed at the locations with coordinates shown in **Table 1** and bounded within the polygon shown in **Table 2.** Finally, in **Table 3**, the geographic coordinates of characteristic points of the MT grid alignment are presented, as well as in **Table 4** , the geographic coordinates of characteristic points of the access road.

Table 12.1: Geographical coordinates of the locations of the proposed A/Cs

A/A	ΕΓΣΑ '87		WGS '84	
	X	Y	λ	φ
A/C 1	630595,345	4572505,875	25,56156865	41,29598652
A/C 2	631145,480	4572498,203	25,56813529	41,29582813
A/C 3	631611,673	4572399,368	25,57367994	41,29486222
A/C 4	632086,755	4572507,258	25,57937545	41,29575600
A/C 5	631401,593	4573456,765	25,57140032	41,30441762
A/C 6	631803,477	4573236,410	25,57615139	41,30236786
A/C 7	632092,086	4572914,405	25,57952756	41,29942119
A/C 8	632351,354	4573615,171	25,5827758	41,30568854
A/C 9	631782,911	4574235,508	25,57612249	41,31136737
A/C 10	632147,963	4574494,530	25,58053834	41,31363988
A/C 11	632648,666	4573973,357	25,58640421	41,30886485

Table 12.2: Geographical coordinates of the polygons of the installation of the ASPEE (ΕΓΣΑ '87)

Coordinates of Polygon vertices (A/C 1 - A/C 11)		
A/A	**X**	**Y**
A1	630340,39	4572569,003
A2	630474,242	4572892,15
A3	630800,301	4572950,714
A4	631120,538	4572892,15
A5	631150,436	4572819,97
A6	631435,524	4572938,057
A7	631600,897	4572869,557
A8	631533,783	4573031,583
A9	631454,494	4572998,741
A10	631131,346	4573132,593
A11	630997,494	4573455,741
A12	631131,346	4573778,888
A13	631454,494	4573912,741
A14	631777,641	4573778,888
A15	631897,236	4573490,161
A16	631924,723	4573501,547
A17	631909,262	4573538,872
A18	632007,618	4573776,326
A19	631697,178	4573904,914
A20	631563,326	4574228,062
A21	631697,178	4574551,21
A22	631963,948	4574661,71
A23	631995,53	4574635,541
A24	632095,357	4574592,211
A25	632278,661	4574553,648
A26	632323,445	4574559,506
A27	632343,474	4574551,21
A28	632403,43	4574406,464
A29	632579,587	4574479,266
A30	632573,746	4574317,073
A31	632561,039	4574245,57
A32	632494,721	4574175,972
A33	632532,548	4574129,074
A34	632632,824	4574099,366
A35	632675,722	4574045,398
A36	632832,335	4574008,214
A37	633041,031	4573890,63
A38	632971,879	4573727,924
A39	632778,187	4573647,694
A40	632823,262	4573538,872
A41	632675,457	4573225,351

A42	632418,065	4573103,33
A43	632433,526	4573066,004
A44	632323,157	4572799,551
A45	632403,339	4572766,338
A46	632537,192	4572443,19
A47	632403,339	4572120,042
A48	632080,293	4571994,779
A49	631757,044	4572120,042
A50	631743,894	4572151,788
A51	631435,524	4572024,057
A52	631112,376	4572157,909
A53	631082,478	4572230,09
A54	630797,39	4572112,003
A55	630474,242	4572245,855
A1	630340,39	4572569,003

Table 12.3: Geographical coordinates of characteristic points of the route of the MT transmission line

A/N	x	y	φ	λ
1	631846	4572132	41.29241939	25.57642858
2	631954	4572001	41.29122631	25.57769559
3	632078	4571790	41.28930399	25.57912728
4	632007	4571636	41.28792353	25.57824651
5	631894	4571192	41.28394942	25.5768029
6	631662	4571029	41.28252179	25.57399848
7	631715	4570903	41.28137636	25.574602
8	631841	4570603	41.27865034	25.5760368
9	631695	4570041	41.27361895	25.57417295
10	631272	4569624	41.26993343	25.56904041
11	631362	4568971	41.26403924	25.56996399
12	631048	4568349	41.25848358	25.56608892
13	630909	4567916	41.25460716	25.56433606
14	630839	4567174	41.24794355	25.56333738
15	630910	4566934	41.24576978	25.56413488
16	631001	4566415	41.24107628	25.56511209
17	631297	4565873	41.23614715	25.56852912
18	631276	4565546	41.2332108	25.56820114
19	631680	4564465	41.22340746	25.57278538
20	631757	4563485	41.21457373	25.57349569
21	632207	4562971	41.20987205	25.57874898
22	631592	4562269	41.20365368	25.57126091
23	630828	4560806	41.1906026	25.56185039
24	631524	4559410	41.17791708	25.56983984

25	631886	4558577	41.17035976	25.57397204
26	632037	4557108	41.15710561	25.57545999
27	632131	4557161	41.15757042	25.57658849
28	632438	4555964	41.14674202	25.57998724
29	632351	4554984	41.13792633	25.57873637
30	633416	4554921	41.13718847	25.59141467
31	633710	4554263	41.13121189	25.59477442
32	633923	4554441	41.13277785	25.59734285
33	634159	4554248	41.13100575	25.60010899
34	634240	4554136	41.12998473	25.60105518

* The points of the common path of the interconnection network and the road network are marked in grey outline

Table 12.4: Geographical coordinates of access road feature points

	x	y	φ	λ
1	631715	4570903	41.28137636	25.574602
2	631662	4571029	41.28252179	25.57399848
3	631894	4571192	41.28394942	25.5768029
4	632007	4571636	41.28792353	25.57824651
5	632078	4571790	41.28930399	25.57912728
6	631954	4572001	41.29122631	25.57769559
7	631846	4572132	41.29241939	25.57642858
8	631725	4572196	41.29301419	25.57499283
9	631512	4572011	41.29138824	25.57241004
10	631449	4572251	41.2935537	25.57171228
11	631109	4572322	41.29424949	25.56766928
12	630886	4572443	41.29537615	25.56503431
13	630793	4572577	41.29659782	25.56395278
14	631118	4572666	41.29734965	25.56785158
15	631307	4572741	41.29798955	25.57012643
16	631395	4573131	41.30148989	25.57125869
17	631452	4573428	41.30415059	25.57200849
18	631677	4572267	41.29366177	25.574442
19	631462	4572389	41.29479949	25.57189651
20	631308	4572429	41.29518545	25.5700755
21	631675	4572502	41.29577892	25.57446718
22	632021	4572696	41.29746917	25.57864031
23	632154	4572739	41.29783456	25.58023762
24	631980	4572821	41.29860142	25.57817792
25	631832	4573059	41.30076865	25.57646244
26	632176	4573001	41.30018977	25.58055632
27	632267	4573285	41.30273235	25.58170561

28	632290	4573427	41.30400718	25.58201115
29	632435	4573725	41.30666663	25.5838075
30	632511	4574066	41.30972459	25.5847894
31	632502	4574371	41.31246877	25.5847466
32	632377	4574532	41.31393973	25.58328918
33	632026	4574247	41.3114332	25.57903963

* The points of the common path of the interconnection network and the road network are marked in grey outline

As mentioned above, among the accompanying works is the improvement of the existing rural- forest roads, mainly concerning the widening and reinforcement of access roads to the considered ASPEO, with a total length of 3.96km, as well as the construction of small new sections, where access and transport of the ASPEO's components will be ensured, mainly with paving materials, with a total length of about 7.22km.

The project is presented in detail in the maps and technical drawings accompanying the EIA file.

B. ESTABLISHED BASIC CHARACTERISTICS OF THE PROJECT SITE AND ITS SENSITIVE ENVIRONMENTAL FEATURES

B.1) Spatial planning and land use:

KYA 49828/2008 (Government Gazette 2464/B/2008) "Approval of the Special Framework for Spatial Planning and Sustainable Development for Renewable Energy Sources and its Strategic Environmental Impact Study" is in force and the project is compatible with the guidelines and restrictions of the EIAEA for RES.

The revision of the Regional Spatial Framework of the Region of Macedonia - Thrace approved by the Regional Spatial Plan of the Region of Macedonia - Thrace No. The project is compatible with the objectives of the Region for its integration into international energy networks and the development of soft - renewable energy sources, since as a RES infrastructure it contributes to the protection, preservation and promotion of natural and cultural heritage and enhances the system of ADMIE.

B.2) Evidence of the environmental sensitivity of the area: The ASPEO is located within the boundaries of the Important Bird Area "Filliouris Valley and Eastern Rhodope" with code GR008. The wind turbines under consideration will be installed outside and within > 10.0 km from the boundaries of the

Natura 2000 network area. The existing access road that is planned to be widened to meet the manufacturer's specifications for the movement of the equipment of the A/C, as well as the new road sections, are located outside and at a significant distance (>11km) from the nearest Natura 2000 network site, the SPA GR1130011 "Valley of Filliouris". Furthermore, the access road as well as the MT network for the interconnection of the Wind Farm with the existing MT/150kV "Flamburo" Voltage Raising TS "Flamburo", pass within the boundaries and a small part of it within the Wildlife Refuge "Patermon - Adas" with code K.A.Z. - K805, of the Municipality of Komotini.

Γ. LIMIT VALUES FOR EMISSIONS OF POLLUTANTS TO AIR, WATER, SOIL, NOISE AND VIBRATION AND ENVIRONMENTAL QUALITY

C.1) Atmospheric environment - Air emissions and concentrations

The basic air quality limit values and guide values refer mainly to the following provisions:

i. Decree 1180/1981 (Government Gazette 293/A/06.10.1981) "On the regulation of matters relating to the establishment and operation of industries, crafts, all types of mechanical installations and warehouses and the safeguarding of the environment in general" for t h e emission of air pollutants from certain installations.

ii. C.I.A. D13/O/121/2007 (Government Gazette 53/B/24.01.2007) "Measures against the emission of gaseous and particulate pollutants from internal combustion engines installed in non-road mobile machinery in compliance with the provisions of Directive 97/68/EC as amended by Council Directives 2001/63/EC, 2002/88/EC and 2004/26/EC of 17 August 2001, 9 December 2002 and 21 April 2004 respectively", as amended by the K.Y.A. D13/O/3967/2011 (Government Gazette 741/B/05.05.2011), on the limitation of the emission of gaseous and particulate pollutants from internal combustion engines installed in non-road mobile machinery.

iii. C.I.A. H.P. 14122/549/E.103/2011 (Government Gazette 488/B/30.03.2011) "Measures to improve air quality, in compliance with the provisions of Directive 2008/50/EC "on ambient air quality and cleaner air for Europe" of the European Parliament and of the Council of the European Union of 21 May 2008".

iv. 174505/607/2017 (Government Gazette 1311/B/13.04.2017) "Amendment of Annexes IV and V of Article 8 of Joint Ministerial Decision No. 22306/1075/2007 (920/B) and Annexes I, III, VI and IX of Article 30 of Joint Ministerial Decision No. 14122/549/2011 ministerial decision (488/B), in compliance with Directive 2015/1480/EU "amending certain annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down rules on reference methods, data validation and the location of sampling points for the assessment of ambient air quality" of the European Commission".

For point source emissions of suspended solids (dust) from project sites, the following apply: The limit of 100 $mg/m^{3,}$ determined by article 2 par. d΄ of P.D. 1180/1981 (Government Gazette 293/A/06.10.1981)
"On the regulation of issues relating to the establishment and operation of industries, crafts, all kinds of mechanical installations and warehouses and the safeguarding of the environment in general", as amended by Law 1650/1986 (Government Gazette 160/A/16.10.1986) (§1a, b, d of article 1 were abolished) and the Ministry of Justice 69269/5387/1990 (Government Gazette 678/B/25.10.1990).

C.2) Water Environment - Liquid Waste

The basic limit and guide values for water and waste water quality are mainly referred to in the following provisions:

i. C.I.A. Y2/2600/2001 (Government Gazette 892/B/11.07.2001) "Quality of water for human consumption", in compliance with Directive 98/83/EC of the Council of the European Union of 3 November 1998", as amended and supplemented by the K.Y.A. DYΓ2/G.P.οικ.38295/2007 (Government Gazette 630/B/26.04.2007), Article 18.

ii. Law 3199/2003 (Government Gazette 280/A/09.12.2003) "Protection and management of waters - Harmonization with Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000".

iii. P.D. 51/2007 (Government Gazette 54/A/08.03.2007) "Definition of measures and procedures for integrated water protection and management in compliance with the provisions of Directive 2000/60/EC "establishing a framework for Community action in the field of water policy" of the European Parliament and of the Council of 23 October 2000".

iv. K.Y.A. 39626/2208/E130/2009 (Government Gazette 2075/B/25.09.2009) "Determination of measures for the protection of groundwater against pollution and deterioration, in compliance with the provisions of Directive 2006/118/EC "on the protection of groundwater against pollution and deterioration" of the European Parliament and of the Council of 12 December 2006".

v. C.I.A. H.P. 51354/2641/E103/2010 (Government Gazette 1909/B/08.12.2010) "Establishment of Environmental Quality Standards (EQS) for the concentrations of certain pollutants and priority substances in surface water, in compliance with the provisions of Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008
"on environmental quality standards (EQS) in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC and 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council", as well as on concentrations of specific pollutants in inland surface waters and other provisions.

vi. Y.A. οικ.1811/2011 (Government Gazette 3322/B/30.12.2011) "Definition of upper acceptable values for the concentration of specific pollutants, groups of pollutants or indicators of pollution in groundwater, in application of paragraph 2 of Article 3 of Joint Ministerial Decision No.: 39626/2208/E130/2009 (B΄2075)".

For liquid wastes and their disposal limits, the limits indicated in the relevant Ministerial Decisions, Health Regulations and Prefectural Decisions and their amendments should be respected, unless stricter limits are set by Chapter 4 of this document:

i. Health Decree E1b/221/1965 (Government Gazette 138/B/24.02.1965) "On the disposal of sewage and industrial waste", as amended by No. C1/17831/7.12.1971 (Government Gazette 986/B/10.12.1971), No. G4/1305/02.08.1974 (Government Gazette 801/B/09.08.1974) and D.ΥΓ2/G.Π.οικ.133551/
30.09.2008 (Government Gazette 2089/B/09.10.2008).

ii. K.Y.A. 5673/400/1997 (Government Gazette 192/B/14.03.1997) "Measures and conditions for the treatment of urban waste water".

iii. K.Y.A. 4859/726/2001 (Government Gazette 253/B/09.03.2001) "Measures and restrictions for the protection of the aquatic environment from discharges and in particular the establishment of limit values for certain dangerous substances included in List II of Council Directive 76/464/EEC of 4 May 1976", Articles 4 and 12, as amended by the K.Y.A. H.P. 51354/2641/E103/2010 (OFFICIAL GAZETTE 1909/B/08.12.2010).

iv. K.Y.A. 50388/2704/E103/2003 (Government Gazette 1866/B/12.12.2003) "Modification and supplementation of P.Y.S. 2/2001 (Government Gazette 15/A/02.02.2001) 'Determination of guideline and limit values for water quality values for discharges of certain dangerous substances included in List II of Council Directive 76/464/EEC of 4 May 1976 (A15)', Article 2(2), subparagraph 4.2. H.P. 51354/2641/E103/2010 (OFFICIAL GAZETTE 1909/B/08.12.2010).

C.3) Solid waste

Their general management and disposal is subject to the provisions of Law 4042/2012 (Government Gazette 24/A/13.02.2012) and the provisions of ΡΥΣ 49/2015 (Government Gazette 174/A/15.12.2015), as applicable, and 29407/3508/2002 (Government Gazette 1572/B/16.12.2002) "Measures and Conditions for the Landfilling of Waste", as amended by H.O. 28745/895/E103/2013 (Government Gazette 1104/B/02.05.2013) "Modification of the specific criteria for the storage of metallic mercury considered as waste". For excavation, construction and demolition wastes, M.A. 36259/1757/E103/2010 (Government Gazette 1312/B/24.08.2010) applies, as amended by Law 4030/2011 (Government Gazette 249/A/25.11.2011).

C.4) Waste electrical and electronic equipment

For waste electrical and electronic equipment, K.Y.A. no. H.P. 23615/651/E.103/2014 (Government

Gazette 1184/B/09.05.2014), as amended and in force with the H.A.

YPEN/DNEP/36928/2227/2018 (Government Gazette 5459/B/06.12.2018). For batteries and accumulators, the Government Decree 41624/2057/E103/2010 (Government Gazette 1625/B/11.10.2010) applies, as amended and in force with the Government Decree 39200/2015 (Government Gazette 2057/B/18.09.2015).

C.5) Acoustic environment - Specific noise limits

The noise emitted by the project equipment, as well as the noise generated on the road network, is mainly subject to the provisions of the regulations:

i. Decree 1180/1981 (Government Gazette 293/A/06.10.1981) "On the regulation of matters relating to the establishment and operation of industries, crafts, all kinds of mechanical installations and warehouses and the safeguarding of the environment in general".

ii. C.I.A. H.P. 37393/2028/2003 (Government Gazette 1418/B/01.10.2003) "Measures and conditions for noise emissions into the environment from equipment for use outdoors", as amended by K.Y.A. 9272/471/2007 (Government Gazette 286/B/02.03.2007).

iii. K.Y.A. 211773/2012 (Government Gazette 1367/B/27.04.2012) "Determination of Evaluation Indicators and Maximum Permissible Limits of Environmental Noise Indicators from the operation of transport projects, technical specifications of special acoustic studies for the calculation and application of anti-noise filters, specifications of environmental noise monitoring programs and other provisions". The noise during the operation of the installations should comply with the provisions of the provisions of the Government Decree A5/2375/1978 (Government Gazette 689/B/18.8.1978), Government Decree No. 56206/1613/1986 (Government Gazette 570/B/09.09.1986), Government Gazette 69001/1921/1988 (Government Gazette 751/B/18.10.1988) as amended by Y.A. 10933 F5.3/361/1991 (Government Gazette 359/B/28.05.1991) and Y.A. 765/1991 (Government Gazette 81/B/21.02.1991) as amended by Y.A. οικ. 11481/523/1997 (FEK 295/B/11.04.1997).

C.6) Exposure to low-frequency changing electric and magnetic fields

For the electric and magnetic field of substations, the basic restrictions and reference levels of the Council Recommendation of 12 July 1999 "on the limitation of public exposure to electromagnetic fields (0 Hz - 300 GHz)" apply, in accordance with the guideline of ICNIRP/1998 (International Commission for Non-Ionizing Radiation Protection) - GUIDELINES FOR LIMITING EXPOSURE TO TIME - VARYING ELECTRIC, MAGNETIC AND ELECTROMAGNETIC FIELDS

(Health Physics, April 1998, Vol. 74 No. 4). For the electromagnetic field of transmission lines and voltage transformers, the following basic limitations and levels apply reference of the Ministry of Justice 3060 (ΦΟΡ) 238/2002 (Government Gazette 512/B/25.04.2002) "Measures to protect the public from the operation of low frequency electromagnetic field emission devices", as in force after the errors corrections made (Government Gazette 759/B/19-06-2002) and what is mentioned in the Ministry of Justice 3060/2002 (ΦΟΡ) 238 (B' 512).

For installations located close to the boundaries of settlements (uncontrolled public stay), the reference levels of the ICNIRP/1998 Directive are for the Electric field 5 kV/m and for the Magnetic field 100 μT.In the case of exposure of workers (controlled occupation), the reference levels for the Electric field 10 kV/m and for t h e Magnetic field 500 μT apply.

For the electromagnetic field of transmission lines and voltage transformers, the basic restrictions and reference levels of Decree 3060 (ΦΟΡ) 238/2002 (Government Gazette 512/B/25.04.2002) apply. "Measures to protect the public from the operation of low frequency electromagnetic field emission devices", as in force after the corrections of errors (Journal of Laws No 759/B/19-06-2002).

C.7) Monitoring programme and reports

- The impact of the project on the environment and the implementation of environmental conditions related to its operation will be monitored through an appropriate Environmental Monitoring Programme (EMP), as described in Chapter 11 of the EIA. The programme will be finalised and submitted for approval to the project permitting authority.
- In the framework of the IMP, data relating to the information referred to in Chap. 11 of the RIA.
- The results of the monitoring programme shall be communicated to the environmental permitting authority of the project in the form of an annual report. It is recommended that at least a summary report of the results is made publicly available on the website of the project operator.

Δ. CONDITIONS, MEASURES AND RESTRICTIONS TO BE TAKEN TO MINIMISE AND ADDRESS POTENTIAL ENVIRONMENTAL IMPACTS

D.1) General

1. The project developer and any person legally liable shall be fully responsible for compliance with the environmental conditions, measures and restrictions imposed by this Decision (AEPO).
2. The project developer is required to designate a competent person to monitor compliance with the environmental conditions, measures and restrictions imposed by this Decision and to notify the environmental authority of his/her name.
3. The project developer is not exempted from the obligation to comply with the provisions of the applicable environmental legislation, regardless of the existence of an explicit reference in the terms of the AEP.
4. The developer must, during the construction process, take all necessary measures to ensure that:

   a. compliance by the manufacturer with the environmental conditions as far as they are concerned

   b. the ability to address and remedy environmentally unfavourable situations caused by actions or omissions of the developer in breach of environmental conditions.
5. During the construction phase of the project, the construction contractor is responsible for implementing the monitoring programme. In the operational phase of the project, the project promoter is responsible.
6. During the approval, supervision and acceptance procedures of the project, to take all necessary actions and measures to ensure compliance with the environmental conditions, and the possibility to address and remedy environmentally unpleasant situations due to actions or omissions in violation of environmental conditions.
7. The appropriations for the construction and operation of the Project shall provide, as a priority, the necessary expenditure for the environmental protection works required for full compliance with the conditions and restrictions of this Decision.
8. Individual projects and activities relating to construction works or operational activities, other than those described in the EIA and therefore included in the scope of this document, are subject to environmental permitting in accordance with the provisions of Article 6 of Law No. 4014/2011. If it concerns an installation for which the general impact assessment is included in the EIA and this Decision provides for general and/or specific conditions and restrictions for such installations and operations, it is possible for the project promoter to submit a Technical Environmental

Study (TEPEM), which is assessed and approved by the environmental authority responsible for the project, based on its classification according to the Ministry of Environment 1958/2012 (B΄ 21).

D.2) Construction phase

1. Limiting the movement of heavy vehicles and construction machinery to the absolute minimum.
2. Use of heavy-duty, low-emission vehicles and their regular maintenance and inspection.
3. The above vehicles and machinery must have the appropriate permits (MOT) and comply with the European Eurostage regulations depending on their horsepower, type and date of manufacture.
4. Regular maintenance and inspection of the mechanical equipment of the construction sites.
5. Restricting excavation and vegetation clearance strictly to the intended locations of the works. Excavations will be carried out to the depth and volume absolutely necessary and foreseen, with controlled disposal of surplus materials in the temporary storage shed foreseen in the installation squares of the A/C.
6. Any storage or deposition, even temporary, of materials outside the designated site areas, where excavated materials will also be temporarily deposited until their reuse or disposal through a SEMS, is prohibited.
7. Correct planning of the work so that there is immediate reuse of excavations and the shortest time of open trenches.
8. Any site installation shall be removed at the end of construction and the site shall be immediately restored.
9. Construction sites should have closed waste bins and open or closed containers for the temporary storage of non-hazardous solid waste. Construction sites shall also be equipped with chemical toilets with adequate capacity sewage holding tanks.
10. The contractor should implement sound management practices for hazardous waste that may be generated during construction activities. All types of waste materials should be collected and disposed of in accordance with the provisions of Law 4042/2012, as in force.
    Hazardous waste should be collected separately in special bins within sealed areas of the construction sites and disposed to companies that have a relevant license for the management of hazardous waste in accordance with Law 4042/2012.

11. The removed vegetation will be properly preserved for use in restoration work on the surrounding area.
12. The temporary deposition of the earthworks to be reused for the embankments should be done in a way (shaping of materials on slopes of gentle slopes, covering of materials with plastic covers, wetting of soils) so as not to allow erosion or leaching of these materials.
13. Excess excavated material will be disposed of through the AECS for further management or for use in another project of the operator in the area for which there is a need for landfilling.
14. It is recommended that the accumulation of large volumes of excavated material be avoided and that any storage, even temporary, of materials outside the project's designated temporary storage bins be prohibited.
15. The aggregates required in each phase of the project construction will be provided either from project excavation materials or from legally operating aggregate production facilities in the area, under the responsibility of the project proponent.
16. All site facilities shall be removed at the end of each phase of construction and the site areas shall be restored and landscaped as required by the project design.
17. Proper organisation of the construction stages for faster completion of the project. Use of the minimum number of machines and the fewest number of routes, in order to minimise disturbance to the fauna of the area.
18. Access and movement of machinery will be made as far as possible from existing roads or from roads that are about to be opened as part of the permitting of the works.
19. A maximum speed limit will be set for construction site vehicles and vehicles travelling along the work zone (normal practice is to apply a speed limit of approximately 20-30 km/hr), in order to reduce the risk of killing fauna species.
20. Temporary construction facilities will be located on land of low ecological value.
21. During earthworks, methods to reduce dust dispersion, particularly during dry and windy periods, by wetting the soil piles and covering the transport vehicles will be applied.
22. The environment that will be altered by the whole operation and after the completion of the works, which will not be covered by infrastructure works, will be properly restored.

23. Fire protection measures will be taken to protect the vegetation in the vicinity of the works to be constructed. In this context, the developer will follow the relevant instructions of the competent forestry department, which will be given to him in writing.

24. Passages/egress ramps for wildlife species will be maintained throughout the work zone as much as possible during construction, and passage restoration will be conducted immediately following completion of construction. Similarly, the same shall apply to the placement of site facilities which shall be in such a manner that the free passage of fauna species in the area is not obstructed.

25. It is prohibited, even temporarily, to deposit materials in protected areas, streams, torrents, irrigation ditches, and forested areas, outside the defined areas of the project area.

26. The excavation and demolition works during the construction of the project will be carried out in the mildest possible way and without the use of explosives.

27. In relation to disturbance from lighting of project elements and construction sites during construction should be kept to a minimum. Where this is required for safety (such as site areas, facilities, etc.), non-diffusing lighting will be used.

28. The operation of machinery during earthmoving operations will be handled with care to limit the release of dust.

29. Regular wetting of the vehicle traffic lanes, as well as the dredging - backfilling areas and spoil heaps, especially in case of strong winds in the project area and when it is not possible to stop the works. In addition, the depositing of materials in heaps due to excavation work will be carried out from the minimum possible height in order to avoid the creation of dust.

30. The trucks transporting aggregates or excavated materials will necessarily carry a special cover in accordance with the existing provisions (Law 4433/1964 on Mining Exploration of the State and other mining provisions, as amended by Law 273/1976 PL 50/A and Y.A. P-5h/F/17402/84ETC 931/B--Regulation on Mining and Quarrying Operations) and will avoid their overfilling.

31. Vehicles and machinery of all kinds will move at low speeds on all dirt surfaces to avoid dust generation.

32. All machinery and equipment used in construction will be in good condition and will meet the manufacturer's specifications in order to

emissions of air pollutants are minimised. The maintenance programme will be checked by the employer on a bi-monthly basis.

33. The contractor of the construction project is obliged to use machinery with the strictest emission reduction specifications in accordance with Greek and European legislation.
34. No burning of any kind of material in the project area. All kinds of waste, scrap materials, old spare parts, oil, will be collected and removed from the site of the works and their disposal will be in accordance with the applicable provisions.
35. Selection of routes for transporting materials and vehicles outside the settlements, as far as possible.
36. Compliance with the applicable legislation on specific emission limit values for pollutant loads and concentrations in accordance with the applicable provisions.
37. Excavated materials that are not directly reused within the project will be temporarily stored within the temporary stockpiles in rows covered for water protection in the event of a storm. Final disposal will be in licensed receptors under the responsibility of the project operator.
38. Solid waste of municipal type of the site personnel to be collected within the site premises in closed bins/containers (closed-type containers) and will be collected regularly.
39. Hazardous waste (mineral oils, lubricants, asphalt, concrete, paint, batteries, mechanical equipment, etc.) will be collected separately in special bins within sealed areas of the construction sites and will be disposed of to companies that have a relevant license for the management of hazardous waste in accordance with Law 4042/2012, as in force.
40. Installation of chemical toilets for the storage of wastewater from site personnel, which will then be transported by licensed transporters to wastewater treatment plants in the wider area.
41. Prohibit maintenance and repair of construction equipment in the work area except in emergencies. Maintenance and repair will be done at licensed sites-workshops.
42. All waste and refuse resulting from the construction of the project (solid and liquid, hazardous and non-hazardous) will be properly managed in order to

prevent pollution of the area from uncontrolled disposal or spills.

43. The site will be equipped with bins for household waste, where urban waste will be collected and which will be periodically disposed of either in the nearest municipal bins from where they will be collected by the Municipality's refuse collection vehicles or in the nearest waste disposal site of the relevant Municipality, after consultation with the relevant Municipality.

44. The contractor shall implement a waste management and accidental pollution prevention control programme.

45. The management of the used mineral oils should be done in accordance with the provisions of P.D. 82/25.02.2004 (Government Gazette 64/A/02.03.04) on "Determination of measures and conditions for the management of used mineral oils", as replaced by the KYA 98012/2001/96. Waste lubricating oils and fluids should be collected separately by category in appropriate tanks or drums and stored temporarily in a covered area.

46. The management of hazardous waste should be carried out in accordance with the provisions of KYA 19396/1546/97 (Government Gazette 604/B/18-7-1997) as replaced by KYA HP 13588/725/2006 (Government Gazette 383/B/28-3-2006).

47. Temporary storage of hazardous waste on the A/P facility should be carried out using UN-compliant packaging for solid waste and leakage collection tanks for liquid waste. These tanks should be placed in an area with appropriate signage and adequate ventilation.

48. Proper and systematic maintenance of the vehicles and machinery on site should be ensured in order to avoid any accidental pollution. The uncontrolled disposal of machinery oil is prohibited.

49. A suitable and adequate Safety and Health Plan (SHP) must be prepared before the start of the works. The Safety and Health Plan is the main tool for preventing risks during the execution of the project.

50. The transport and installation of the towers will start after all the necessary technical works (roads, foundations, etc.) have been inspected and no dangerous situations are foreseen.

51. The installation of the gensets will be carried out during periods of low wind or low wind speed according to the construction company's forecasts, in order to avoid accidents during the construction stage of the gensets.

52. Workers will use the prescribed personal protective equipment (mainly for welding operators, electric welding operators, etc.) and personal hearing protection equipment (mainly for hoe operators, wheel operators, etc.).

53. Compliance with the seismic design regulations and preparation of a geotechnical study for the foundation of the A/C and all technical works.

54. Compliance with fire safety measures such as: Existence of all required fire-fighting equipment in readiness, detailed cleaning of vegetation in the squares of the installation of the A/C.

D.3) Operation phase

1. Proper maintenance of the equipment of the A/Cs so that they operate properly without emitting high noise levels. The noise limit is set at 45 dB(A) at the boundaries of built-up areas.

2. A bird movement detection and impeller shutdown system of the DtBird or nvbird type or equivalent shall be installed on all A/Cs.

3. Keep a record of the maintenance work carried out on the project premises (type of work, date of completion, materials used).

4. For the fire protection and fire safety of the area, all necessary lightning protection and fire fighting measures will be taken and implemented for the Gensets and the Voltage Booster Station.

5. In cases of extreme weather events (storms, etc.) the staff will evacuate the turbines and no maintenance or other related work will be performed.

6. In the event of a fire in the fuselage of a wind turbine or in the event of inability to control the rotor speed in extreme wind speeds, the project operator must immediately inform the civil protection service.

7. Install day and night lighting on the project's wind turbines in accordance with the instructions of the Civil Aviation Authority (CAA).

8. Implement the Environmental Management Plan, which forms an integral part of this Decision. The reports included in the monitoring programme shall be drawn up and submitted.

9. Keep a record of the waste generated during the construction and operation of the project and the way it is managed (type of waste, quantity and the company authorised to manage it).

D.4) Rehabilitation, partial or partial or permanent cessation of operations

1. After the project has ceased operation, the environment should be restored as far as possible to its previous state under the care and responsibility of the project promoter.

2. All types of site facilities (offices, workshops, warehouses, etc.) to be removed at the end of each construction project and the site to be restored regardless of the ownership of the site.

3. After the completion of the construction works, the contractor shall restore the landscape of the intervention areas by removing waste materials and machinery and by carrying out soil normalization works in the areas where the construction works have created unsightly folds and distortion of the local morphology.

4. Otherwise, the conditions, measures and restrictions described in the assessed RIA dossier shall apply, provided that they do not contradict the above paragraphs. The cost of all works, actions and interventions resulting from the environmental conditions, restrictions and regulations shall be borne by the developer.

Commented [CK1]: The sentence was removed:
All equipment will be removed and the land will be returned to agricultural use.

Commented [KK2R1]: On what was removed, where is the disagreement? Equally Equal which reinforces the agency's image of protecting the area and caring for the local community.

E. PERIOD OF VALIDITY OF THE AGREEMENT - CONDITIONS FOR ITS RENEWAL OR AMENDMENT

1. This Decision shall be valid for fifteen (15) years from the date of its adoption, provided that there has been no change in the data on the basis of which it was adopted in the meantime. The project promoter, if it wishes to continue its operation, must submit a new application to our Service at least two (2) months before its expiry, in order to comply with the provisions of Article 5 of Law 4014/2011, as amended by Article 3 of Law 4685/2020.

2. This Decision shall remain provisionally in force after its expiry until the adoption of a new renewed or amended Decision, provided that the body responsible for its renewal or amendment requests its renewal or amendment in good time, at least two months before its expiry, by submitting the supporting documents required for this purpose.

3. For the modernization, improvement, extension or modification of the project, as described in the certified M.P.E. and implemented under the terms and conditions of this Decision, compliance with Article 6 of Law 4014/2011, as amended by Article 4 of Law 4685/2020, is required.

4. In the event that regular and extraordinary environmental inspections reveal serious problems of environmental degradation or if impacts on the environment are observed that were not foreseen by the M.P.E. and this Decision, additional environmental conditions shall be imposed or the conditions of this Decision shall be modified, as provided for in par. 9 of Article 2 in conjunction with Article 6 of Law 4014/2011, as amended and in force, not excluding any compensatory measures or fees within the meaning of paragraph 1 of Article 17 of Law 4014/2011.

F. OTHER PROVISIONS

1. The AEPO does not cover issues of safety against large-scale accidents or the safety and hygiene of personnel, nor does it exempt the liable entity from the obligation to provide it with other permits, which may be provided for by the legislation in force, it is issued without examining the ownership titles of the site of the project or activity, as well as the conditions and restrictions of building on the land and does not entail the legalisation of any arbitrary existing structures to which the provisions of the legislation in force on the construction of the land are applicable.

2. The AEPO is valid subject to the proviso that it does not contradict any special planning and other special provisions that may prevail.

3. The AEPO is also an intervention approval within the meaning of the sixth (F) chapter of Law 998/79 in accordance with the provisions of Article 12 of Law 4014/2011 (Government Gazette 209/A/21.09.2011) (as amended by Paragraph 3 of Article 55 of Law 4042/2012) and Article 3 (paragraphs 2 and 3) of Y.A. 15277/2012 (Government Gazette 1077/B/09.04.2012).

7. MONITORING OF COMPLIANCE WITH THE ENVIRONMENTAL CONDITIONS OF THE AIR POLLUTION

1. The AEP with the relevant certified EIA and the accompanying file must be available at the site of the project or activity under consideration and must be presented by the liable entity to any competent control body in accordance with the legislation in force.

2. The liable entity has the obligation to:

    - Keep records (invoices, contracts, various supporting documents, data registers, etc.) to prove compliance with the environmental conditions of the AEP. These records should be kept on the site of the project or activity.
    - Allow access to any competent control body.
    - Provide all required data and information.
    - To facilitate the control and to comply with the recommendations - suggestions of the competent control bodies for the observance of the provisions of the applicable environmental legislation.

3. Any issues that arise during the implementation of the AEP and are not covered by its terms are resolved on the basis of the applicable legislation (national and Community) and, where this is not possible, on the basis of the relevant certified EIA or the accompanying file.

4. In case of any pollution or other environmental degradation or violation of the terms of the AEPO, the project or activity managers are subject to the sanctions provided for by the provisions of articles 28, 29 and 30 of Law 1650/86, as amended by Law 3010/2002, Law 4014/2011 and Law 4042/2012 and in force.

CHAPTER 13: ADDITIONAL INFORMATION

Contents of the Chapter

13 ADDITIONAL INFORMATION

13.1 SPECIALISED STUDIES

The project did not require the preparation of any special study, except for the study for the improvement of existing/opening of new roads and the construction of squares for the A/C

It is noted that for the preparation of this P . E.I., data from the following studies were used, regarding the impacts of similar projects on the environment:

- GOOD PRACTICE GUIDE for the mitigation of the impacts of wind farms on biodiversity using modern technologies (KAPE, 2018) www.windfarms-wildlife.gr
- "Wind Energy or Climate Change?" (Greenpeace, 2001)
- Repowering & Recycling, Operations & Recycling Directorate RES Generation Management PPC (February 2022)

The main points and conclusions of these studies are incorporated in the main text of the RIA**.**

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13.3 DEVELOPMENT PROBLEMS AND WAYS OF SOLVING THEM

No serious difficulties arose during the preparation of the study that are worth mentioning in this paper.

CHAPTER 14: PHOTOGRAPHIC DOCUMENTATION

Photos

14 PHOTOGRAPHIC DOCUMENTATION

This chapter contains illustrations of the site location of the considered AISP. It includes shots of characteristic points of the area where the installation of the MT interconnection line, the interventions of opening new road sections and the improvement of the existing road network are to be carried out. In addition, the area where the squares are to be built and then where the STs are to be installed is shown.

Photo 14-1: Illustration of the area where the MT cable will run underground (1 of 2)

Photo 14-2: Illustration of the area where the MT cable will be routed (2 of 2)

Photo 14-3: Illustration of the area in need of new road sections

Photo 14-4: Illustration of the existing road network in the immediate area that needs improvement (1/2)

Photo 14-5: Illustration of the existing road network in the immediate area that needs improvement (2/2)

Photo 14-6: Illustration of a typical point where the square of the A/C is to be built (1/2)

Photo 14-7: Illustration of a typical point where the plasma of the A/C is to be erected (2/2)