PROJECT OPERATOR	**:**	**MYTILINEOS S.A.** **POWER & GAS BUSINESS UNIT**
TYPE OF ACTIVITY	**:**	**TRANSMISSION LINE OF ELECTRIC ENERGY 400kV, FOR THE CONNECTION OF AGIOS NIKOLAOS HIGH VOLTAGE CENTER (HVC) WITH THE DISTOMO HIGH VOLTAGE CENTER (HVC), IN VIOTIA REGION (DIVERSION OF PART OF TRANSMISSION LINE)**
PROJECT SITE	**:**	**POSITION "AGIOS NIKOLAOS" - OUTSIDE URBAN DESIGN REGION - MUNICIPALITY UNIT (MU) DISTOMO – MUNICIPALITY OF DISTOMO - ARACHOVAS - ANTIKYRAS & OUTSIDE URBAN DESIGN REGION KYRIAKIOY – MUNICIPALITY UNIT (MU) OF KYRIAKIOU - MUNICIPALITY OF LEVADIA, REGION OF VIOTIA**

ENVIRONMENTAL IMPACT ASSESSMENT FOR MODIFICATION OF N^{O} 124363 / 16.04.2010 ENVIRONMENTAL TERMS APPROVAL (E.T.A.)

Environmental Study Engineer:

SAMARAS & ASSOCIATES S.A.
CONSULTING ENGINEERS

T H E S S A L O N I K I , O C T O B E R 2 0 2 0

PROJECT OPERATOR

MYTILINEOS S.A.

Power & Gas Business Unit

Contact person: Mr Kyriakos Berdebes

Technical Director & Director of Renewable Energy and Power &Gas Business Unit

Postal Address : Artemidos 8, TK 151 25 Maroussi, Attica

Contact number : 210 3448340

E-mail : kyriakos.berdebes@protergia.gr

ENVIRONMENTAL STUDY ENGINEER

SAMARAS & COOPERATES S.A. - ENGINEERING CONSULTANTS

President and CEO: Mr. Samaras Dimitrios

A.M. Company Degree: 926

Category No 27: Degree Class D

Postal Address: 26 October 43 – FIX Area ("Limani" Center),

TK 546 27, Thessaloniki

Contact number: 2310 552110 – Fax: 2310 552107

E-mail: doukissa.kouka@samaras-co.gr

THESSALONIKI, OCTOBER 2020

PROJECT OPERATOR	ENVIRONMENTAL STUDY ENGINEER

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1 INTRODUCTION

EMPLOYER	:	**MYTILINEOS S.A. - POWER & GAS BUSINESS UNIT**
PROJECT	:	**TRANSMISSION LINE (T.L.) ELECTRIC ENERGY 400kV**
PROJECT SITE	:	**POSITION "AGIOS NIKOLAOS" - OUTSIDE URBAN DESIGN REGION - DISTOMO – MUNICIPALITY OF DISTOMO - ARAHOVAS - ANTIKYRAS & OUTSIDE URBAN DESIGN REGION KYRIAKIOY - MUNICIPALITY OF LEVADIA, REGION OF VIOTIA**

1.1 PROJECT TITLE

This Environmental Impact Assessment is submitted in order to amend No. 124363/16.04.2010 Environmental Terms Approval (ETA) of the Special Environment Agency of the Ministry of Environment, as amended and renewed by No. 32394/2177/13.11.2019 Environmental Terms Approval Environmental (ETA) of the Directorate of Environmental Licensing of the Ministry of Environment and Energy, which concerns the project entitled: **"Electricity Transmission Line (TL.) 400kV and substation (P/S) of High Voltage for the connection of Thermal Power Plant Ag. Nikolaos (444.48MW) with the existing Line 400kV (Acheloos High Voltage Center (HVC) – Distomo High Voltage Substation(HVS), in Region of Viotia".**

This amendment concerns the diversion (change of route) of part of the existing 400kV electricity T.L. The existing and environmentally licensed Electricity Transmission Line under study has a total length of 10,460m, starting from HVC Ag. Nikolaos (High Voltage P/S - within the existing facilities of MYTILINEOS S.A.) and is terminated in its connection with the existing High Voltage Transmission Line 400kV dual circuit (HVC Acheloos – HVC Distomos). This amendment proposes the abolition of the last 3,833m of the existing and environmentally licensed T.L electricity 400kV, in its connection with the existing High Voltage T.L. 400kV HVC Acheloos – HVC Distomos and the construction of a new T.L. of about 5,198m length and its connection with the HVC Distomos, for the implementation of an enhanced connection scheme of HVC Ag. Nikolaos with the National System. **The total length of the new electricity transmission line, considering the requested amendment, will be 11,825m.**

The new title of the project under study is as follows: **"Transmission line (T.L) of electricity 400kV for the connection of Ag. Nikolaos HVC with Distomo HVC, in the Regional Unit of Viotia".**

1.2 TYPE AND SIZE OF THE PROJECT

With No. 124363/16.04.2010 Environmental Terms Approval as amended and renewed by No. Ministry of Environment and Energy 32394/2177/13.11.2019 approval, the connection of Agios Nikolaos Thermal Power Plant 444.48MW with the System was licensed. In particular, projects environmentally licensed under the above approvals concern the following:

- Electricity Transmission Line 400kV, 10,460m long, connecting the Thermal Power Plant of Agios Nikolaos with the existing 400kV dual-circuit High Voltage Transmission Line, which in turn connects the Acheloos High Voltage Center with the Distomo High Voltage Center and
- High Voltage Substation (P/S) 400KV – Ag. Nikolaos High voltage Center .

This environmental study aims to the modification of the above Environmental Terms Approval, because of the diversion (change of route) of part of the existing 400kV High Voltage electricity transmission line and its connection to the Distomos High Voltage Center.

This indicates that Agios Nikolaos thermal power plant, which is not the subject of this study, has been authorized under the following Environmental Terms Approval:

- No. 160645/14.07.2006 Environmental Terms Approval from the Directorate of E.A.R.Th. of the Ministry of Spatial Planning and Public Works
- No. 167271/23.08.2010 Environmental Terms Approval from the Directorate of E.A.R.Th. of the Ministry of Environment and Climate Change, concerning the amendment of No. 160645/14.07.2006 Environmental Terms Approval
- No. 182392/09.04.2013 Environmental Terms Approval of the Directorate of E.A.R.Th. of the Ministry of Environment and Climate Change, concerning the extension of the validity of No. 160645/14.07.2006 Environmental Terms Approval
- No. 23918/01.11.2016 Environmental Terms Approval of the Ministry of Environment and Energy, concerning the renewal of No. 160645/14.07.2006 Environmental Terms Approval

It is also stated that the High Voltage Center of Distomo has been licensed under the following Environmental Terms Approval:

- No. 5119/19.08.2009/ Environmental Terms Approval of Ministry's Special Environment Agency and for which a file has been submitted in October 2019 for the abovementioned Environmental Terms Approval renewal.

The amendments proposed in this environmental study concern the following:

- removal of part of the 400kV Electricity Transmission Line, for a length of 3.833m in its connection to the existing high voltage transmission line 400kV high voltage center of Acheloos – high voltage center of Distomo, with the removal of twelve (12) high voltage pylons,
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5.198m for its direct connection to the Distomo high voltage center, with the construction of seventeen (17) new High Voltage pylons
- execution of work – addition of equipment, within the high voltage center of Agios Nikolaos and high voltage center of Distomo
- opening of forest road, with a total length of about 4.174m, to serve the construction and operation needs of the new section of the electricity transmission line
- reunion of the circuit Acheloos HVC - Distomo HVC

In particular, the existing and environmentally licensed Electricity Transmission Line, with a total length of 10.460m, is starting from the high-voltage center of Ag. Nikolaos (High Voltage P/S - within the existing facilities of MYTILINEOS S.A.) and is terminated in its connection with the existing High Voltage Transmission Line 400kV dual circuit (Acheloos High Voltage Center – Distomo High Voltage Center). This amendment proposes the abolition of the last 3.833m of the existing and environmentally licensed 400kV electricity transmission line, in its connection to the existing high voltage transmission line 400kV HVC of Acheloos – HVC of Distomo and the construction of a new transmission line of about 5.198m length with its connection directly to the Distomo HVC, as shown in the following satellite imagery extract. The total length of the electricity transmission line from Agios Nikolaos high voltage center to Distomo high voltage center, taking into account the requested modifications will be 11.825m and will consist of 37 pillars.

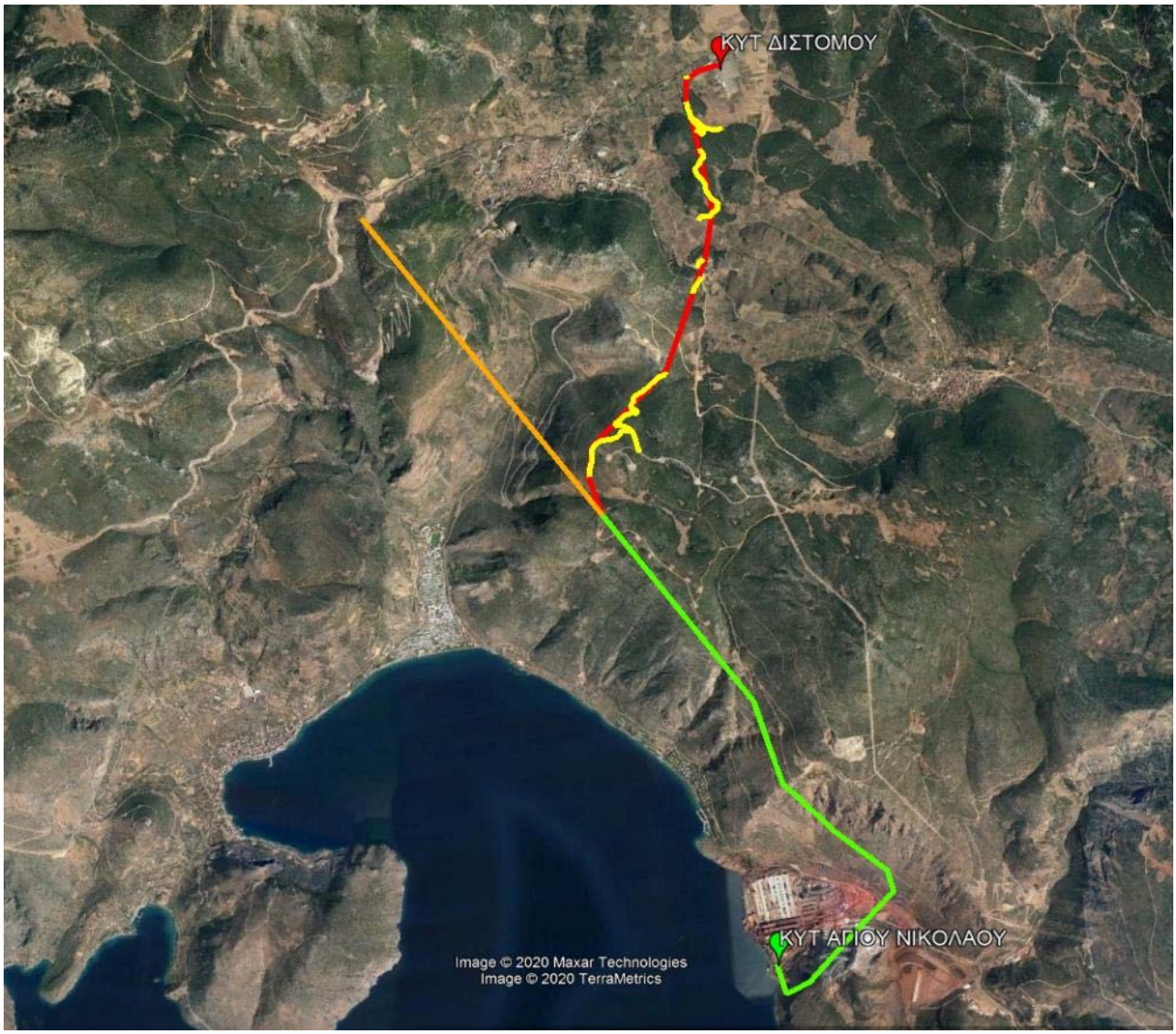


Figure 1.1: A google earth extract showing the environmentally licensed 400kV electricity transmission line maintained, an orange line reflects the environmentally licensed 400kV electricity transmission line, which is being removed, and with a red line the proposed modification of the route of that transmission line With yellow lines, the access roads to be opened for the service of the construction and operation of the new section.

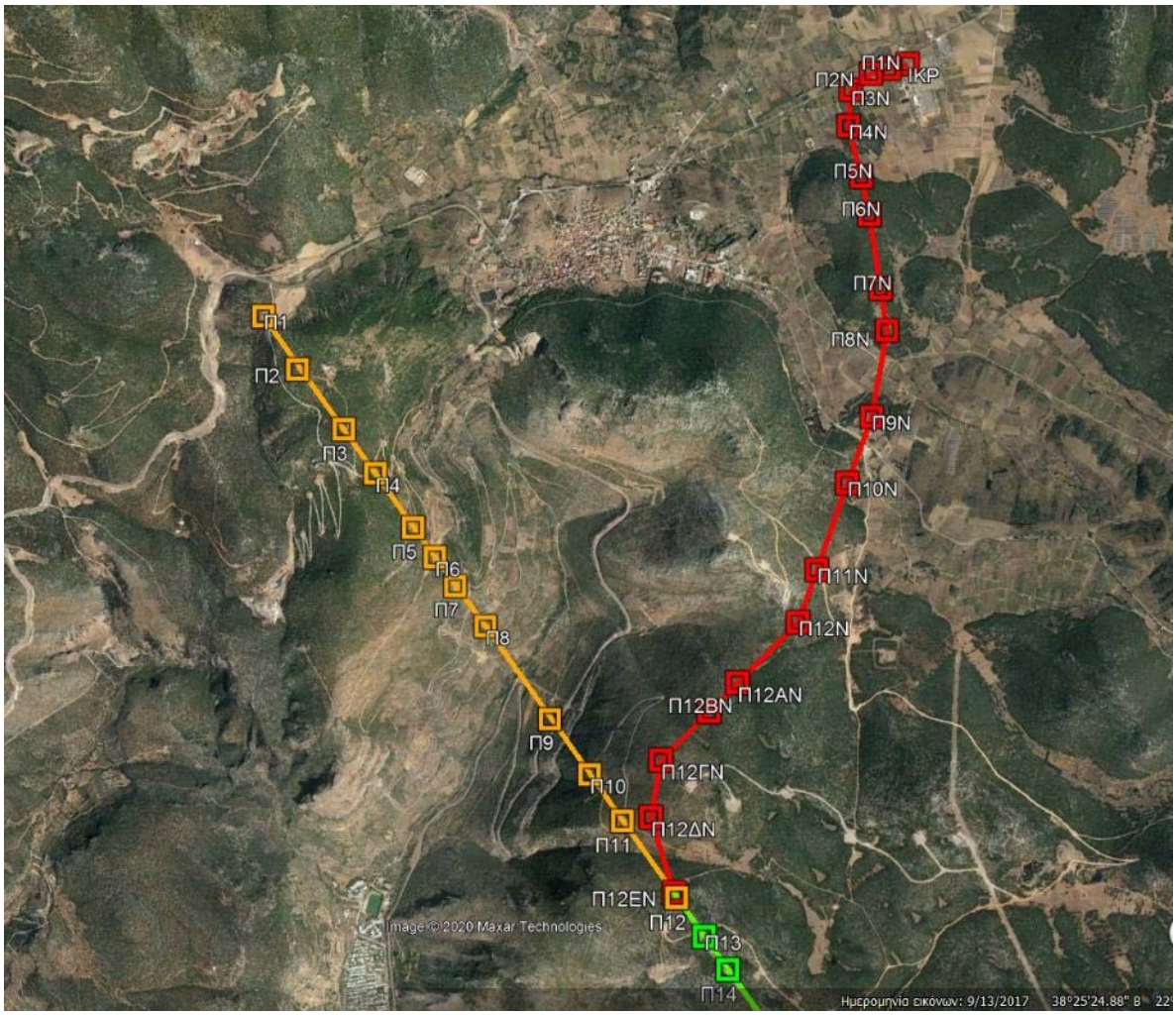


Figure 1.2: A google earth extract showing the environmentally licensed power transmission line and the corresponding pylons being removed, while red lines and red squares show the proposed new route of the electricity transmission line and the corresponding pillars. With green line and green squares are presented the environmentally licensed power transmission line and the corresponding pillars maintained.

In order to meet the construction and operation needs of the new section of the electricity transmission line, a new forest road, with a total length of about 4.174m, is required. The proposed road sections are presented in the following satellite imagery extract.

Figure 1.3: An excerpt of satellite imagery (google earth), showing the new road of the electricity transmission line with a red line, while yellow lines show the access roads that will be opened to serve the construction and operation needs of the new section.

For the connection needs of the New Power Station 826MW with the high voltage center of Agios Nikolaos, it requires the execution of work and the addition of equipment, without the need to extend this installation site.

For the interconnection of the 400kV line with the Distomo high voltage center, equipment will be installed within the licensed -with the No. 5119/149.08.2009 E.T.A.- and in operation high voltage center Distomo, without extending it to a neighboring area, while the relevant terminal scaffolding lines are already licensed and constructed. The development of the two (2) complete gates with the necessary equipment for the interconnection of a 400kV transmission line within the Distomo high voltage center refers to the already submitted Renewal Envelope 143072/04.08.2009 HVC 400/150 kV DISTOMOS as a future possibility.

Finally, there will be a reunion of the circuit center of Acheloos HVC - Distomo HVC, which has been environmentally licensed and in the current situation is used for the interconnection with the high voltage center of Agios Nikolaos, applying all the relevant procedures of the National Transmission Manager of Electricity.

1.3 GEOGRAPHICAL POSITION AND ADMINISTRATIVE OF A PROJECT

1.3.1 Place

The project under study is located on the north coast of the Corinthian Gulf and particularly in the bay of Antikyra, between the extensions of the mountain volumes Parnassos and Elikos, and extends to the west of the settlement of Distomo as shown by Figure 1.4.

Figure 1.3: Geographical location of the project.

The nearest settlements on the electricity transmission line under study are:

- Tarsos, located at a distance of about 1.000m South-East of the existing electricity transmission line. The settlement of Tarsos was established by No. 3149/16.11.1987 Decision of the Prefect of Viotia (Government Gazette 1187/D/14.12.1987).
- The Steiri is located at a distance of about 2.0km South-East of the new proposed electricity route of T.L The settlement of Seri was institutionalized with the No. 3354/27.07.1986 Decision of the Prefect of Viotia (Government Gazette 926/D/06.10.1986).
- Distomo, located at a distance of about 800m West of the new proposed route of the electricity transmission line. The settlement of Distomo was established by No. 36642/20.06.1972 Decision of the Prefect of Viotia (Government Gazette 156/D/07.07.1972).

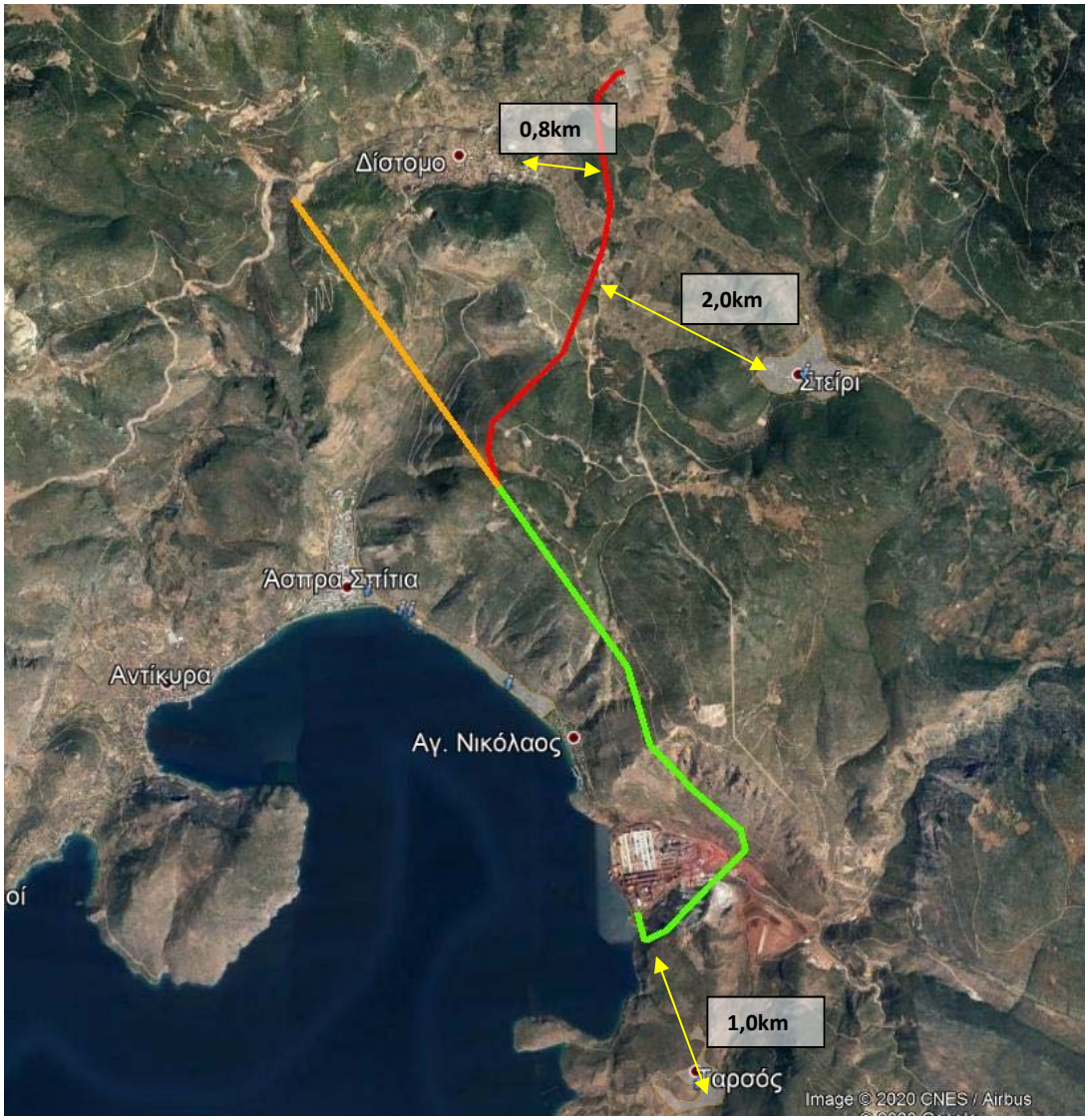


Figure 1.4: A google earth extract showing the project under study, as well as the nearest demarcated settlements.

1.3.2 Project Administrative Subordination

The environmentally licensed project is administratively under the region of Central Greece, the Regional Unit of Viotia, the Municipalities of Levadia and Distomo - Arachova - Antikyra (as formed under Law 3852/2010) and in particular, the Municipal Units of Kyriaki and Distomos, respectively. The amendments under consideration fall under the administrative unit of Distomos of the Municipality of Distomos. The administrative affiliation of the project is shown in the figure below (????).

1.3.3 Geographical Coordinates

In the context of this environmental assessment , it is requested to modify the route of the existing and environmentally licensed 400kV High Voltage Transmission Line connecting the existing high voltage center of Agios Nikolaos, with the existing High Voltage Transmission Line 400kV (Acheloos High Voltage Center - Distomo High Voltage Center).

In particular, as mentioned above, the 3,833m of the existing and environmentally licensed 400kV electricity transmission line is abolished, in its connection to the existing 400kV dual-circuit High Voltage Transmission Line (Acheloos High Voltage Center – Distomos High Voltage Center), as well as twelve (12) pillars (P1, P2, P3,..., P12) and a new transmission line of approximately 5,198m long and seventeen (17) new High Voltage pylons (P1N) is being constructed , P2N, P3N, P4N,..., P12N, P12AN, P12VN, P12GN, P12DN, P12EN).

The following table shows the geographical coordinates of all the pillars - based on the requested modification - of the above High Voltage Transmission Line 400kV, the Greek Geodesic Reference System 1987 (EGSA '87) and the Global Geodesic System WGS '84.

Table 1.1: Coordinates of all the pillars of the 400kV electricity transmission line, based on the requested modification. The coordinates of the new proposed pillars and the new location of the terminal scaffolds are presented in bold font

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	ϕ (°)	λ (°)
ΙΚΡΙΟΜΑ	**385.273,595**	**4.254.984,159**	**38° 26΄ 18,16΄΄**	**22° 41΄ 13,76΄΄**
Π1Ν	**385.181,654**	**4.254.962,070**	**38° 26΄ 17,40΄΄**	**22° 41΄ 09,98΄΄**
Π2Ν	**385.064,859**	**4.254.932,363**	**38° 26΄ 16,38΄΄**	**22° 41΄ 05,18΄΄**
Π3Ν	**384.951,259**	**4.254.846,412**	**38° 26΄ 13,54΄΄**	**22° 41΄ 00,55΄΄**
Π4Ν	**384.931,759**	**4.254.637,913**	**38° 26΄ 06,77΄΄**	**22° 40΄ 59,87΄΄**

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	ϕ (°)	λ (°)
Π5N	**384.994,243**	**4.254.347,512**	**38° 25΄ 57,38΄΄**	**22° 41΄ 02,61΄΄**
Π6N	**385.026,821**	**4.254.129,398**	**38° 25΄ 50,32΄΄**	**22° 41΄ 04,09΄΄**
Π7N	**385.087,389**	**4.253.723,896**	**38° 25΄ 37,19΄΄**	**22° 41΄ 06,82΄΄**
Π8N	**385.121,365**	**4.253.496,419**	**38° 25΄ 29,83΄΄**	**22° 41΄ 08,36΄΄**
Π9N	**385.025,217**	**4.253.019,760**	**38° 25΄ 14,32΄΄**	**22° 41΄ 04,67΄΄**
Π10N	**384.878,511**	**4.252.656,327**	**38° 25΄ 02,47΄΄**	**22° 40΄ 58,84΄΄**
Π11N	**384.687,608**	**4.252.183,404**	**38° 24΄ 47,04΄΄**	**22° 40΄ 51,25΄΄**
Π12N	**384.573,440**	**4.251.900,578**	**38° 24΄ 37,81΄΄**	**22° 40΄ 46,71΄΄**
Π12Α N	**384.234,785**	**4.251.580,861**	**38° 24΄ 27,29΄΄**	**22° 40΄ 32,94΄΄**
Π12Β N	**384.074,813**	**4.251.429,835**	**38° 24΄ 22,31΄΄**	**22° 40΄ 26,43΄΄**
Π12Γ N	**383807,245**	**4251177,230**	**38° 24΄ 14,00΄΄**	**22° 40΄ 15,55΄΄**
Π12Δ N	**383.749,323**	**4.250.872,004**	**38° 24΄ 04,07΄΄**	**22° 40΄ 13,35΄΄**
Π12Ε N	**383.865,819**	**4.250.472,273**	**38° 23΄ 51,16΄΄**	**22° 40΄ 18,38΄΄**
Π13	384.024,604	4.250.244,325	38° 23΄ 43,84΄΄	22° 40΄ 25,06΄΄
Π14	384.147,488	4.250.067,903	38° 23΄ 38,17΄΄	22° 40΄ 30,23΄΄
Π15	384.364,678	4.249.756,088	38° 23΄ 28,18΄΄	22° 40΄ 39,37΄΄
Π16	384.593,299	4.249.427,922	38° 23΄ 17,62΄΄	22° 40΄ 48,98΄΄
Π17	384.756,165	4.249.194,050	38 ° 23΄ 10,11΄΄	22° 40΄ 55,83΄΄
Π18	384.870,501	4.249.029,887	38° 23΄ 04,84΄΄	22° 41΄ 00,64΄΄
Π19	385.231,891	4.248.511,047	38° 22΄ 48,18΄΄	22° 41΄ 15,84΄΄
Π20	385.368,582	4.248.009,334	38° 22΄ 31,97΄΄	22° 41΄ 21,76΄΄
Π21	385.465,767	4.247.668,073	38° 22΄ 20,94΄΄	22° 41΄ 25,97΄΄
Π22	385.662,333	4.247.458,793	38° 22΄ 14,25΄΄	22° 41΄ 34,19΄΄
Π23	385.947,861	4.247.154,797	38° 22΄ 04,52΄΄	22° 41΄ 46,13΄΄
Π24	386.212,415	4.246.927,908	38° 21΄ 57,28΄΄	22° 41΄ 57,16΄΄
Π25	386.433,088	4.246.739,502	38Ο 21΄ 51,27΄΄	22° 42΄ 06,36΄΄
Π26	386.483,578	4.246.525,359	38° 21΄ 44,34΄΄	22° 42΄ 08,57΄΄
Π27	386.068,714	4.246.127,224	38° 21΄ 31,24΄΄	22° 41΄ 51,71΄΄
Π28N	385.810,894	4.245.866,146	38° 21΄ 22,65΄΄	22° 41΄ 41,24΄΄
Π29N	385.608,430	4.245.660,769	38° 21΄ 15,90΄΄	22° 41΄ 33,02΄΄
Π30N	385.414,038	4.245.571,275	38° 21΄ 12,91΄΄	22° 41΄ 25,06΄΄
Π31N	385.375,650	4.245.560,360	38° 21΄ 12,54΄΄	22° 41΄ 23,49΄΄
Π32N	385.326,234	4.245.759,300	38° 21΄ 18,97΄΄	22° 41΄ 21,34΄΄
ΙΚΡΙΟΜΑ	385.303,997	4.245.863,870	38° 21΄ 22,35΄΄	22° 41΄ 20,36΄΄

The table below shows the geographical coordinates of the road sections under study (beginning, middle and end), which are being used to meet the construction needs of the proposed project, the diversion of the 400kV High Voltage Transmission Line. The geographical coordinates of the new roads are given in the Greek Geodesic Reference System 1987 (EGSA '87) and the Global Geodesic System WGS '84.

Table 1.2: Coordinates of the road sections under study, in the Greek Geodesic Reference System 1987 (EGSA '87) and in the Global Geodesic System WGS '84.

roads	A/A	EGSA ΄87		WGS ΄84	
		X (m)	Y (m)	φ (°)	λ (°)
Π1- ROAD 1	Beginning	384.265,5	4.251.085,5	38° 24΄ 11,23΄΄	22° 40΄ 34,49΄΄
	middle	384.229,7	4.251.497,4	38° 24΄ 24,58΄΄	22° 40΄ 32,78΄΄
	End	384.574,3	4.251.888,5	38° 24΄ 37,42΄΄	22° 40΄ 46,75΄΄
Π1 ROAD -2	Beginning	384.190,2	4.251.315,3	38° 24΄ 18,65΄΄	22° 40΄ 31,25΄΄
	middle	383.856,0	4.251.205,2	38° 24΄ 14,93΄΄	22° 40΄ 17,54΄΄
	End	383.765,0	4.250.865,7	38° 24΄ 03,87΄΄	22° 40΄ 14,00΄΄
Π2- ROAD 1	Beginning	384.981,4	4.252.835,5	38° 25΄ 08,33΄΄	22° 41΄ 02,97΄΄
	middle	384.922,0	4.252.752,6	38° 25΄ 05,61΄΄	22° 41΄ 00,57΄΄
	End	384.879,7	4.252.667,3	38° 25΄ 02,83΄΄	22° 40΄ 58,88΄΄
Π2- ROAD 2	Beginning	384.939,2	4.252.928,4	38° 25΄ 11,23΄΄	22° 41΄ 01,18΄΄
	middle	384.965,4	4.252.982,2	38° 25΄ 13,08΄΄	22° 41΄ 02,23΄΄
	End	385.014,0	4.253.010,7	38° 25΄ 14,03΄΄	22° 41΄ 04,21΄΄
Π3- ROAD 1	Beginning	384.982,8	4.253.409,7	38° 25΄ 26,95΄΄	22° 41΄ 02,69΄΄
	middle	385.072,2	4.253.720,8	38° 25΄ 37,08΄΄	22° 41΄ 06,20΄΄
	End	385.038,2	4.254.142,1	38° 25΄ 50,73΄΄	22° 41΄ 04,55΄΄
Π3- ROAD 2	Beginning	384.974,3	4.254.466,9	38° 26΄ 01,24΄΄	22° 41΄ 01,72΄΄
	middle	384.947,8	4.254.545,6	38° 26΄ 03,78΄΄	22° 41΄ 05,58΄΄
	End	384.933,3	4.254.627,5	38° 26΄ 06,44΄΄	22° 41΄ 00,53΄΄
Π3- ROAD 3	Beginning	385.274,6	4.254.341,9	38° 25΄ 57,32΄΄	22° 41΄ 14,18΄΄
	middle	384.994,4	4.254.445,0	38° 26΄ 00,54΄΄	22° 41΄ 02,56΄΄
	End	385.001,6	4.254.335,2	38° 25΄ 56,98΄΄	22° 41΄ 02,92΄΄
Π3- ROAD 4	Beginning	384.948,7	4.254.894,2	38° 26΄ 15,09΄΄	22° 41΄ 00,41΄΄
	middle	384.952,6	4.254.875,7	38° 26΄ 14,49΄΄	22° 41΄ 00,58΄΄
	End	384.957,3	4.254.857,2	38° 26΄ 13,89΄΄	22° 41΄ 00,79΄΄

1.4 CLASSIFICATION OF THE PROJECT

According to No. oik37674/10.08.2016 (Government Gazette 2471/B/2016) MD as applicable, the project under study belongs to the 11th Project Group "Energy, Fuel and Chemical Transport" and concerns "Air power transmission lines with these accompanying installations (super-high voltage substations and centers)" (A/A 10).

As an accompanying project, it is the opening of sections of road construction, which belong to the 1st Project Group "Land and air transport projects" and concerns a "Forest Road" (A/A 11).

The environmental classification of the project is as follows:

Table 1.3: Classification of the project under study, in accordance with No oik37674/10.08.2016 MD, as applicable.

Project Group	A/A	Type of project - activity	Sub-category A1	Sub-category. A2	category B	Comments
11η	10	Aerial power transmission lines with their accompanying installations (super-high voltage substations and centers)	T ≥ 150kV και L >15km	**50 ≤ T ≤ 450 and L ≤ 15km**		T: L-line operating voltage: line length
1η	11	Forest Road			**The total**	

On the basis of the above table, the following are highlighted:

- the operating voltage of the power transmission line under study is T=400kV and
- the total length of the electricity transmission line, taking into account the requested modification, shall be L=11.825m
- in response to the construction needs of the new pillars, the opening of road construction is required.

On the basis of the above and in accordance with Article 1(5) of Law 4014/2011, a project or activity involving individual projects or activities is classified in the subcategory of the individual project or activity with the most significant impact on the environment and therefore in the highest subcategory. The project under study is therefore classified in subcategory A2.

According to the Statistical Coding of Economic Activities (STAKOD, 2008) the activity is classified in Section D "ELECTRIC REFERENCE, NATURAL GAS, STEAM AND CLIMATION" with Code 35.12-0 **"Electricity Transmission".**

This economic activity does not correspond to a category of nuisance according to the Ministry of Economic And Social Security. 3137/191/F.15/2012 "Matching the categories of industrial and craft and electricity generation activities with the degrees of nuisance referred to in the urban planning decrees", as amended and in force.

The activity in question is not subject to the provisions of Joint Ministerial Decision 172058/2016 (Government Gazette 354B/2016) laying down measures and conditions for dealing with risks from large-scale accidents in installations or units, in view of the existence of dangerous substances, in compliance with the provisions of Directive 2003/105/EC "amending Council Directive 96/82/EC on the treatment of the risks of major accidents related to dangerous substances" of the European Parliament and of the Council of 16 December 2003". However, in this study the required funds have been added (Chapters 5.6 & 7.13), as referred to in Decision 1915 (Government Gazette 304/b/02-02-2018).

At this point it is stressed that the Forest Road Study prepared for the opening of the forest sections to serve the construction and operation needs of the new section of the electricity transmission line, was prepared by Ms. Keskilidou Konstantina, Forester, who holds study degrees of 24 class B and 25 class A, which are integrated into the company **SAMARAS & COOPERATES S.A. – MECHANICAL COUNCILS** , with A.M. Company Degree: 926.

1.5 PROJECT OPERATOR

MYTILINEOS S.A.

Power & Gas Business Unit

Contact person: Mr Kyriakos Berdebes

Technical Director & Director of Renewable Energy and Power & Gas Business Unit

Postal Address : Artemidos 8, TK 151 25 Maroussi, Attica

Contact number : 210 3448340

E-mail : kyriakos.berdebes@protergia.gr

1.6 ENVIRONMENTAL STUDY ENGINEER

SAMARAS & COOPERATES S.A. - ENGINEERING CONSULTANTS

President and CEO: Mr. Samaras Dimitrios

A.M. Company Degree: 926

Category No 27: Degree Class D

Postal Address: 26 October 43 – FIX Area ("Limani" Center),

TK 546 27, Thessaloniki

Contact number: 2310 552110 – Fax: 2310 552107

E-mail: doukissa.kouka@samaras-co.gr

2 NON-TECHNICAL SUMMARY

This chapter provides a non-Technical Summary of the Environmental Impact Assessment for the amendment of No. 124363/16.04.2010 Environmental Terms Approval to approve environmental terms, as amended and renewed by No. 32394/2177/13.11.2019 approval , with which the connection of Agios Nikolaos thermal power station 444,48MW with the System Independent Power Transmission Operator was authorised. In particular, projects environmentally licensed under the above Environmental Terms Approval to approve environmental conditions concern the following:

- **400kV electricity transmission line, 10.460m long**, connecting the Agios Nikolaos Thermal Power Plant with the existing 400kV dual-circuit High Voltage Transmission Line, which in turn connects the Acheloos High Voltage Center with the Distomo High Voltage Center and
- **High Voltage Substation (P/S) 400KV – HVC Ag. Nikolaos.**

This environmental impact assessment concerns the amendment of No. 124363/16.04.2010 Environmental Terms Approval, as applicable, regarding the diversion of the existing 400kV High Voltage Electricity Transmission Line, connecting the Ag. Nikolaos HVC with the National System 400kV and its connection directly to the Distomo HVC through a new exclusive section T.L 2B'B'/400kV double circuit length of approximately 5.198m, for the implementation of an enhanced connection shape of HVC Ag. Nicholas with the National System.

The amendments proposed in this environmental study concern the following:

- removal of part of the 400kV Electricity Transmission Line, for a length of 3,833m on its connection to the existing transmission line High Voltage 400kV Acheloos HVC – Distomo High Voltage Center of, with the removal of twelve (12) High Voltage pylons
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5,198m for its direct connection to the Distomos high voltage center, with the construction of seventeen (17) new High Voltage pylons
- execution of work – addition of equipment, within the HVC of Agios Nikolaos and highHVC Distomos
- opening of a forest road, with a total length of about 4,174m, to serve the construction and operation needs of the new section of the electricity transmission line
- reunion of the circuit Acheloos HVC - Distomo HVC

In particular, the existing and environmentally licensed Electricity Transmission Line, with a total length of 10,460m, is being carried out by the HVC Ag. Nikolaos (High Voltage P/S - within the existing facilities of MYTILINEOS S.A.) and is terminated in its connection with the existing High Voltage Transmission Line 400kV dual circuit (HVC Acheloos – HVC Distomos). This amendment proposes the abolition of the last 3,833m of the existing and environmentally licensed 400kV electricity transmission line, in its connection to the existing 400kV High Voltage Transmission Line Acheloos – HVC Distomos and the construction of a new transmission line of approximately 5,198m with its connection directly to the Distomo HVC, as shown in the following satellite imaging extract. The total length of the electricity transmission line from the Agios Nikolaos HVC to the Distomos HVC , taking into account the requested modifications will be 11,825m and will consist of 37 pillars.

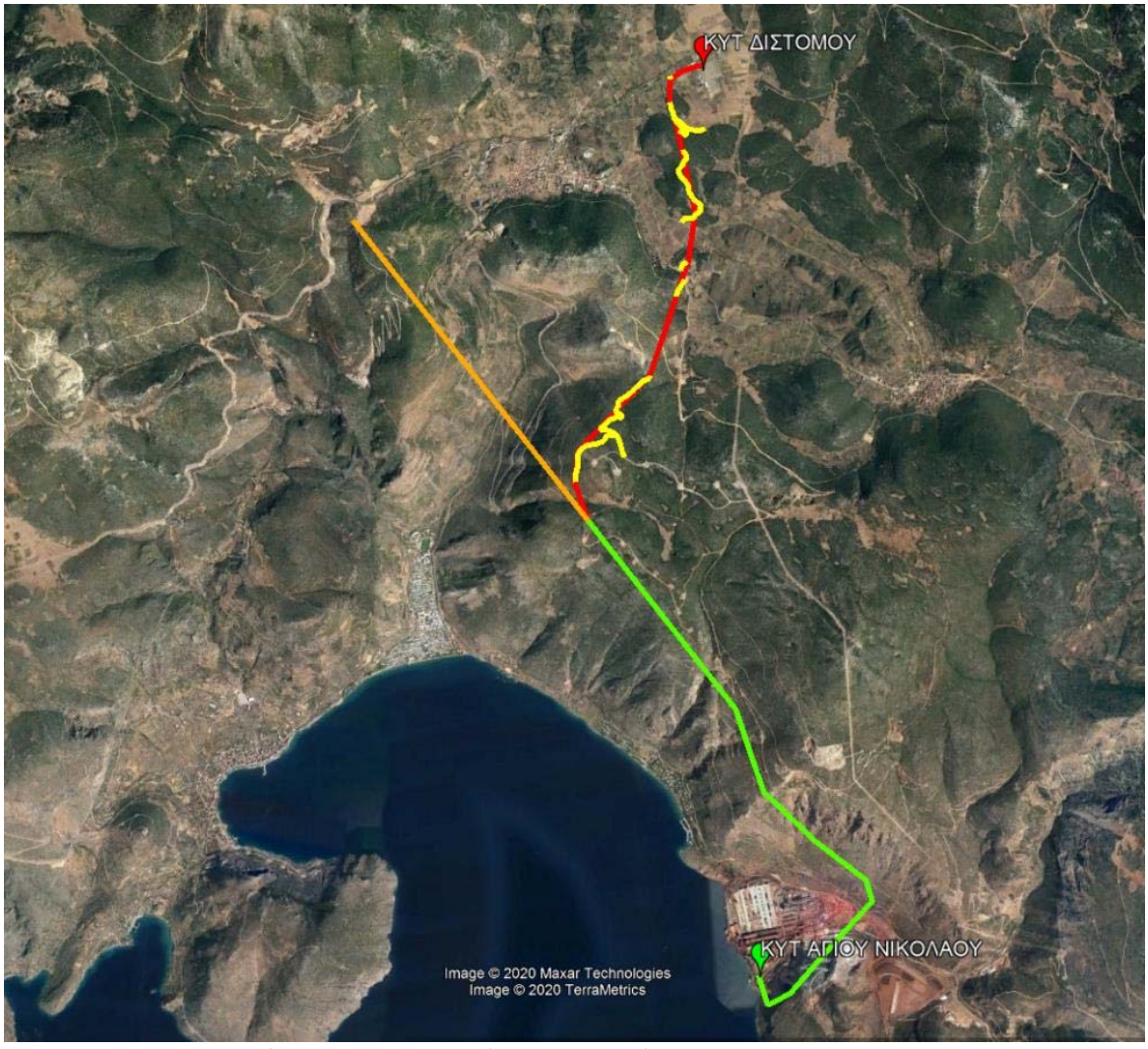


Figure 2.1: An extract of satellite imagery (google earth), showing the environmentally licensed 400kV electricity transmission line which is maintained, with an orange line, shows the environmentally licensed 400kV electricity transmission line which is being abolished and

with a red line the proposed modification of the route of that transmission line Yellow lines shows the access roads to be opened for the service of the construction and operation of the new section.

In order to meet the construction and operation needs of the new section of the electricity transmission line, a new forest road, with a total length of about 4,174m, is required. The proposed road sections are presented in the following satellite imagery extract.

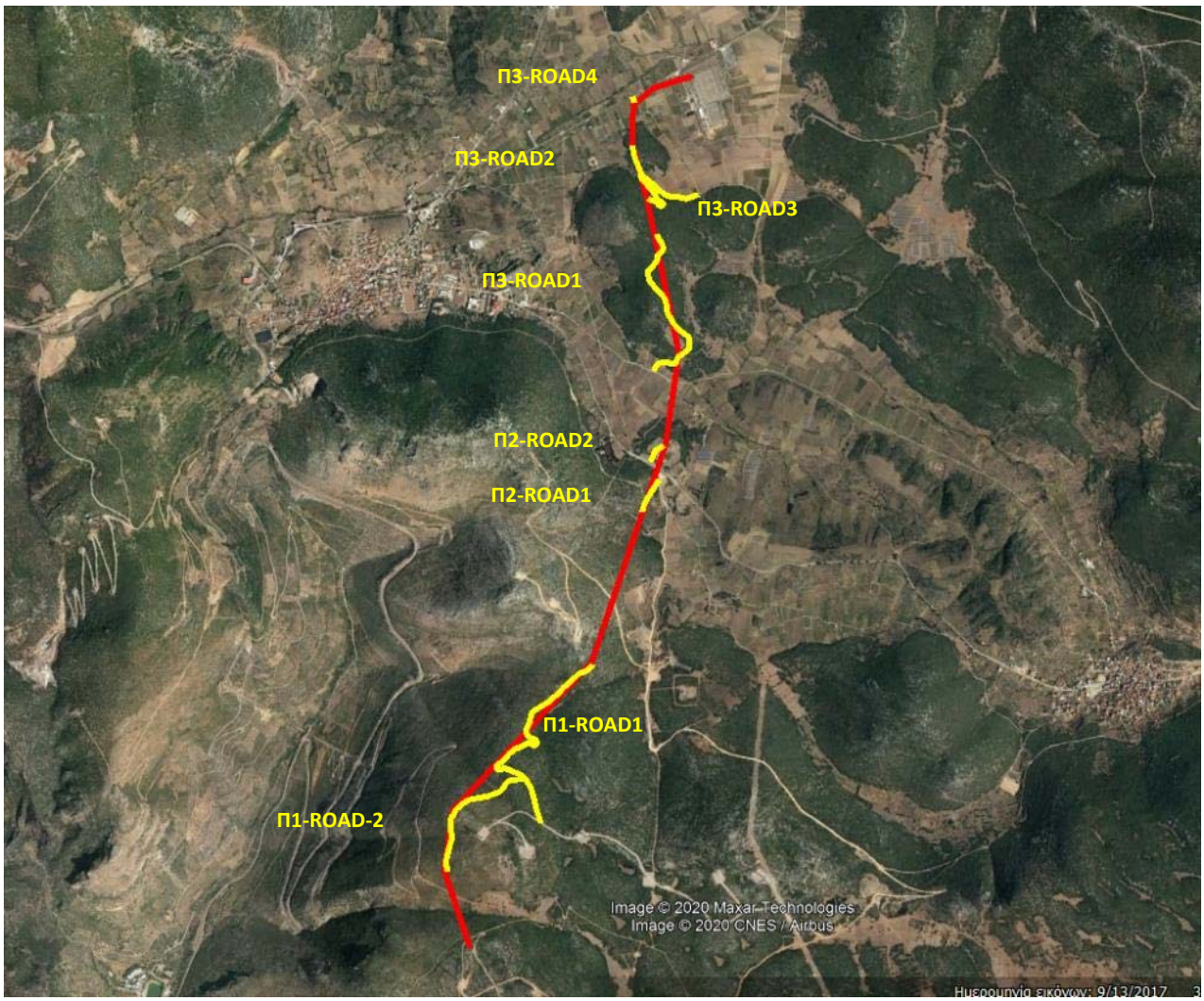


Figure 2.2: An excerpt of satellite imagery (google earth), showing the new road of the electricity transmission line with a red line, while yellow lines show the access roads that will be opened to serve the construction and operation needs of the new section.

For the connection needs of the New Power Station 826MW with the Agios Nikolaos HVC, it requires the execution of work and the addition of equipment, without the need to extend this installation site.

For the interconnection of the 400kV transmission line with the Distomo HVC , equipment will be installed within the licensed -with the No. 5119/149.08.2009 E.T.A.- and in operation Distomo HVC, without extending it to a neighbouring area, while the relevant terminal scaffolding lines are already licensed and constructed. The development of the two (2) complete gateways with the necessary equipment for the interconnection of a 400kV transmission line within the Distomo HVC refers to the already submitted Renewal file 143072/04.08.2009 HVC 400/150kV Distomo as a future possibility.

Finally, a reunion will take place of the circuit Acheloos HVC - Distomo HVC, which has been environmentally licensed and in the current situation is used for interconnection with the Agios Nikolaos HVC, applying all the relevant procedures of the Independent Transmission Operator of Power (Independent Power Transmission Operator).

The project under study belongs administratively to the Region of Central Greece, to the Regional Unit (of Viotia, to the Municipalities of Levadia and Distomos - Arachova - Antikyra (as formed pursuant to Law 3852/2010) and in particular, to the Municipal Units (M.U.) of Kyriaki and Distomo, respectively. The amendments under study fall under the Municipal Units of Distomos of the Municipality of Distomos - Arachova - Antikyra.

The project **does not** fall within a protected area of the **European Ecological Network Natura 2000** (Directive 92/43/EEC), nor in any other protected area of Law 3937/2011. Closer to the activity under study are the following protected areas of the European Natura 2000 Eco-Network:

- "Corinthian Gulf" (GR 2530007) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 200m SW of the existing transmission line and about 1,800m Southwest of the proposed modifications.
- "Parnassos National Park" (GR 2410002) which has been designated as a Special Protection Zone (Z.E.P. or S.P.A.) and is located at a distance of about 1,600m Northwest of the proposed amendments.
- "Southeastern Parnassos-Parnassos National Park-Tithoreas Forest" (GR 2450005) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 9,500m NORTHWEST of the proposed amendments.

Figure 2.3: A google earth extract showing the environmentally licensed 400kV electricity T.L which is maintained, an orange line reflects the environmentally licensed 400kV electricity transmission line which is being abolished and with a red line the proposed modification of the route of that transmission line Also, the protected lines of the European Ecological Network Area Natura 2000 (green shading) are reflected.) and the Wildlife Refuges (brown shading) of the area.

Also, in the wider area of activity are located the following Wildlife Refuges:

- "All Saints (Delphi – Desfinas – Chrysos)" (Government Gazette 343/B/1987), at a distance of about 16.0km West of the proposed amendments.
- "Latsoudi (Distomo – Styrio)" (Government Gazette 961/B/1995), at a distance of about 6.0km East of the proposed amendments.
- "Asprochoma-Psilo-Prodol-Kelari (Arachova)" (Government Gazette 1043/B/1976), at a distance of about 9.8km NW of the proposed amendments.

For the study area there are no ratified or posted forest maps.

In any case, in accordance with Chapter 6 of L. 998/1979 "Allowable interventions in forests, forest areas and public areas referred to in points (a) and (b) of paragraph 5 of Article 3 of this Law', in particular in

accordance with paragraph 5 of Article 53 'Infrastructure projects', the installation of power stations by conventional fuel and accompanying works only on public land referred to in points (a) and (b) of Article 3(5) of Law 998/1979 and in the absence thereof in forested areas and forests.

In the wider area of the project are located the following archaeological sites:

- Remnants of the wall of the acropolis of Fokikos Medeon, which is built on the hill of Agioi Theodoros, at a distance of 800m SW of the existing electricity transmission line.
- The monastery of St. Luke, which was built in the 10th century and belongs to the list of UNESCO World Heritage Sites, is about 1.500m from the existing electricity transmission line and more than 3.000m from the proposed amendment,
- The location Farygio A part (Puntas Tarsos area – White Houses of Viotia), at a distance of about 1.000m SW of the existing electricity transmission line.

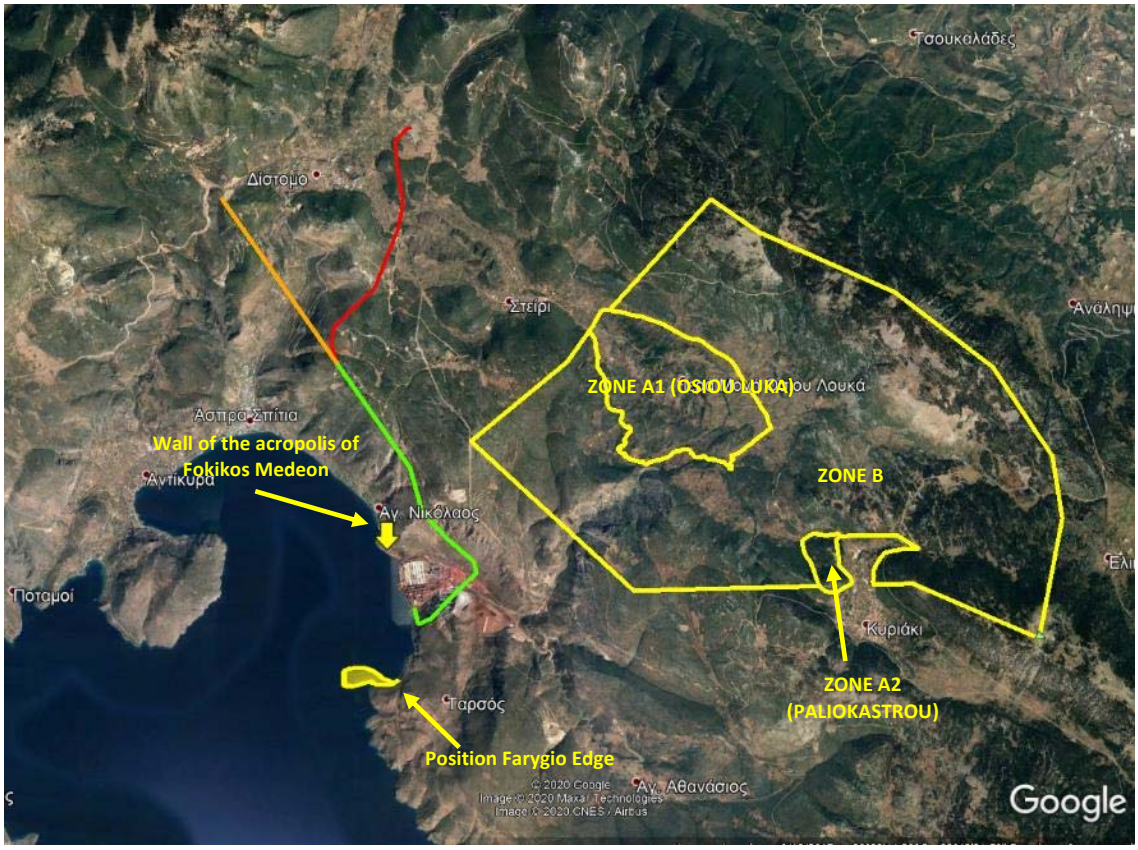


Figure 2.4: An extract of satellite imagery (google earth), showing the environmentally licensed 400kV electricity transmission line which is maintained, with an orange line, the environmentally licensed 400kV electricity transmission line which is being abolished and with a red line the proposed modification of the route of that transmission line Also, in yellow, the archaeological sites of the area are depicted in yellow.

The nearest settlements in the project under study are:

- Tarsos, located at a distance of about 1.000m South-East of the existing electricity transmission line. The settlement of Tarsos was established by No. 3149/16.11.1987 Decision of the Prefect of Viotia (Government Gazette 1187/D/14.12.1987).
- The Steiri is located at a distance of about 2.0km South-East of the new proposed electricity route of T.L. The settlement of Seri was institutionalized with the No. 3354/27.07.1986 Decision of the Prefect of Viotia (Government Gazette 926/D/06.10.1986).
- Distomo, located at a distance of about 800m West of the new proposed route of the electricity transmission line. The settlement of Distomo was established by No. 36642/20.06.1972 Decision of the Prefect of Viotia (Government Gazette 156/D/07.07.1972).

According to Decision 3124/128532 (Government Gazette 432/A.A.P./31.12.2012) "Approval of the General Urban Plan (G.U.P.) of the Municipal Unit M.U. (M.U.)of Distomo, Municipality of Distomos - Arachova - Antikyra", the proposed amendments pass through the Areas of Control and Restriction of Construction (PEPD) PEPD 1 "Zone for the protection of agricultural land and the rural landscape and the development of agricultural activities (falls the smallest part of the GM under consideration)" and PEP 2 "Zone of grassland and development of RES facilities and bauxite mines (falls for the largest part of the GM concerned)". Facilities and technical infrastructure networks are permitted in both the WFP1 and the WFP2 zone.

According to Decision 3529/149006 (Government Gazette 273/A.A.P./12.12.2016) "Approval of the General Urban Plan (G.U.P.) of the Community of Kyriaki, Municipality of Levadia", part of the project under study falls under the Areas of Control and Restriction of Construction (PEPD) PEP 1 "Agricultural Development Area" and PEPD 2 "Coastal Area".

Both in the area of development of agricultural uses and in the area of coastal area, among others, the facilities and the networks of technical infrastructure are allowed.

The purpose of this environmental impact assessment is to present the environmental impact of the construction and operation of the proposed project, including the proposed modifications.

The following table summarises the environmental impact on the natural and man-made environment of the study area, from the construction of the proposed modifications, but also the operation of the project.

In particular, color encoding is used in which the positive edge of the variance range of each parameter is shown in green, with white the neutral state and with yellow the negative edge.

Table 2.1: Summary environmental impact table of the project.

Impact Category		Impact characterisation during the construction phase of the proposed amendments	Impact rating during the project operation phase
Climate and Bioclimatic Characteristics		Neutral	Neutral
Morphological – Topological Characteristics			
•	Changes in the image of the wider region	Negative, weak, short-term, fully treatable	Negative, weak, long-term, un treatable
•	Assessment of local changes	Neutral	Neutral
•	Probability of disruption of the horizon line and the natural shapes and colors of the landscape	Neutral	Neutral
•	Compatibility of upcoming changes in relation to the European Landscape Convention, ratified by L. 3827/2010	Neutral	Neutral
Geological, Tectonic and Soil Characteristics			
•	Alteration, partitioning of the outer surface of the rocks	Negative, weak, short-term, fully treatable	Neutral
•	Possible destruction of special geological characteristics	Neutral	Neutral
•	Possible occurrence of geological phenomena of special importance	Neutral	Neutral
•	Probability of soil pollution	Negative, weak, short-term, fully treatable	Neutral
•	Soil quality degradation	Neutral	Neutral
•	Soil erosion	Negative, weak, short-term, fully treatable	Neutral
Natural Environment			
•	Effects on flora, fauna and ecosystems	Negative, weak, short-term, fully treatable	Negative, weak, short-term, fully treatable

•	Impact on areas of the national system of protected areas	Neutral	Neutral
•	Effects on forests and woodlands	Negative, weak, short-term, fully treatable	Negative, weak, short-term, fully treatable
Anthropogenic Environment			
•	Spatial Planning - Land Uses	Neutral	Neutral
•	Structure and Functions of the Anthropogenic Environment	Negative, weak, short-term, fully treatable	Neutral
•	Cultural heritage	Neutral	Neutral
Socio-economic Impact		Positive	Positive
Impact on Technical Infrastructure		Negative, weak, short-term, fully treatable	Neutral
Association with anthropogenic pressures in the environment		Neutral	Neutral
Effects on air quality		Negative, weak, short-term, fully treatable	Neutral
Effects of noise or vibration		Negative, weak, short-term, fully treatable	Neutral
Effects related to electromagnetic fields		Neutral	Neutral
Effects on water		Neutral	Neutral

3 BRIEF DESCRIPTION OF THE PROJECT

3.1 BASIC PROJECT ELEMENTS

This Environmental Impact Assessment concerns the amendment of No. 124363/16.04.2010 E.T.A., as amended and renewed by 32394/2177/13.11.2019 E.T.A.., with which the connection of Thermal Power Plant Agios Nikolaos 444.48MW with the National System (Independent Power Transmission Operator) was licensed. In particular, the projects that were environmentally licensed with the above E.T.A.. concern the following:

- **Electricity Transmission Line 400kV, 10,460m long**, connecting the Thermoelectric Station (THE) of Agios Nikolaos with the existing 400kV dual-circuit High Voltage Transmission Line, which in turn connects Acheloos High Voltage Center (HVC) with the Distomo HVC and
- **High Voltage Substation (P/S) 400kV – HVC Ag. Nikolaos.**

This environmental assessment concerns the amendment of No. 124363/16.04.2010 E.T.A., as in force, because of diversion of the existing 400kV High Voltage Electricity T.L, which connects the Agios Nikolaos HVC with the National System 400kV and its connection directly to the Distomos HVC via a new exclusive section T.L 2B'B'/400kV double circuit length of approximately 5.198 m, for the implementation of an enhanced connection shape of the HVC Ag. Nikolaos with the National System.

The amendments proposed in this environmental assessment concern the following:

- removal of part of the 400kV Electricity Transmission Line, for a length of 3.833m in its connection to the existing High Voltage T.L 400kV HVC Acheloos – HVC of Distomo, with the removal of twelve (12) High Voltage pylons
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5.198m for its direct connection to the Distomos HVC , with the construction of seventeen (17) new High Voltage pylons
- execution of work - addition of equipment, within the HVC of Agios Nikolaos and HVC of Distomos
- opening of a forest road, with a total length of about 4.174m, to serve the construction and operation needs of the new section of the electricity transmission line and
- reunification of the HVC Acheloos - HVC Distomos circuit

In particular, the existing and environmentally licensed Electricity Transmission Line, with a total length of 10,460m, is being carried out by the HVC Ag. Nikolaos and is terminated in its connection with the existing 400kV dual-circuit High Voltage Transmission Line (Acheloos HVC – Distomo HVC). This amendment

proposes the abolition of the last 3.833m of the existing and environmentally licensed T.L electricity 400kV, in its connection to the existing High Voltage T.L. 400kV Acheloos HVC– Distomo HVC and the construction of a new T.L. of about 5.198m length with its connection directly to the Distomo HVC, as shown in the following satellite imaging extract. The total length of the electricity transmission line from the Agios Nikolaos HVC to the Distomos HVC, taking into account the requested modifications will be 11.825m and will consist of 37 pillars.

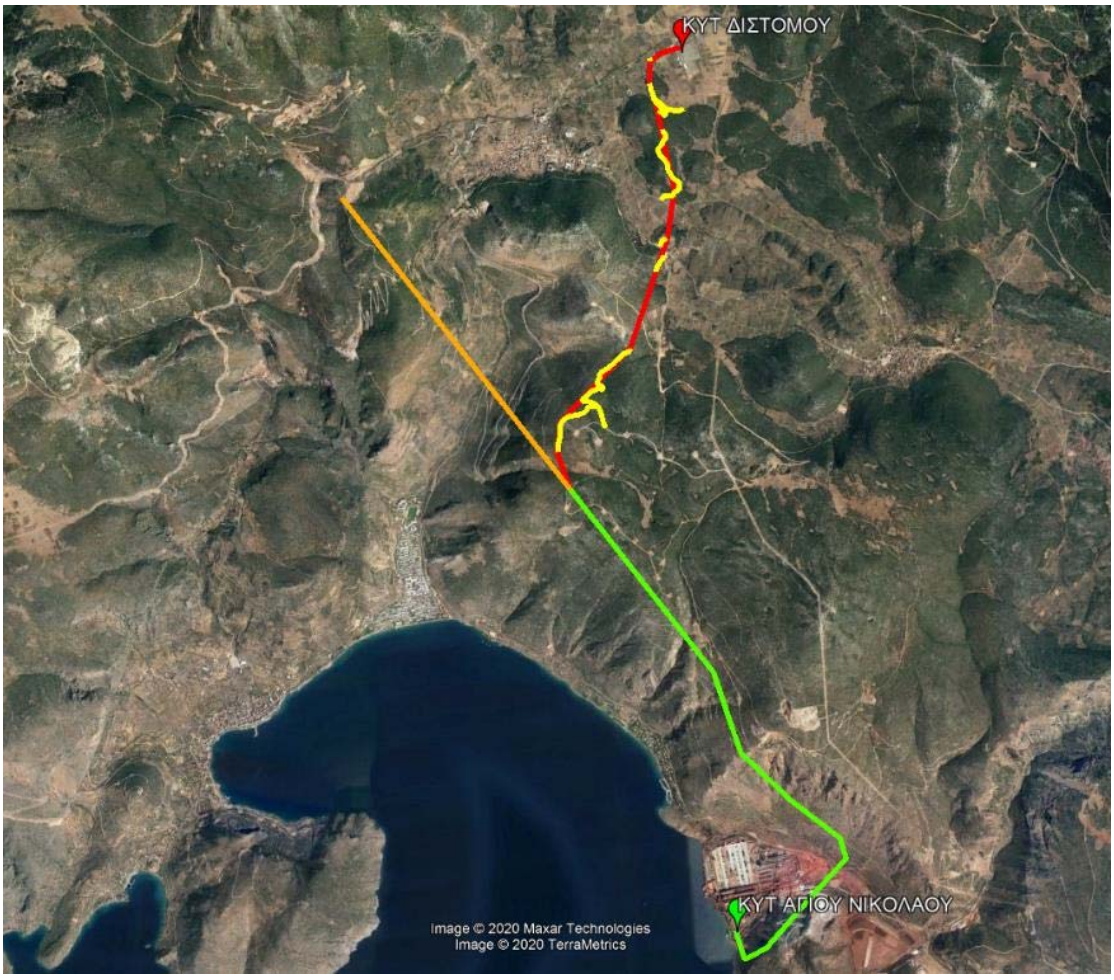


Figure 3.1: Extract of satellite imaging (google earth), showing the environmentally licensed T.L with a green line. 400kV electricity which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L is reflected, which is abolished and with a red line the proposed modification of the route of that T.L Yellow lines show the access roads that will be opened to serve the construction and operation needs of the of the new section.

In order to meet the construction and operation needs of the new section of the electricity transmission line, a new forest road, with a total length of about 4.174m, is required.

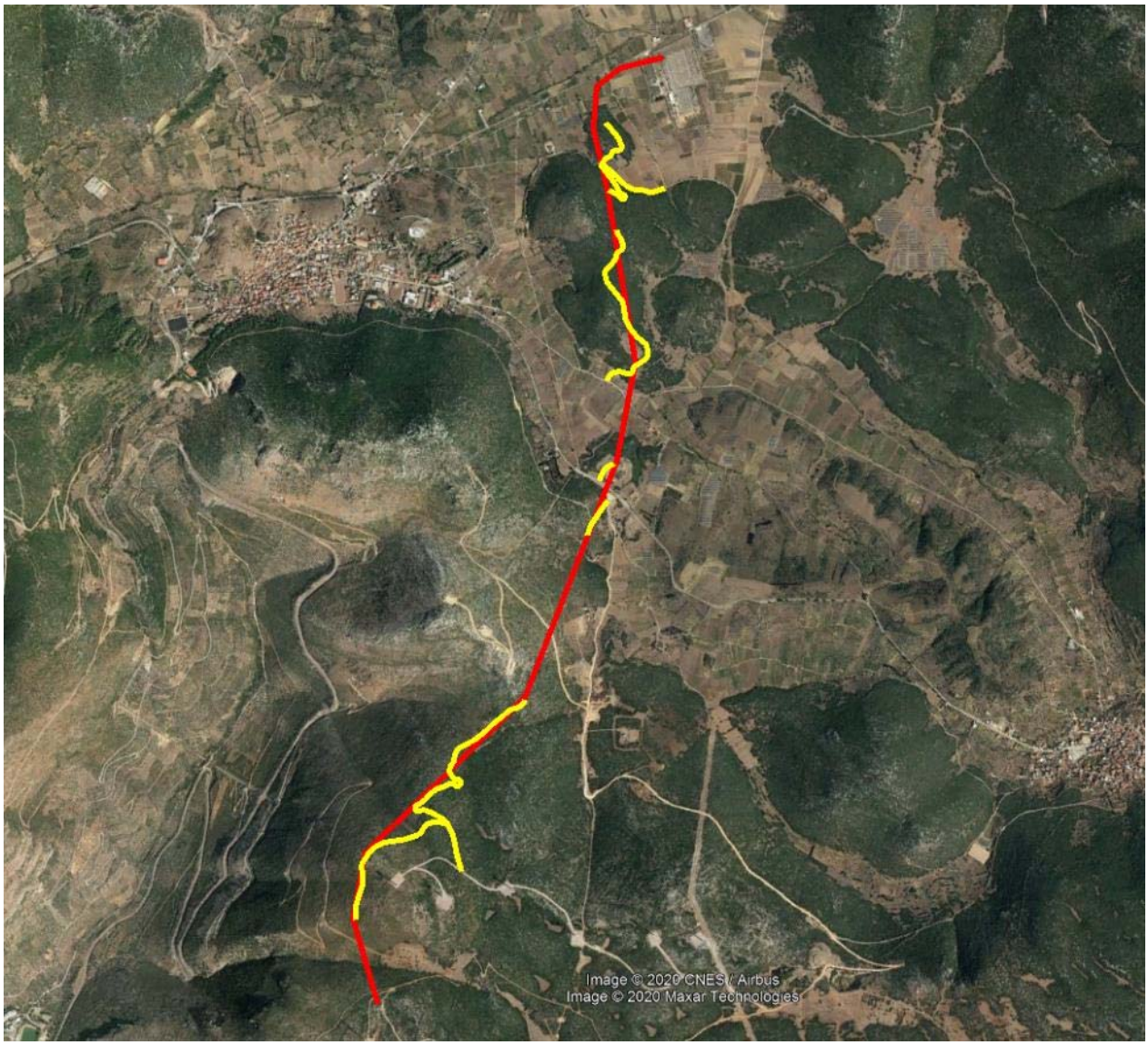


Figure 3.2: A google earth extract, showing the new electricity T.L road, while yellow lines show the access roads that will be opened to serve the construction needs of the new section.

For the connection needs of the New Power Station 826MW with the Agios Nikolaos HVC, it requires the execution of work and the addition of equipment, without the need to extend this installation site.

For the interconnection of T.L. 400kV with the Distomo HVC, equipment will be installed within the licensed -with the No. 5119/149.08.2009 E.T.A.- and in operation HVC Distomo, without extending it to a neighbouring area, while the relevant terminal scaffolding lines are already licensed and constructed. The development of the two (2) complete gateways with the necessary equipment for the 400kV T.L interconnection within the Distomos HVC refers to the already submitted Renewal File 143072/04.08.2009 HVC 400/150kV DISTOMOS as a future possibility.

Finally, a reunion will take place of the HVC of Acheloos - HVC of Distomos circuit, which has been environmentally licensed and in the current situation is used for interconnection with the HVC of Agios Nikolaos, applying all the relevant procedures of the National Electricity Transmission Operator.

3.2 KEY ELEMENTS OF THE CONSTRUCTION AND OPERATION PHASES OF THE PROJECT

3.2.1 Construction phase

- **Timeschedule of construction of the project**

According to the project plan, work on the implementation of the amendments under consideration is expected to be carried out gradually within twelve (12) months.

- **Support facilities**

The operation of the project will not require supporting facilities, such as loan and storage facilities.

With regard to the loans materials that will be required for the construction needs of the proposed project, they will be procured from legally operated quarries in the area.

From the construction of the proposed project, from the configuration of the squares for the installation of the pillars, from the opening of the new forest road, from the work on the foundation of the pillars, but also from the dismantling of the twelve (12) existing and environmentally licensed pillars, earthworks are planned.

Excavations amounting to 40.582,59m^3 are required from the construction work of the proposed projects, of which 11.676,37m^3 will be used for the necessary excavations. Therefore, the excess of the excavation products to be managed amounts to **28.906,22m^3**.

Surplus materials resulting from the construction phase, which cannot be used in re-construction operations, will be deposited in an environmentally licensed repository or in landfills or in areas where other projects are carried out, which have approved environmental conditions and in which such materials can be used either in inactive quarries or through alternative management systems.

In any case, the current legislation must be taken into account, ie the 36259/1757 / E103 / 2010 MD "Measures, conditions and programs for the alternative management of waste from excavations, constructions and demolition (E.C.D.)" (Government Gazette 1312 B' 2010), as amended and in force.

For the construction needs of the project and due to its nature, since it is developed linearly, the location of a construction site will not be required. The machinery required for the construction of the project will come daily to the area and will not require the construction of construction facilities, M.U. offices, material warehouses, workshops, machinery storage areas, concrete production complexes, etc. The storage of the machines will take place within the installation site of the HVC of Agios Nikolaos or the adjacent existing Independent Power Station of Mytilineos S.A. / Electricity & Natural Gas BS.

- **Liquid waste outflows**

Chemical toilets will be installed for the collection of urban wastewater, which will be produced by the staff working on the construction of the projects. Considering a construction site of 10 persons, a sewage supply equal to:

50 l/ person/ day x 10 persons = 500 l/ day or 0,5 m^3/day is estimated.

The wastewater collected will be made available by means of specialized tankers at the nearest, in-service Wastewater Treatment Facility. Used Waste Oils (ALEs) resulting from construction machinery and equipment will be collected and stored in a temporary wastewater storage area until their delivery to approved ALE collectors. In the construction area there is no provision for washing or maintenance of the construction machinery, as it will be done either in specialized workshops.

- **Surplus or waste materials or solid waste**

As mentioned above, excavations amounting to 40.582,59m^3 are required from the construction work of the proposed projects, of which 11.676,37m^3 will be used for the necessary excavations. Therefore, the excess of the excavation products to be managed amounts to 28.906,22m^3.

Surplus materials resulting from the construction phase, which cannot be used in re-construction operations, will be deposited in an environmentally licensed repository or in landfills or in areas where other projects are carried out, which have approved environmental conditions and in which such materials can be used either in inactive quarries or through alternative management systems.

In any case, account must be taken of the legislation in force, namely 36259/1757/E103/2010 JMD "Measures, conditions and programmes for the alternative management of waste from excavations, constructions and demolitions (E.C.D.)" (Government Gazette 1312 B' 2010), as amended and in force.

In addition, it is expected that small quantities of solid waste, of household waste type, will be produced by the personnel working on the site during the construction phase of the project. This waste will be collected and disposed of in the bins of the area's municipal waste collection system.

Other waste that may be generated during the construction phase of the projects, such as worn spare parts or materials from mobile equipment (eg tires, hoses or metal pipes, etc.), will be delivered - returned to suppliers

Finally, waste such as: mineral oils, petroleum lubricants, oil tankers, spare parts for machinery, batteries - accumulators of cars, trucks, car consumables, trucks, such as pads, oil filters, air filters, etc., will be collected in suitable watertight containers and removed by authorised management companies.

- **Emissions of pollutants into the air**

During the construction phase of the project, small-scale emissions of gaseous pollutants are expected to occur in the immediate area, which will mainly include emissions of particulate matter (dust) during earthworks and exhaust emissions from the operation of excavating and construction machinery, etc.

- **Noise and vibration emissions**

Noise emissions are expected during the construction of the project mainly due to the operation of excavating and construction machinery, which will be relatively short in intensity and duration.

3.2.2 Operation phase

During the operation of the project under study, regular inspection and maintenance of the computer equipment and cleaning of the project area, as well as maintenance work, will be carried out if required. During the operation of the projects, control and supervision will be carried out by remote control, remote control and remote control or on the spot.

Periodic checks will be carried out in the area of the overhead transmission line, consisting of cleaning the insulators by aerial or ground means in the control of the pillars.

Ground access for the maintenance of the Air Transport Line (insulator washing, control of pylons) will be by aerial or even ground means where possible.

3.3 REQUIRED QUANTITIES OF RAW MATERIALS, WATER AND ENERGY, EXPECTED QUANTITIES OF WASTE

During the operational phase of the project under study, small-scale consumption of water and electricity is required for the operation of the Agios Nikolaos HVC . The nature of the project under study does not require input of materials, nor does it require significant energy and water consumption.

Due to the nature of the project under study, this is not related to the outflow of significant amounts of wastewater. Any liquid waste resulting from the maintenance of the computer equipment will be collected and delivered to companies authorized to manage it.

Due to the nature of the project under study, this is not related to the outflow of significant quantities of solid waste. During the operation of the projects, solid waste will periodically be generated from the maintenance work of the project's equipment. Such waste, if hazardous, will be delivered to authorized companies for proper disposal. If they are not hazardous, they will either be recycled or used (e.g. metal materials) or if they fall into the category of municipal waste they will be disposed of in landfills.

In the operational phase of the projects under study, no significant emissions of gaseous pollutants into the atmosphere are expected.

Noise during the operational phase of the project is limited to the appearance of the Corona effect on the surface of the transmission lines when the intensity of the electric field on the surface of the conductor exceeds the dielectric strength of the air.

4 OBJECTIVE AND PURPOSE OF IMPLEMENTATION OF THE PROJECT

4.1 OBJECTIVE AND PURPOSE

4.1.1 Purpose and expediency of the project

This Environmental Impact Assessment is submitted for the amending of No. 124363/16.04.2010 E.T.A., as amended and renewed by No. 32394/2177/13.11.2019 E.T.A. and refers to the diversion of the existing 400kV High Voltage Electricity T.L., which connects the Agios Nikolaos HVC with the National System 400kV and its connection directly to the Distomo HVC via a new exclusive section T.L 2B'B'/400kV double circuit length of approximately 5.198m, for the implementation of an enhanced connection shape of the HVC Ag. Nikolaos with the National System.

The implementation of the above reinforced connection scheme will allow with the connection of the New Power Station 826MW, the safe absorption of its full generated power by the National System and will give greater reliability and flexibility to the connection of the HVC Ag. Nikolaos with the System (according to the Terms of Connection of the new Station – No./m.: Independent Power Transmission Operator /DSSAS 20804/8.10.2019), as the connection is made to the trunk of the National System and in particular to a key HVC with eight (8) Connections to other Substations 400kV (2x HVC Trikala, 2x HVC Larymnas, 2x HVC Acheloos, HVC Heron, HVC Thisvi) and four (4) with other Substations 150kV (2x P/S Aluminium, H/S HERON, P/S Asprochomatos), with direct T.L. without being affected by restrictions on the availability of T.L HVC Distomo - HVC Acheloos. In parallel with this modification, significant capacity is released to T.L HVC Distomo - HVC Acheloos, which can be allocated to increase the penetration of Renewable Sources into the Greek Electricity System, taking into account the expansion projects of 400kV, ADMEE, in the Peloponnese. The proposed connection will, finally, facilitate the exploitation of the capacity of the Combined Cycle Unit Ag. Nikolaos to contribute to Voltage Control and the stabilization of the trend profile in the National Electricity System.

4.1.2 Developmental, environmental, social and other criteria that support the continuation of the project

All of the proposed projects are fully compatible with the country's energy policy and the fight against climate change as it is linked to the gradual withdrawal of lignite plants.

The following figure shows the evolution of the Total Net Electricity Demand of the System (pumping load has been removed) since 2000, in accordance with the 10-year Development Program of the Independent Power Transmission Operator. It is noted that the Total Net Demand also includes that served directly at the Distribution level from dispersed production. Between 2000 and 2008 there was a continuous increase in total net demand. Then, in the wake of the economic crisis, there is a continuous decline, and after 2013 there has been a stabilization of overall net demand.

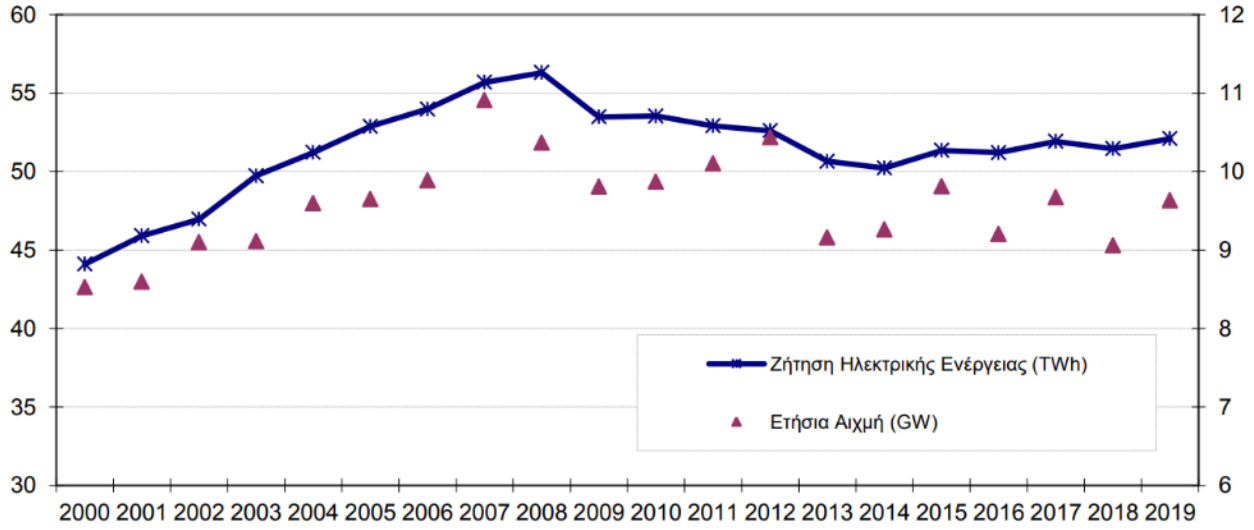


Figure 4.1: Evolution of total net electricity demand over the period 2000 to 2019.

The average annual growth rate of total net demand in the decade 2000 to 2010 was 2.17%, a significant decrease over past decades. In the period 2000 to 2007 the average annual growth rate of total net electricity demand was 3.39%. In 2008, at the beginning of the economic crisis, total net demand (excluding pumping load) in the System reached 56.3TWh and is a historic peak, an increase of 1.11% over 2007. 2009 was marked by a significant decrease in total net demand in the System, by 5.01% compared to 2008, due to a marked decrease in industrial loads of 20.19% compared to 2008, while consumption at distribution level decreased by 3.63%. After 2013 the total net demand for electricity in the EESM shows a stabilization of around 51TWh. In 2019 the total net demand for electricity in the ESME amounted to 52,101GWh, an increase of 1.24% compared to 2018.

The Independent Power Transmission Operator 's forecasts for annual total net electricity demand for the period 2020 to 2030 are summarized graphically in the following figure. The Independent Power Transmission Operator 's forecasts for annual total net electricity demand for the period 2020 to 2030 are summarized graphically in the following figure.

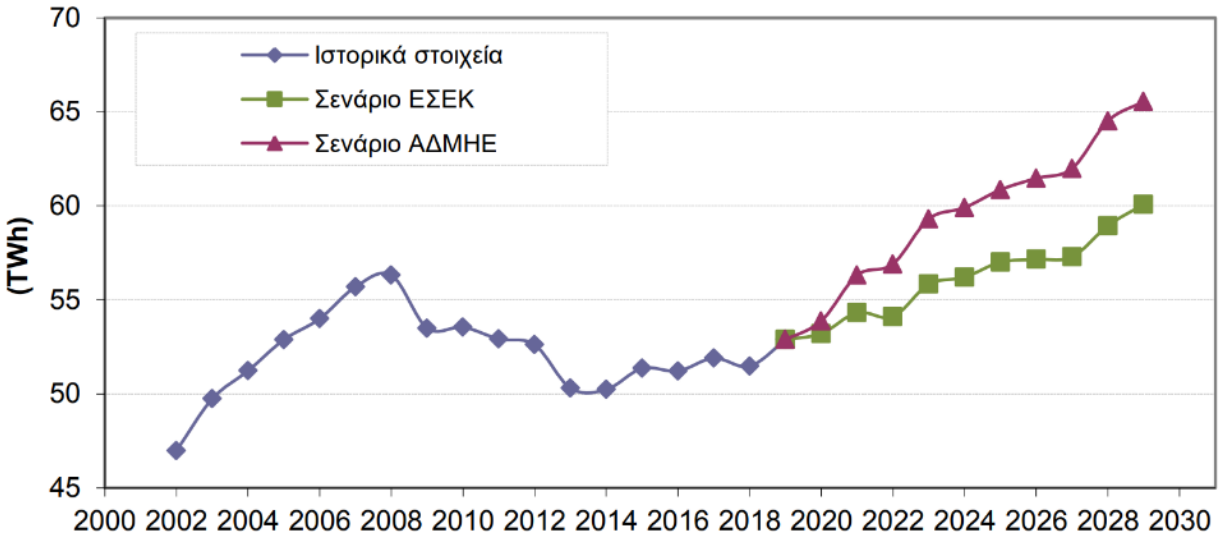


Figure 4.2: Forecasts of the evolution of total net electricity demand in the period 2020 - 2030. Forecasts of the evolution of total net electricity demand in the period 2020 - 2030.

It should be noted that the forecasts shown in the graph above include the demand of the islands to be interconnected from the first year of full operation of their interconnection. In particular, from the year 2021 includes the demand of Crete, which will be served through the association ER, while from the year 2023 includes all the demand of Crete (with the completion of the association MS). After 2025, the estimated demand of the Western Cyclades (Phase IV of the Interconnection of the Cyclades) is included, while from 2028 and 2029 the estimated demand of the Dodecanese and The North Aegean Islands under interconnection is included, respectively.

The above data show that demand for electricity in the coming years is on the rise. In this context, the operation of the project under study contributes to the strengthening of the safety of the Electricity Transmission System.

4.1.3 Benefits identified at local, regional or national level

The expected benefits of continuing to operate the project under study at local, regional or national level are:

- ✓ Meeting the country's electricity needs and ensuring the use of different sources
- ✓ Promoting the country's environmentally friendly policy on the use of cleaner primary energy sources, limiting greenhouse gas emissions
- ✓ Economic development at both local and national level

- ✓ Strengthening local employment and developing the local economy

4.2 HISTORICAL DEVELOPMENT OF THE PROJECT

The existing and environmentally licensed project concerns the connection of Thermal Power Plant Agios Nikolaos with the National System (Independent Power Transmission Operator), through a high voltage substation and a 400kV High Voltage Electricity Transmission Line.

For this project, No. 124363/16.04.2010 Environmental Terms Approval (E.T.A.) of the Special Environment Agency (S.E.A.) of the Ministry of Environment, whose validity was until 16.04.2020.

Following the issuance of the above-mentioned ETA of the project, including the Intervention Approval, No D.Y./23.04.2010 installation protocol from the Livadia Forest Authority. Within the year 2010 the project under study was constructed.

After the construction of the project, a final restoration study of the disturbed sections was carried out, due to the opening of roads for the construction needs of the project. With The No. 1830/160794/27.09.2013 document of the Directorate of Forests of Viotia the final restoration study has been approved and then implemented. According to No. 2009/107631/16.06.2015 document of the Livadia Forest Authority, following an autopsy carried out in the project area, was found to have completed the restoration work according to the approved restoration study.

A new Environmental Study was carried out in 2019, which ended in 32394/2177/13.11.2019 Environmental Terms Approval (ETA) of the Ministry of Environment, with effect until 16.04.2030. This amendment concerned the displacement (change of route) of part of the existing 400kV electricity T.L (HVC Agios Nikolaos), for a length of about 1.225m and its connection to the new position of the left circuit of the existing 400kV Transmission Line (HVC Acheloos – HVC Distomo).

4.3 FINANCIAL ELEMENTS OF THE PROJECT

The project under study is a private project and its financial data are not the subject of this study.

4.4 RELATIONSHIP OF THE PROJECT WITH OTHER PROJECTS

Within the study area and close to the projects under study, the following projects are identified:

i. The Independent Power Station Combined Cycle of MYTILINEOS S.A. / BS Electricity & Natural Gas (formerly PROTERGIA S.A.), with a rated capacity of 444.48MW with natural gas fuel.

ii. The construction and operation of a new Power Station of MYTILINEOS S.A. / BS Energy & Natural Gas, with a rated power of 826MW, with natural gas fuel is under way.

The 400kV electricity T.L. under study will connect the energy generated by the above power stations, through the HVC Ag. Nikolaos, with the National System (Independent Power Transmission Operator).

Also, in the wider area there are a number of high and high voltage transmission lines, as well as substations and high voltage centers, as presented in the Extract of the Charter of the Ten-Year Development Programme of the National Electricity Transmission System 2021-2030.

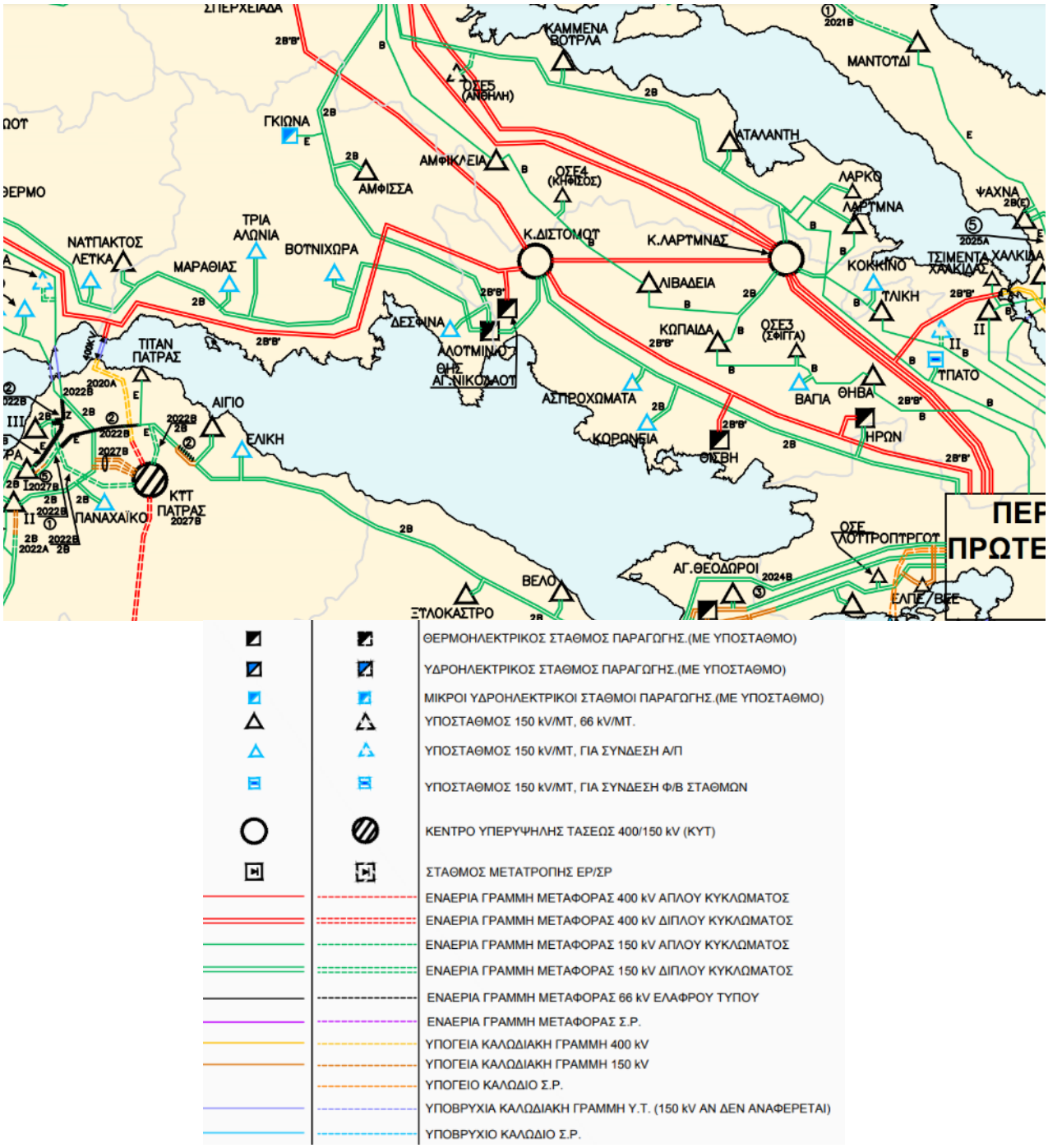


Figure 4.3: Extract Map of the Ten-Year Development Programme (ICP) of the National Electricity Transmission System (ESME) from 2021 to 2030.

5 COMPATIBILITY OF THE PROJECT WITH INSTITUTED SPATIAL AND URBAN PLANNING COMMITMENTS OF THE AREA

5.1 POSITION OF THE PROJECT IN TERMS OF THE NATURAL AND HUMAN-ENVIRONMENT OF THE AREA

5.1.1 Institutional boundaries of settlements and approved urban plans

The project under study belongs administratively to the Region of Central Greece, to the Regional Unit of Viotia, to the Municipalities of Levadia and Distomo - Arachova - Antikyra (as formed pursuant to Law 3852/2010) and in particular, to the Municipal Units (M.U.) of Kyriaki and Distomo, respectively. Most of the existing T.L. and the entire proposed amendment falls under the M.U. Distomo, while the smallest part of the existing T.L., near the HVC of Agios Nikolaos, falls under the M.U. Of Kyriaki.

General Urban Plan of M.U. Distomos of the Municipality of Distomos - Arachova - Antikyra

The Decision 3124/128532 (Government Gazette 432/A.A.P./31.12.2012) "Approval of a General Urban Plan of Municipal Unity (M.U.) of Distomo, Municipality of Distomo - Arachova - Antikyra", concerns the entire area of the M.U. , through which the electricity transmission line under study passes.

The following is an excerpt of the project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. of M.U. Distomos, indicating the electricity T.L under consideration.

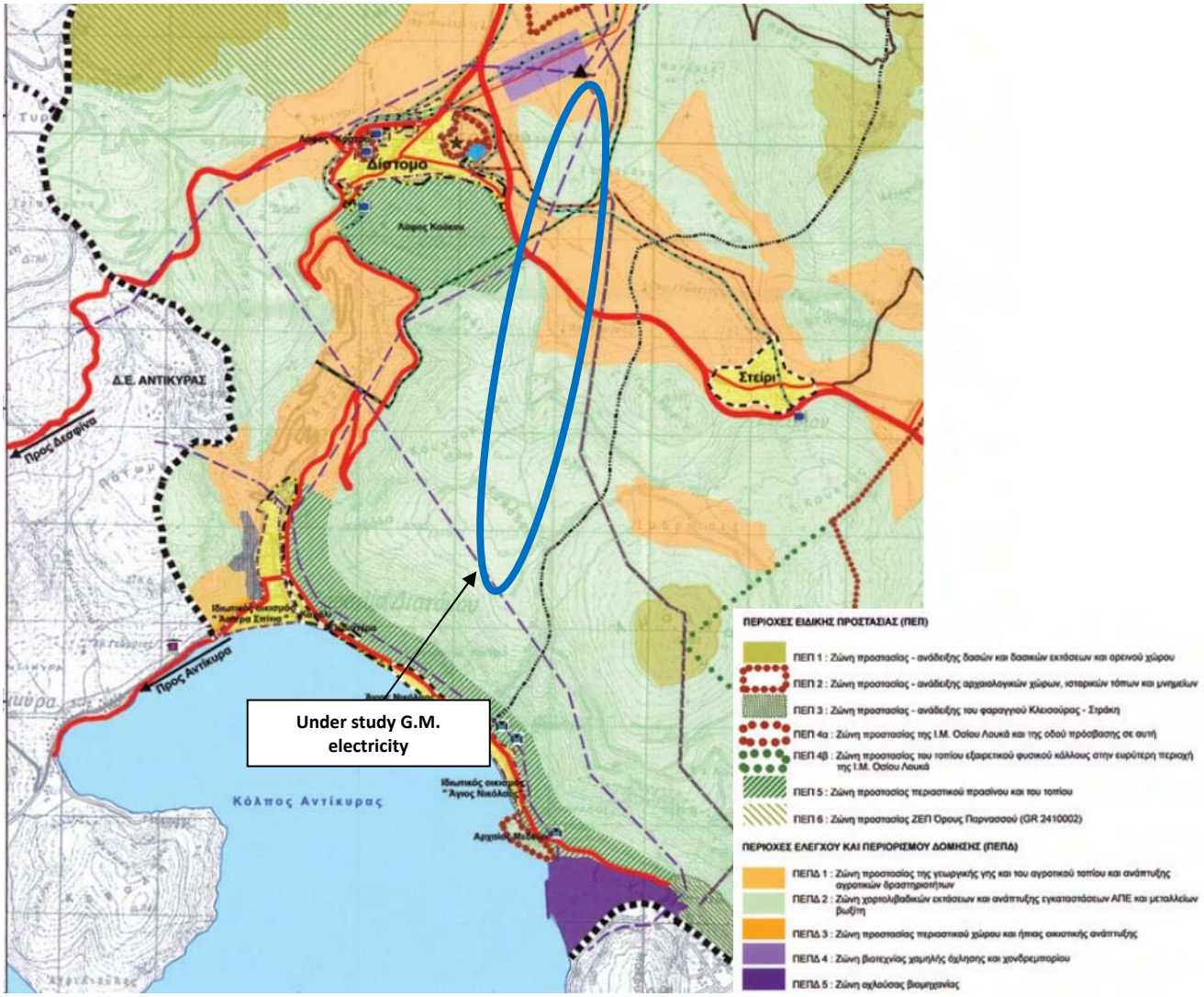


Figure 5.1: An excerpt of a project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. of M.U. Distomos, with a purple dotted line, depicts the existing electricity T.L, while the blue lack indicates the route of the proposed amendment.

According to the organization of land uses and environmental protection of the M.U. , the proposed amendments pass mainly through the Areas of Control and Restriction of Construction (PEPD):

- PEPD 1: Zone for the protection of agricultural land and the rural landscape and the development of agricultural activities (the smallest part of the GM under consideration falls)
- PEPD 2: Zone of grassland areas and development of RES facilities and bauxite mines (falls under the largest part of the GM in question)

Facilities and technical infrastructure networks are permitted in both the PEPD1 and the PEPD2 zone.

General Urban Plan of M.U. Kyrakiou Municipality of Levadia

The Decision 3529/149006 (Government Gazette 273/A.A.P./12.12.2016) "Approval of the General Urban Plan (G.U.P.) of the Community of Kyriaki, Municipality of Levadia", concerns the entire area of the M.U., through which the existing electricity transmission line passes, in the area near Agios Nikolaos HVC.

The following is an excerpt of the project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. of the M.U. Kyriaki, which indicates the area through which the electricity T.L. under study passes.

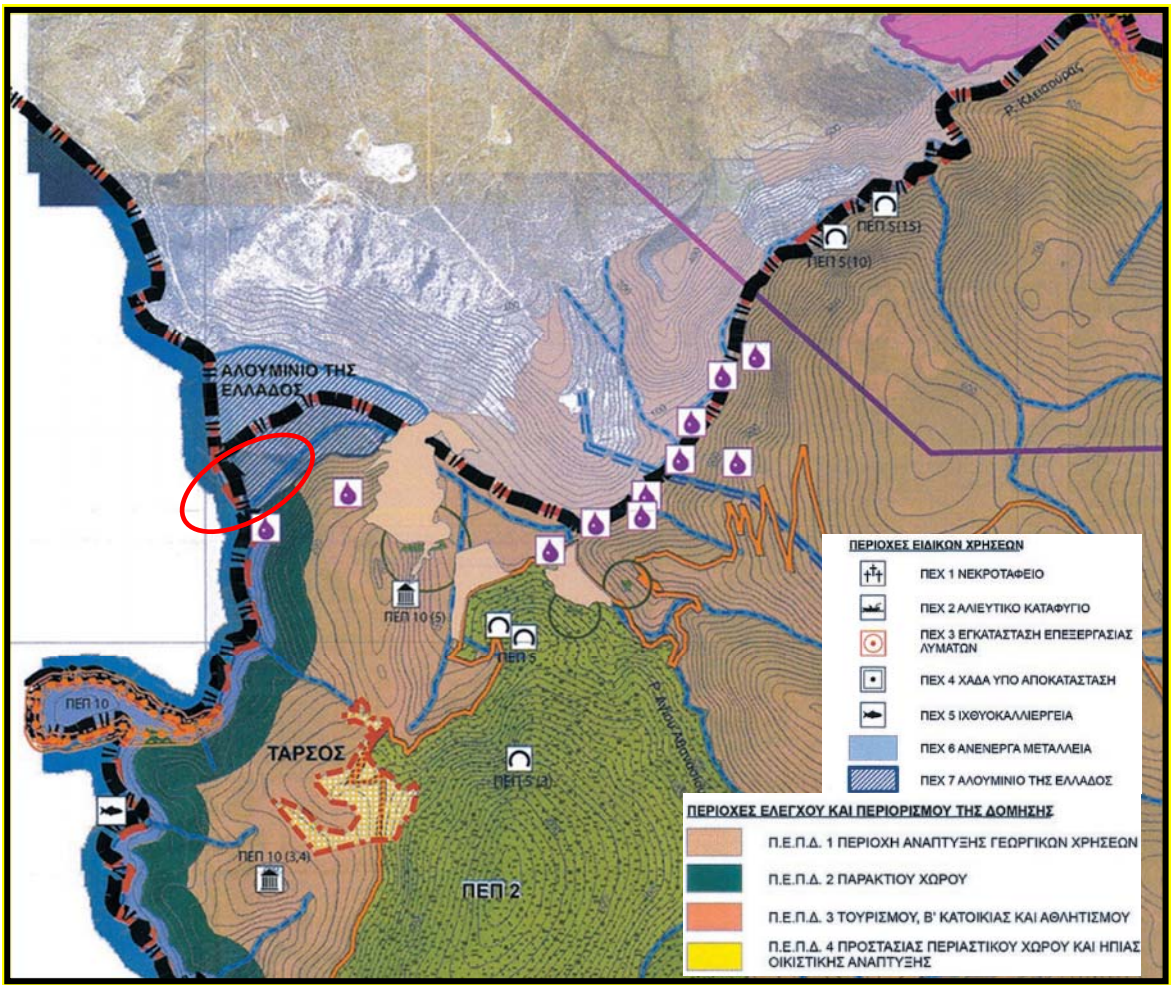


Figure 5.2: Excerpt of a project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. . of the M.U. Kyriaki, where the red shortage includes part of the existing T.L. electricity.

According to the organisation of land uses and environmental protection of the M.U. , part of the electricity under study passes through the Areas of Control and Restriction of Construction (PEPD):

PEPD 1: Area for the development of agricultural uses

PEPD 2: Coastal area

Small part of the electricity T.L., as well as the substation (P/S) of High Voltage 400kV – HVC Ag. Nikolaos pass through the Special Uses Area (CET) 7: Aluminium of Greece.

Facilities and technical infrastructure networks are permitted in both the agricultural development area and the coastal area.

The nearest settlements in the project under study are:

- Tarsos, located at a distance of about 1.000m South-East of the existing electricity transmission line. The settlement of Tarsos was established by No. 3149/16.11.1987 Decision of the Prefect of Viotia (Government Gazette 1187/D/14.12.1987).
- Steiri is located at a distance of about 2.0km South-East of the new proposed electricity route of T.L The settlement of Seri was institutionalized with the No. 3354/27.07.1986 Decision of the Prefect of Viotia (Government Gazette 926/D/06.10.1986).
- Distomo, located at a distance of about 800m West of the new proposed route of the electricity transmission line. The settlement of Distomo was established by No. 36642/20.06.1972 Decision of the Prefect of Viotia (Government Gazette 156/D/07.07.1972).

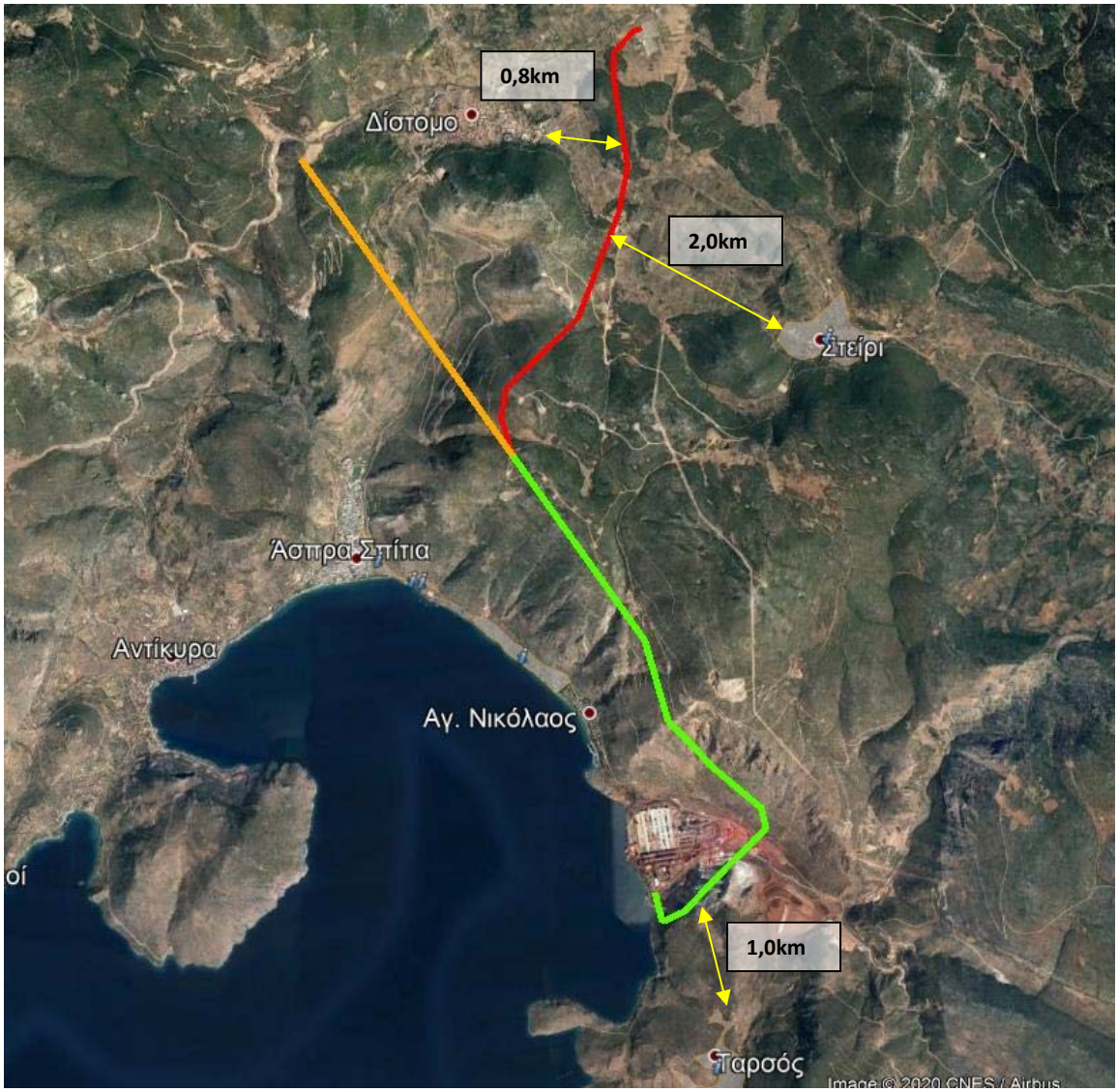


Figure 5.3: A google earth extract showing the project under study, as well as the nearest demarcated settlements.

Based on the above, both the existing project and the proposed modifications are fully consistent and compatible with the institutionalized settlement boundaries and the approved urban plans.

5.1.2 Boundaries of areas of the National System of Protected Areas of Law 3937/2011

Regarding the areas of the National System of Protected Areas, according to no. 50743/2017 JMC (Government Gazette 4432B / 15.12.2017) the national list of the areas of the European Ecological Network Area Natura 2000 was revised.

The nearest protected areas of the European Natura 2000 Ecological Network area (Directive 92/43/EEC) to the project under study are the following:

- "Corinthian Gulf" (GR 2530007) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 200m SW of the existing T.L and about 1,800m SW of the proposed amendments.
- "Parnassos National Park" (GR 2410002) which has been designated as a Special Protection Zone (Z.E.P. or S.P.A.) and is located at a distance of about 1,600m NW of the proposed amendments.
- "Southeastern Parnassos-Parnassos National Park-Tithoreas Forest" (GR 2450005) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 9,500m NW of the proposed amendments.

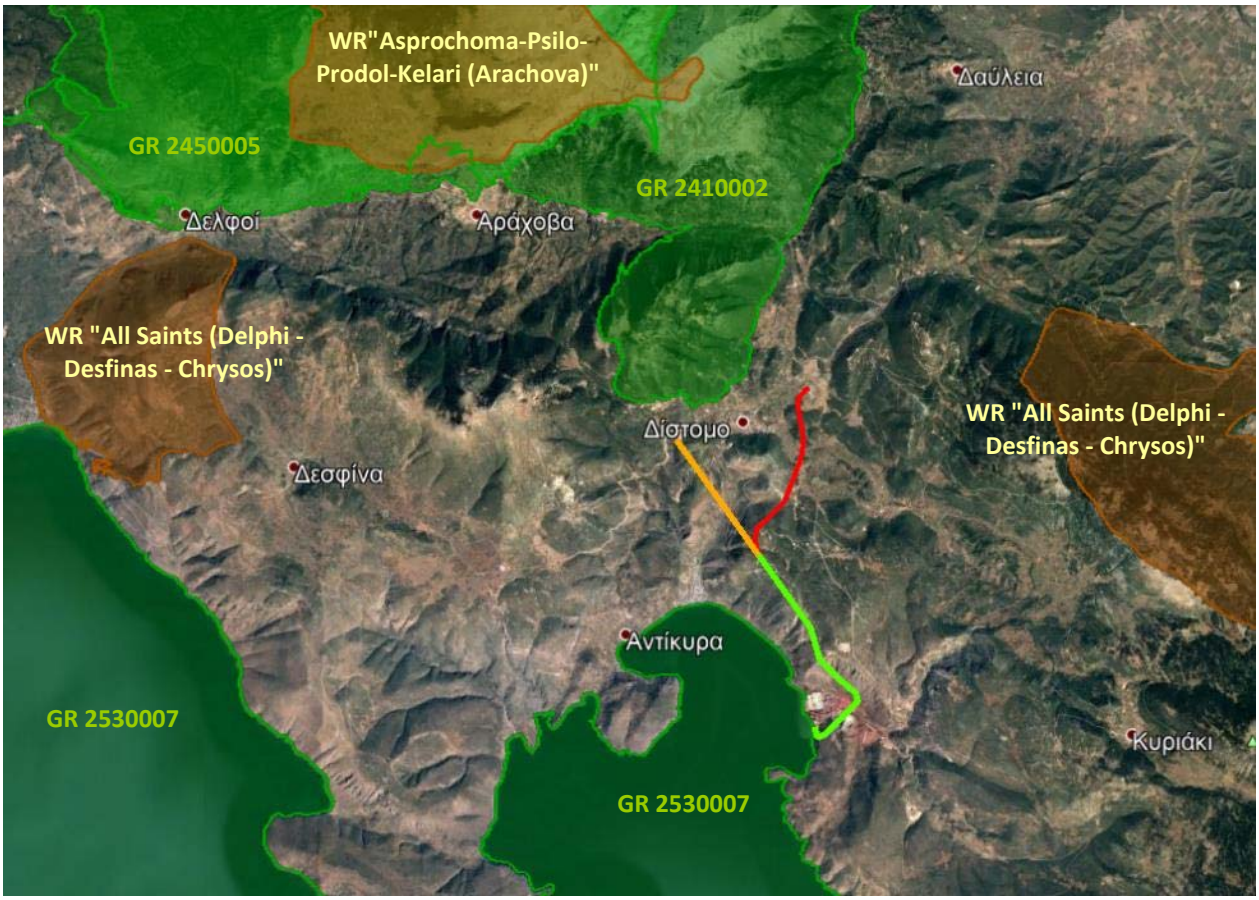


Figure 5.4: Extract of satellite imaging (google earth), showing the environmentally licensed T.L with a green line. 400kV electricity which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L which is abolished and with a red line the proposed modification of the route of that T.L Also reflects the protected lines of the European Ecological Network Area Natura 2000 (green shading) and the Wildlife Refuges Life (brown shading) of the area.

Also, in the wider area of activity are located the following Wildlife Refuges:

- "All Saints (Delphi – Desfinas – Chrysos)" (Government Gazette 343/B/1987), at a distance of about 16,0km West of the proposed amendments.
- "Latsoudi (Distomo – Styrio)" (Government Gazette 961/B/1995), at a distance of about 6.0km East of the proposed amendments.
- "Asprochoma-Psilo-Prodol-Kelari (Arachova)" (Government Gazette 1043/B/1976), at a distance of about 9,8km NW of the proposed amendments.

In any case, both the entire licensed project and the proposed amendments do not fall within areas of the National Protected Areas System.

5.1.3 Forests, Forest and Reforestable areas

For the study area there are no ratified or posted forest maps.

In any case, in accordance with Chapter 6 of L. 998/1979 "Allowable interventions in forests, forest areas and public areas referred to in points (a) and (b) of paragraph 5 of Article 3 of this Law', in particular in accordance with paragraph 5 of Article 53 'Infrastructure projects', **the installation of power stations by conventional fuel and accompanying works only on public** land referred to in points (a) and (b) of Article 3(5) of Law 998/1979 and in the absence thereof in forested areas and forests.

Also, in accordance with Article 46 'Extraordinary nature of permissible interference with resused land', in public and private forests and woodlands declared resusperable, **no intervention provided for in the provisions** of Chapter 6 of Law 998/1979 or by any other provision, **with the exception of those referred to in Article 48(1) is permitted, paragraphs 1**, 3, 4 and 5 of Article 53 (the installation of conventional fuel power stations and their accompanying works), paragraph 1 of Article 54, paragraph 1 of Article 55 and paragraph 5 of Article 57 of Chapter 6, and the provisions of Article 16 of Law 998/1979.

Also, in accordance with Article 45(5) of Law 998/1979, for national and regional road, irrigation and water supply projects as well as networks for the transmission and distribution of **natural gas, petroleum products and electricity in forests, forest areas and public areas referred to in points (a) and (b) of Article 3(5)** of Law 998/1979, in the case of no definitive technical studies have been carried out, the competent forestry authority shall deliver an opinion, with a view to the issue of GNP, on the dossier of the Environmental Impact Assessment (EE) taking into account the limitations and conditions laid down by

forestry legislation for the implementation of those projects on those areas. At the completion of the final studies of the projects, the project body is obliged to submit to the competent forestry authority the relevant dossier for the adoption of a designation act.

In any case, after the finalization of the project design, a request for the issuance of a designation act will be submitted to the competent forest office. However, based on the above, the project under study is compatible with the provisions of forest legislation.

5.1.4 Social infrastructure facilities, public utility

Within the study area and close to the projects under study, the following social infrastructure, utilities, etc. are located:

iii. The Independent Power Station (ASI/IR) Combined Cycle of MYTILINEOS S.A. / BS Electricity & Natural Gas (formerly PROTERGIA S.A.), with a rated capacity of 444,48MW with natural gas fuel.

iv. The construction and operation of a new Power Station (SI) of MYTILINEOS S.A. / BS Energy & Natural Gas, with a rated power of 826MW, with natural gas fuel is under way.

The 400kV electricity transmission line under consideration will connect the above power stations, via Ag. Nikolaos HVC with Distomo HVC.

Also, in the wider area there are a number of high and highvoltage transmission lines, as well as substations and high voltage centers, as presented in the Extract of the Charter of the Ten-Year Development Programme (IAS) of the National Electricity Transmission System 2021-2030.

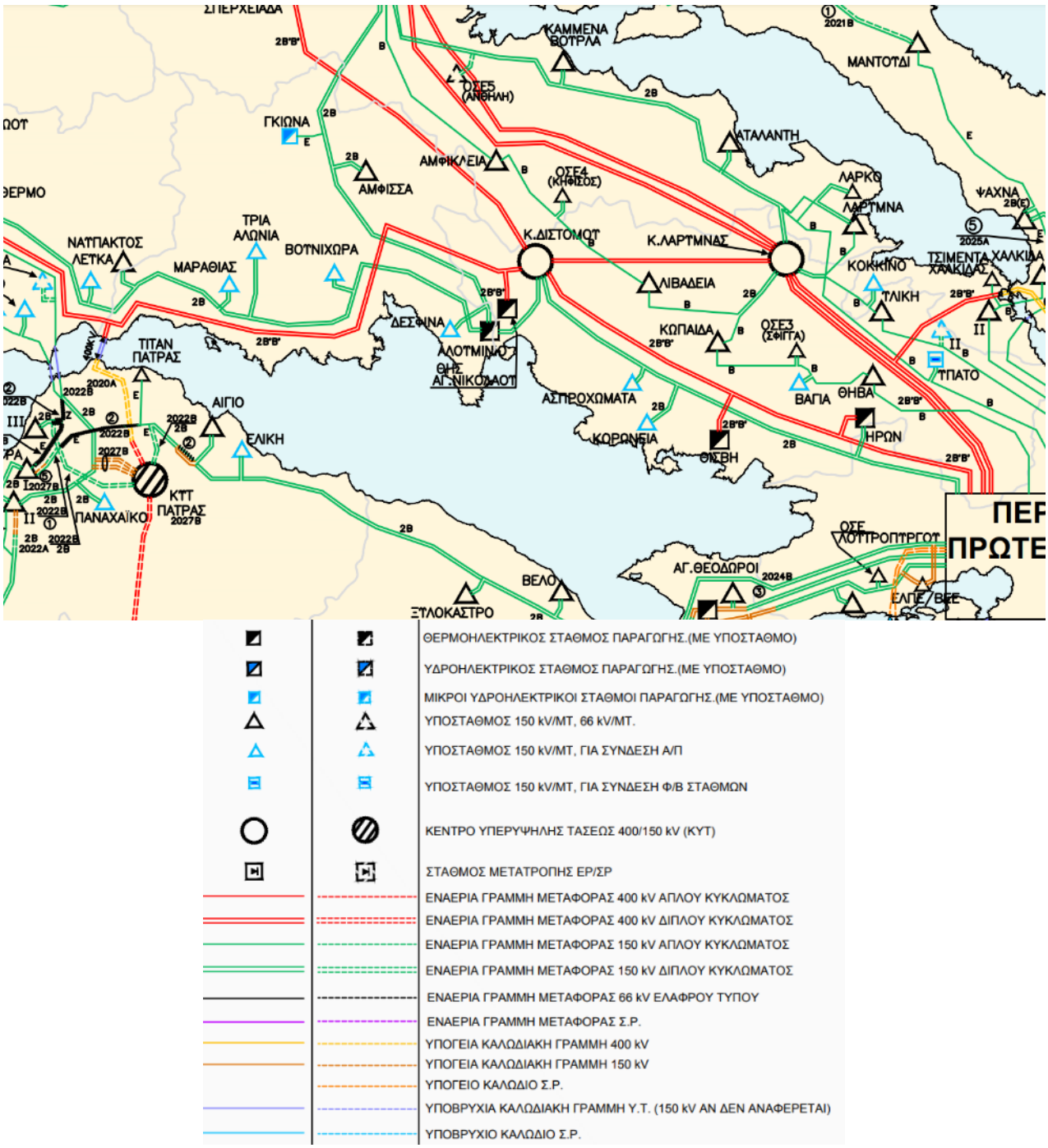


Figure 5.5: Extract Map of the Ten-Year Development Programme (ICP) of the National Electricity Transmission System (ESME) from 2021 to 2030.

Finally, it is stated that there is no question of the compatibility of the environmentally licensed project and the proposed amendments with the social infrastructure facilities of general interest in the region.

5.1.5 Places of archaeological interest

An important archaeological site of the area is the remains of the wall of the acropolis of Fokikos Medeon, which is built on the hill of Agioi Theodoros, at a distance of 800m SW of the existing electricity transmission line.

The low walled hill of Agioi Theodoros, on the east coast of the gulf of Antikyra, has been identified by scholars with the ancient city of Fokikos Medeon. At the time Pausanias visited it, the city was deserted. The citadel is surrounded by strong fortification from the east, north and west sides of the hill, while the steep southern sides of the hill offer natural fortification on the side of the sea. The walls, dating back to the 4th century BC, are constructed according to the irregular isostructure system of wallwork, without binders in the joints with large stonework.

The first excavations were carried out in 1907 by the archaeologist Georgios Sotiriadis, while in the 1960s a part of an extensive ancient cemetery was excavated with uninterrupted use from the Meso-Hellenic era (2100/2000 – 1600 BC) until the 2nd century BC In 1966 on the north side of the hill a vaulted tomb was revealed, preserving its built road, while the dome is not preserved. A characteristic feature of the monument is the existence of a small side room.

An archaeological site of similar importance, at a distance of about 1.500m from the existing electricity T.L and more than 3.000m from the proposed modification, is the monastery of St. Luke, which was built in the 10th century and belongs to the list of UNESCO World Heritage Sites. It is built on the western slopes of Elicus, under the citadel of ancient Styrio and is one of the most important monuments of the Mid-Byzantine period in Greece. The church was dedicated to St. Luke (29 July 896 - 7 February 953), whose remains have been in the Monastery since 1986, when it was transferred from Venice.

The year 2012 and with the MINISTRY/GPAPK/BBMA/TAXMAE/85715/20176/2942/288/20-20 8-2012 (Government Gazette 287/AAP/13.9.2012), Zones A of Absolute Protection and Zone B of Protection of the Monastery of St. Luke, Regional Unit of Viotia were established. The protection zones of this archaeological site are indicated in the satellite imagery extract below, while the activity in question is at a safe distance from them.

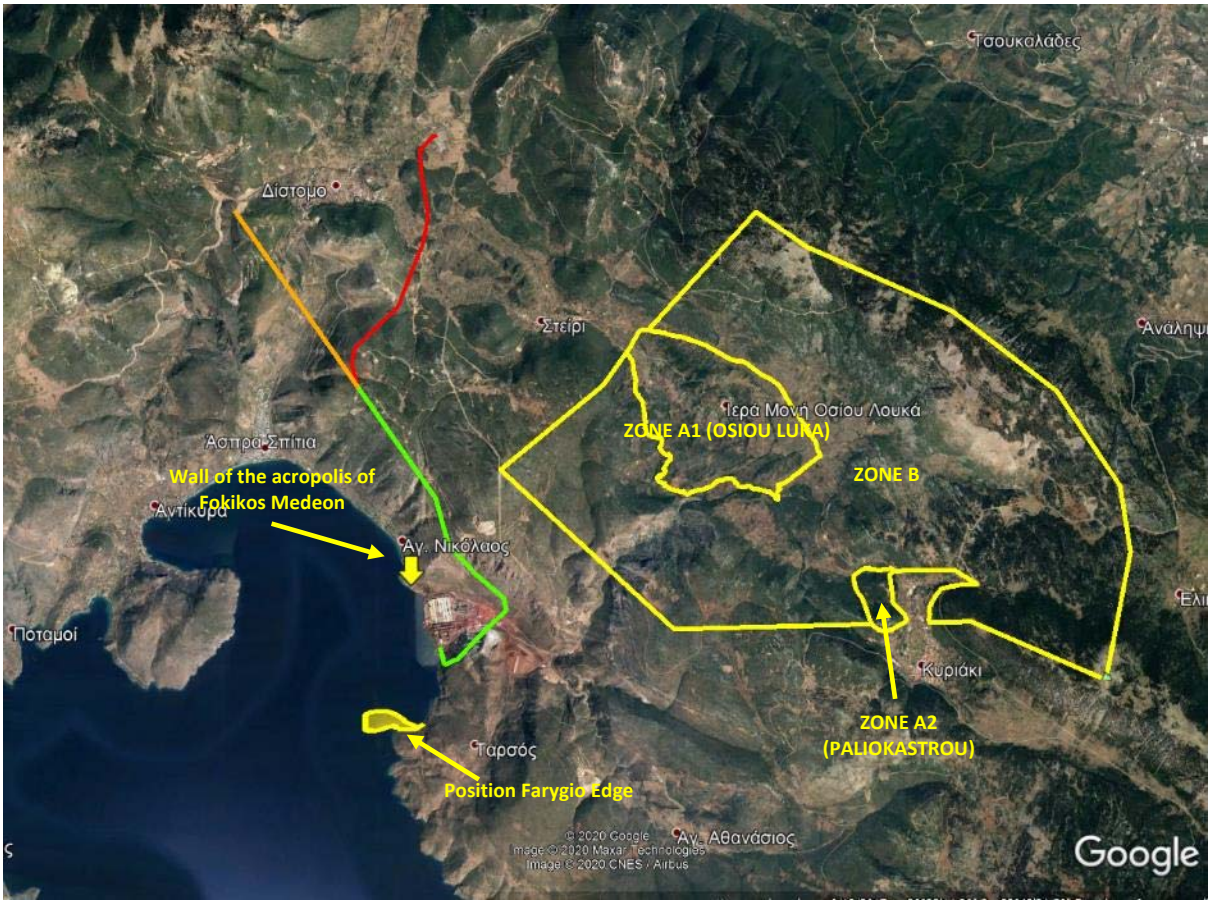


Figure 5.6: A google earth extract, showing the environmentally licensed 400kV electricity T.L which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L which is abolished and with a red line the proposed modification of the route of this T.L Also in yellow are the archaeological sites of the area.

At a distance of about 1.000m SW of the existing T.L declared by EPAO/GDA/ARCH/A/F43/22714/1420 (Government Gazette 603/B/22.05.2001) as an archaeological site the location Farygio A tip (Puntas Tarsos area – White Houses of Viotia) for the protection of the surviving settlement remains of the late Roman empire. These are ruins of houses, a new ancient water tank and a wall that runs through the neck of the Punta Peninsula.

5.2 APPLICABLE SPATIAL PLANNING AND URBAN PLANNING REGULATIONS IN THE PROJECT AREA

This section explores the institutional framework governing land uses and building conditions in the study area. In particular, the following shall be investigated:

- ✓ General Framework for Spatial Planning and Sustainable Development
- ✓ Regional Framework for Spatial Planning and Sustainable Development of the Region of Central Greece

- ✓ General Urban Plans (G.U.P. .)
- ✓ Plan for the Management of river basins of the Water District of Eastern Central Greece (1st revision)
- ✓ River Basin Flood Risk Management Plan of the Water District of Eastern Central Greece

5.2.1 Forecasts and directions of the General, the Special and the relevant Regional Framework of Spatial Planning and Sustainable Development

5.2.1.1 General Framework for Spatial Planning & Sustainable Development

In the General Framework for Spatial Planning and Sustainable Development (GGXSA) (Government Gazette 128/A/03-07-2008) among other things general guidelines are given for the energy sector.

In particular, the energy sector aims to:

- ensuring full coverage of energy needs in all parts of the national area (combined with the continuous effort to save energy in all sectors)
- strengthening energy security with full development of RES, promoting the use of alternative fuels and exploiting domestic resources
- effective monitoring of the environmental performance of the energy sector and reducing the impact of the sector on climate change within the framework of our country's related commitments.

With regard to energy production and transmission infrastructures, the aim is to:

- supporting the proposed development options,
- increasing the rate of penetration of renewable energy sources into total energy production, in accordance with the more specific guidelines of the relevant Specific Framework
- modernising lignite power plants and gradually reducing lignite's participation in the energy balance,
- strengthening the international role of our country as a center for the transmission of electricity, gas and oil
- the sub-basement of electricity distribution networks in traditional settlements and archaeological sites, with provision for suitable sites for distribution substations. Also, the avoidance of the passage of transport networks from archaeological sites and, as far as possible, from areas of the Nature Network (NATURA) 2000 and protected landscapes.

The integration of strategic energy infrastructures into national spatial planning requires the following arrangements and interventions:

- exploitation for energy production of the particular energy advantages of specific regions of the country,
- exploring the feasibility of supplementing the existing oil refineries (Attica / Corinthia and Thessaloniki), with new facilities in Alexandroupolis, in conjunction with the construction of the oil pipeline from Burgas,
- completion, in accordance with the existing design, of the natural gas network (main interconnection with Italy and Turkey with branches to Albania, etc.) and addition of new infrastructure,
- radical improvement of the electricity generation and transmission system,
- promotion of an integrated energy saving programme.

In accordance with the provisions of the above-mentioned SPSA, the project under study is in the direction of the above General Framework and in accordance with the guidelines and objectives referred to above, it is not presumed that the project under study is not compatible with the GSXSA under consideration.

5.2.1.2 Regional Framework for Spatial Planning and Sustainability Development of the Region of Central Greece

In the Regional Framework for Spatial Planning and Sustainable Development of the Region of Central Greece (SPCA) (Government Gazette 229/A.A.P./14-12-2018) among other things, guidelines are given for the spatial structure of the main technical infrastructure networks, including energy infrastructures.

In particular, a general strategy proposes the development of the energy system in synergy with the ten-year Transmission System Development Programme. At the same time, the following strategic objectives are promoted:

- Interconnection of energy production with local human resources, environmental conservation and sustainability of development as well as the creation of capital gains at local level that will enhance the extroversion of the Region.
- Energy saving both in buildings and at the level of the exploitation and dissemination of new technologies in the areas of energy demand and supply.
- Establishment and network operation of Energy Centers (Aliveri, Larymnas, Distomo, Thebes) with the aim of contributing to the formulation of regional energy policy through cooperation in the energy system.

- Further promote natural gas networks to serve all urban centers and production poles (industrial areas, energy centers, large individual production facilities, etc.) and complementary operation with RES and electricity system networks.
- Further penetration of renewable energy sources
- Maintenance of existing development of renewable energy installations and rational development of new plants close to existing ones, since accompanying projects - which require significant interventions in the environment (road networks, electricity grids) - are already being constructed.
- Development of renewable energy sources through MYEE and the exploitation of biomass using the mildest technologies and facilities in the sensitive ecological and developmental mountainous area of high forest and alpine ecosystems and their landslide areas and in particular in P.E. Evritania due to the presence of all the above parameters.
- Promotion of feedback to the E.P. renewable energy sources of the early exception as a whole of REGION OF. Evritania and parts of the mountain volumes Oiti - Vardousia - Giona and Elikia and parts of Evia from the pap areas of the E.P.
- Spatially focused repowering after the lifetime of installed renewable energy plants
- It is proposed to diversify the constructions of the accompanying projects mainly (roads and interconnection projects) towards milder construction for the environment and landscape (e.g. underground electricity networks).
- Priority is given to the location of Wind and Photovoltaic Parks in the areas of inactive quarries or mines.

The above objectives and proposals of the MIPSA of Central Greece are in no way contrary to the operation of the proposed project and in accordance with the guidelines set out in it, it is not presumed that the project under study is not compatible with the GFSP under consideration..

5.2.2 Institutional status, according to the approved plans (regulatory, general urban planning, road planning, residential control zones, plan of spatial and residential organization of open city , demarcation of settlements or other plans for determining land uses and construction

As detailed above in section 5.1.1, in the area has been approved the Decision- 3124/128532 (Government Gazette 432/A.A.P./31.12.2012) "Approval of a General Urban Plan (G.U.P.) of Municipal Unit (M.U.) of Distomo, Municipality of Distomos - Arachova - Antikyra" and 3529/149006 (Government Gazette 273/A.A.P./12.12.2016) "Approval of the General Urban Plan (G.U.P.) of the Community of Kyriaki,

Municipality of Levadia". The project under consideration and the amendments proposed in this study are compatible with the above approved General Urban Plans.

The nearest settlements in the project under study are:

- Tarsos, located at a distance of about 1.000m ENA of the existing electricity T.L The settlement of Tarsos was established by No. 3149/16.11.1987 Decision of the Prefect of Viotia (Government Gazette 1187/D/14.12.1987).
- The Stekri is located at a distance of about 2.0km N.A. of the new proposed electricity route of T.L The settlement of Seri was institutionalized with the No. 3354/27.07.1986 Decision of the Prefect of Viotia (Government Gazette 926/D/06.10.1986).
- Distomo, located at a distance of about 800m west of the new proposed electricity route of T.L The settlement of Distomo was established by No. 36642/20.06.1972 Decision of the Prefect of Viotia (Government Gazette 156/D/07.07.1972).

5.2.3 Special Management Plans (European Convention on Human Rights, regional waste management plan, Water Management Plans)

5.2.3.1 River Basin Management Plan of the Water Department of Central Macedonia

The Water District of Eastern Central Greece (YD07), has an area of 12,291km^2 and includes the entire Regional Units of Evia (and Skyros), Viotia and Sporades, large parts of Fthiotida (87.2%) and Fokida (42.2%) and small parts of West Attica Region (8.2%), East Attica (13%) and Magnesia (1%). Most of the Water District is characterized as lowland to semi-mountainous. The main lowland areas of the YD are the valleys of Sperchios and Boeotic Kifissos - Kopida, while smaller are the plains of Istia and Artakis in Evia. The lakes of the water district are Yliki (20km^2), Paralimni (11km^2) and Dystos (5km^2).

In accordance with Decision No. E.G.: oc.902 (Government Gazette 4673/B/29.12.2017) approved the 1st Review of the River Basin Management Plan of the Water District of Eastern Central Greece and the corresponding Strategic Environmental Impact Assessment. According to the approved SDSP of the Eastern Central Greece (YD EL07), this consists of seven (7) River Runoff Basins (LAPs), which are presented in the table below.

Table 5.1: Water catchment areas of Eastern Central Greece (YD EL07).

Λεκάνη Απορροής Ποταμού (ΛΑΠ)	Έκταση ΛΑΠ (km²)
Σπερχειού (EL0718)	2.315
Εύβοιας (EL0719)	3.681
ΒΑ Παραλίας Καλλιδρόμου (EL0722)	919
Βοιωτικού Κηφισού (EL0723)	2.719
Άμφισσας (EL0724)	786
Ασωπού (EL0725)	1.362
Σποράδων (EL0735)	497
ΣΥΝΟΛΟ έκτασης ΥΔ 07	**12.279**

The existing and environmentally licensed high-voltage electricity transmission line of 400kV (HVC Agios Nikolaos) falls under the River Basins (LAP) Asopos (EL0725) and Amfissa (EL0724), while the proposed amendment falls under the LAP Amfissa (EL0724) & LAP Boeotic Kifissou (EL0723).

Figure 5.7: Satellite imaging extract, showing the existing and proposed electricity transmission line as well as the limit of LAP Assos (EL0725), LAP Amfissa (EL0724) & LAP Boeotic Kifissos (EL0723).

Surface Water Systems (SSS)

From the River Water Systems (PS) recorded under the Management Plan, closer to the study area is the Klisouras stream (EL0725R000300028N). This stream is close to the existing line, but at a distance of more than 5km from the proposed modifications. The Klisouras stream ends up in the sea area on the eastern coast of Antikyra Bay. According to the approved management plan, the length of the Klisouras stream amounts to 8.03km and its catchment area to 135.8km2. According to the Management Plan, the ecological status of the stream is characterized as moderate and its chemical status as good.

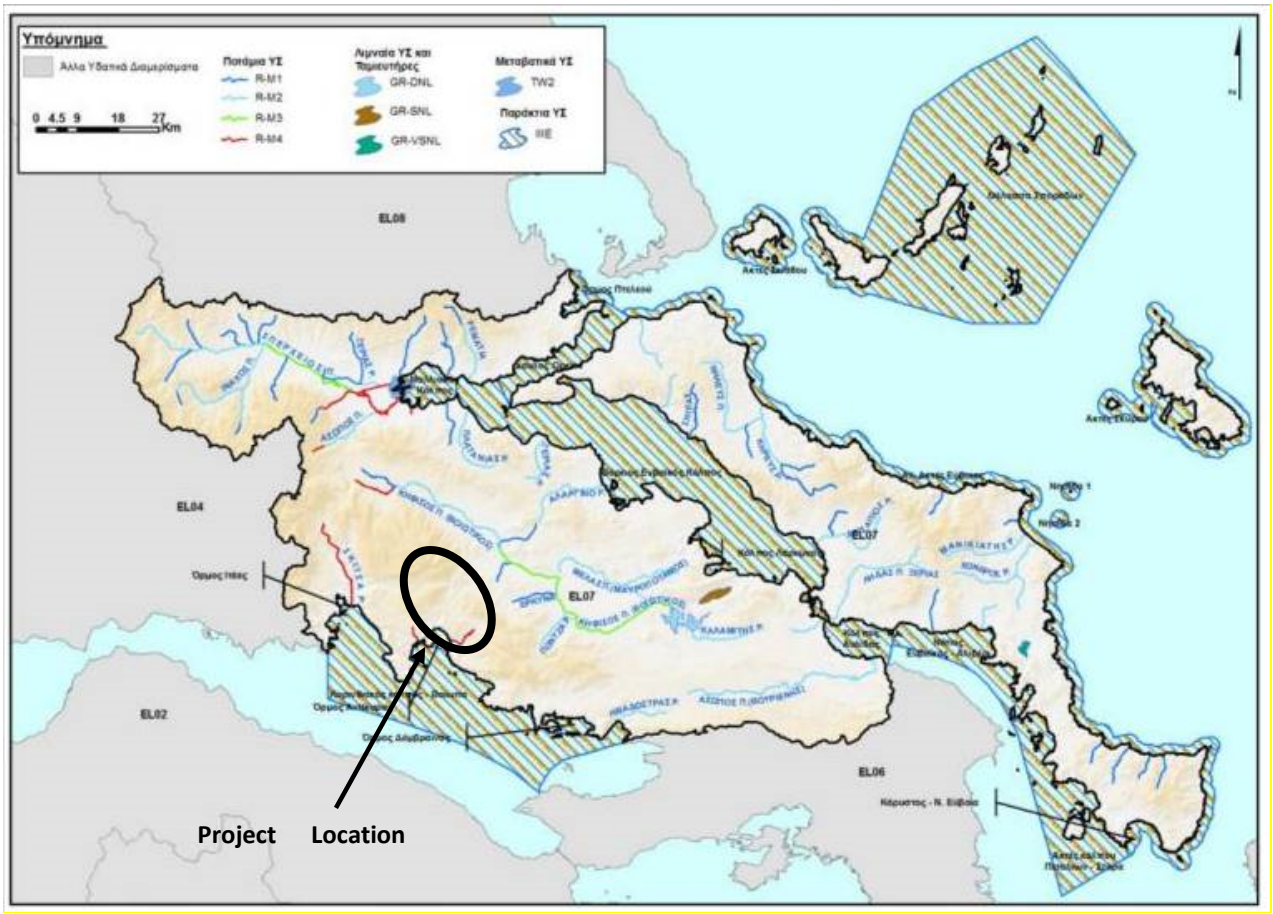


Figure 5.8: Extract Map of Surface Water Systems in YD EL07.

In the immediate area of the project under study is recorded the Coastal YS Bay of Antikyra (EL0724C0017N), whose ecological and chemical status are characterized as good.

In the study area there is no surface water system that falls within an area intended for water abstraction for human consumption and has been included in the Register of Protected Areas.

The objectives of the 1st revision of the management plan set for surface PSEs include:

- For surface waters with good or high status or good ecological potential and good chemical status, the environmental objective is not to degrade them. For surface waters with a status/potential below good, the environmental objective is to upgrade them through the implementation of the Programme of Measures.
- For surface waters their status remains unknown due to a lack of available data, no environmental objective is set other than non-degradation, while the Programme of Measures provides for the collection of data through specific monitoring programmes in order to be able to assess their situation as soon as possible.
- For all river bodies of water identified as Highly Modified Water Systems (not including river reservoirs), a target of 2021 is set to achieve good ecological potential.

Underground Water Systems (YS)

With regard to groundwater, the study area is located the Underground Water System (HYS) "Antikyra - Kithairon", (EL0700230). The HYS "Antikyra - Kithairon" (EL0700230), an area of 900km^2, develops in the masses of carbon rocks that form the southern coastal region of the Eastern Central Greece Water District. From the Gulf of Itea to Fokida to Porto Germeno in Attica. It is a particularly extensive area in which many important aquifers, mainly karstic form, are developed, which are in direct hydraulic communication with the sea, where they are unloaded with large coastal and brackish sources.

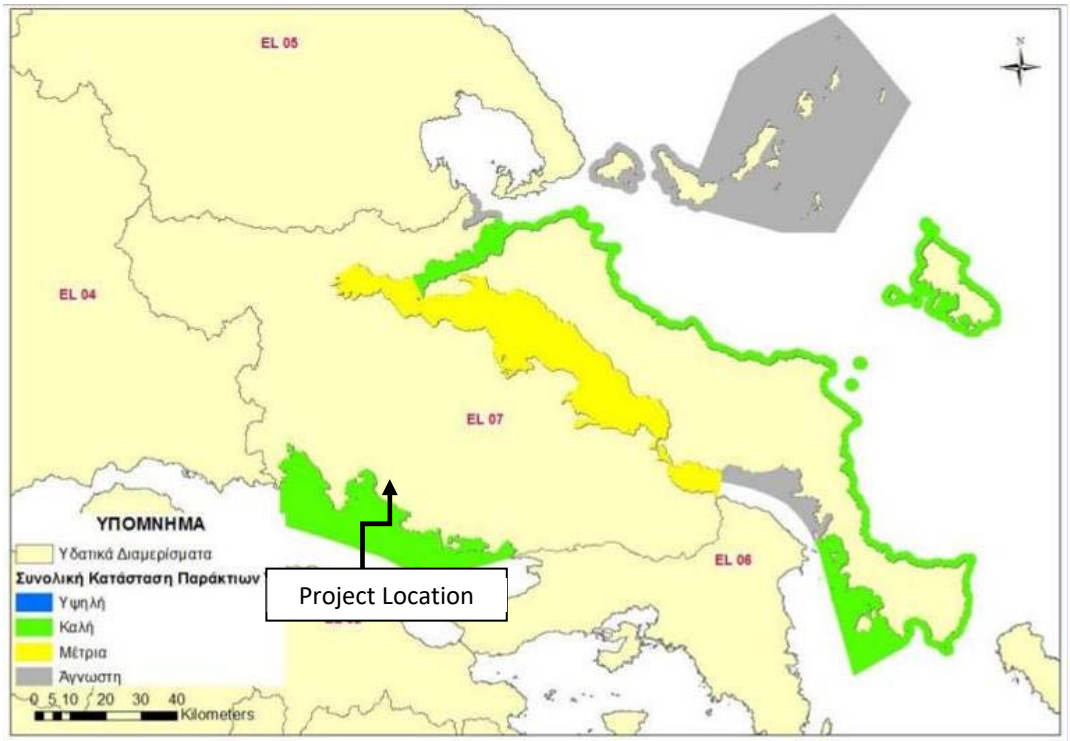


Figure 5.9: Classification of the overall status of coastal water systems of Eastern Central Greece (EL07).

The supply of the system is made by the direct injection of meteoric water, which moves in depth through the karstic network.

Discharges of the system are made in places laterally in quatogenic materials, but its most important discharge, which characterizes the system, takes place in the coastal zone towards the sea. The sea level forms a base level of the karst aquifer with which it is in direct hydraulic communication. Coastal brackish sources of high supply are gushing across the coastline.

The average annual supply of the system is 200×106m3/year, while total receipts are estimated at 9.51×106m^3/year. The quantitative status of the "Antikyra - Kithairon" (EL0700230), as shown in the extract of the map below, is characterized as good.

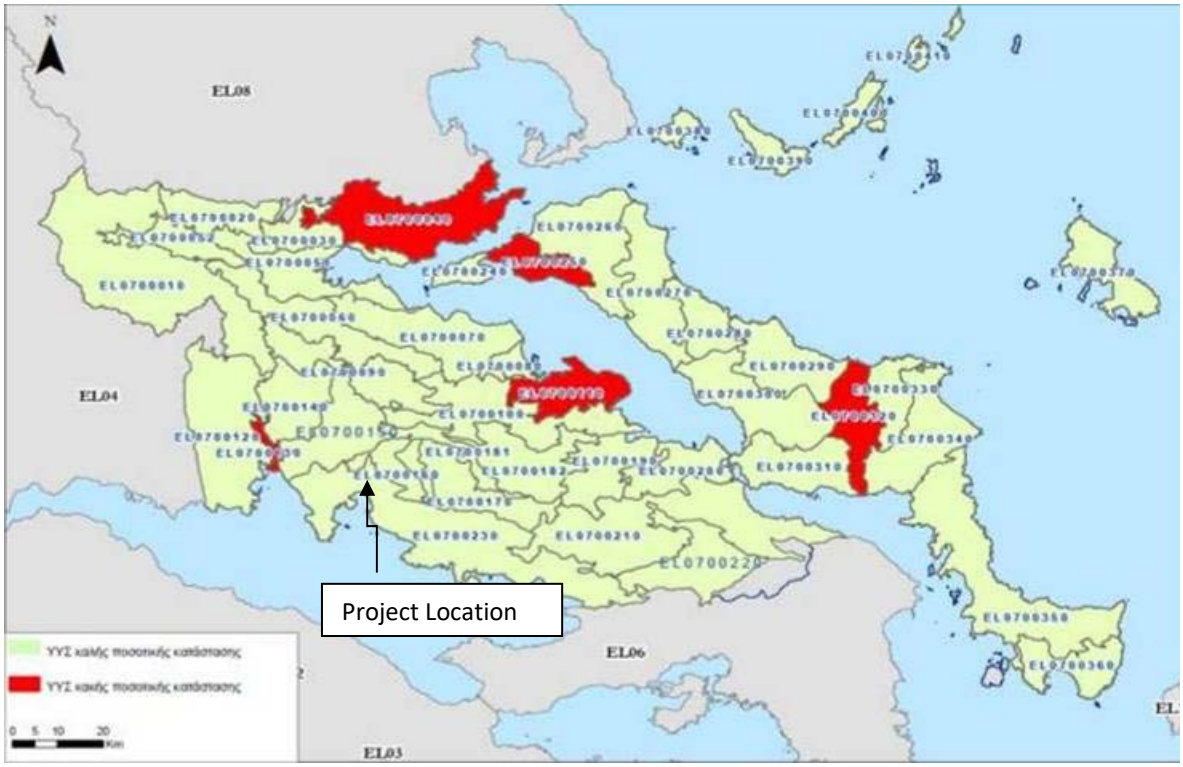


Figure 5.10: Quantitative status of Groundwater Systems in YD EL07.

Similarly, the chemical status of Groundwater System "Antikyra - Kithairon" (EL0700230), as shown in the extract of the map below, is characterized as good.

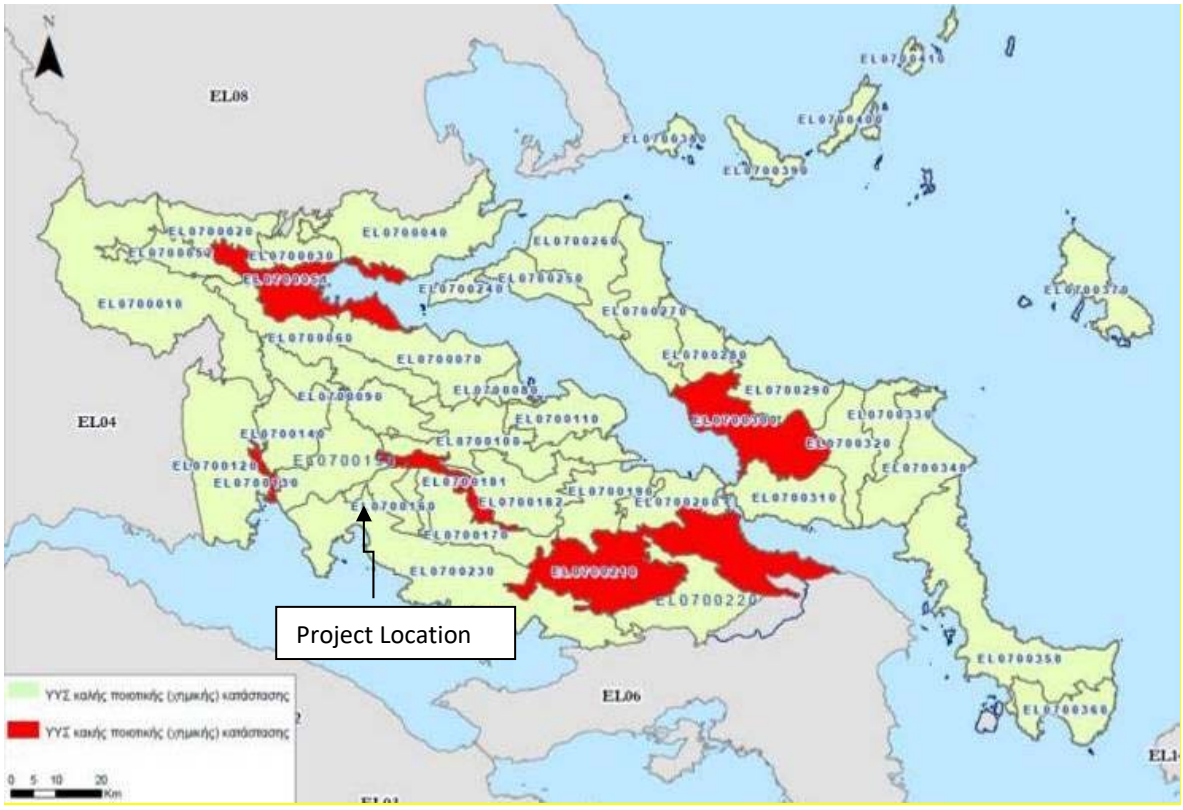


Figure 5.11: Chemical status of Underground Water Systems (UWS) in YD EL07.

In the study area there is no underground water system that falls within an area intended for water abstraction for human consumption and has been included in the Register of Protected Areas.

The objectives of the 1st revision of the management plan set for underground include the following:

- For groundwater with good quantitative status, the environmental objective is to maintain good quantitative status.
- For groundwater with poor quantitative status, the environmental objective is to achieve good quantitative status whenever natural conditions permit after 2027.
- For groundwater with good chemical status, the environmental objective is to maintain good chemical status.
- For groundwater with poor chemical status, the environmental objective is to achieve good chemical status whenever natural conditions permit after 2027.

Since the activity under study cannot have an impact on groundwater in the area, it is compatible with the objectives of the approved management plan with regard to groundwater bodies.

5.2.3.2 River Basin Flood Risk Management Plan of the Water District of Eastern Central Greece

As part of Greece's adaptation of the Community Directive 2007/60/EC on flood risk assessment and management, the Preliminary Flood Risk Assessment was carried out by the EGY in 2012, which defined the Potentially High Flood Risk Zones, collected information on flood events from the relevant risk and disaster management bodies at local and central level, evaluated and recorded their data in territory-specific spreadsheets. In particular, the Preliminary Flood Risk Assessment included the following steps:

- The recording of historical floods with their main characteristics and the identification of significant historical floods based on their consequences.
- Identifying areas where flooding is likely to occur and assessing the potential negative consequences of future floods, taking into account historical flood data and changes in floodplain conditions since then.
- The definition of Potentially High Flood Risk Zones.

In accordance with the 1st Revision of the PRELIMINARY FLOOD RISK ASSESSMENT under Directive 2007/60/EC, pursuant to THE MIP 31822/1542/e103 of the EGY/YPEKA, the study area does not fall within a Potentially High Flood Risk Zone, as shown in the following figure.

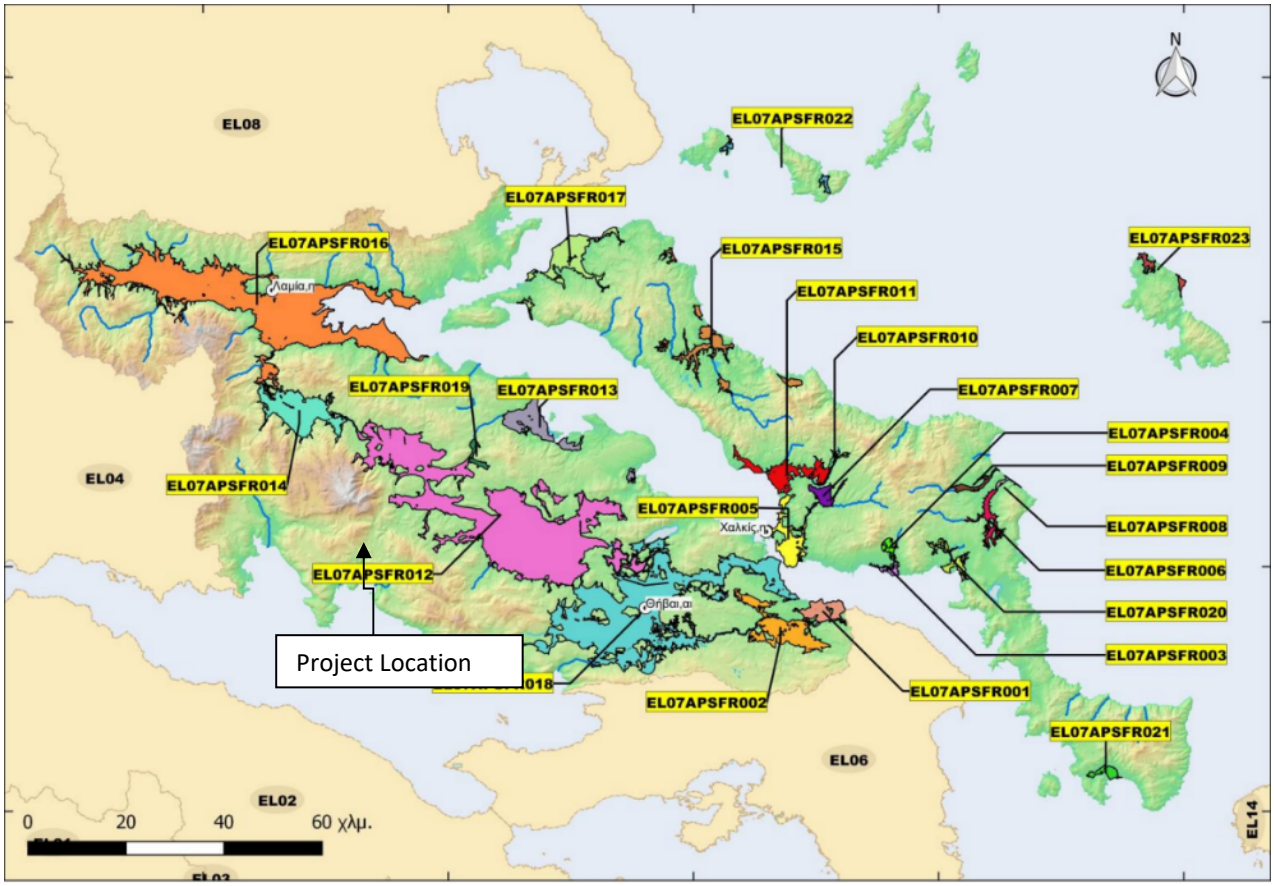


Figure 5.12: Extract from the Map of The Potentially High Flood Risk Zones, based on the 1st Review of the PRELIMINARY FLOOD RISK ASSESSMENT .

In accordance with the Decision of the European Commission, the Court of First Ins RIS/GREGY/41375/328/2018 (Government Gazette 2682/B/06.07.2018) approved the River Basin Flood Risk Management Plan of the Eastern Central Greece Water District (EL07) and the corresponding Environmental Impact Assessment Strategy. The Flood Risk Management Plan is structured in two stages as follows:

- Stage 1: Preparation of Flood Risk Maps and Flood Risk Maps
- Stage 2: Preparation of Flood Risk Management Plans (MSPs), Preparation of Strategic Environmental Impact Studies (SSPs) and Consultation

In particular, flood risk maps have been prepared and approved for each POTENTIALLY HIGH FLOOD RISK ZONE, based on the spatial distribution of the flood flood surface for each recovery period (T=50, 100 and 1000 years). Flood Risk Maps based on the spatial distribution of the flood surface from river flows compiled correspond to the following scenarios:

- floods with a high probability of exceeding a 50-year recovery period,

- floods of an average probability of exceeding a 100-year recovery period,
- floods with a low probability of exceeding a 1000-year recovery period.

The following are excerpts from the Flood Risk Maps for each recovery period (T=50, T=100 and T=1000) and their memo, where:

- red dots depict the areas originally identified under preliminary planning and historical events and other bibliographical information as Potentially High Flood Risk Zones,
- blue stripe shows the flood zone in each recovery period relating to the actual zone that can be flooded under the Flood Risk Management Plans,
- red spot shows the location of the project

Figure 5.13: Flood Risk Map Memo from inland waters, in accordance with the approved Flood Risk Management Plans.

Figure 5.14: Extract Flood Risk Map from inland waters (F.C. 03800-42450) for a period of restoration T=50 years. The project under study does not fall into a flood zone for a 50-year restoration period.

Figure 5.15: Extract Flood Risk Map from inland waters (F.C. 03800-42450) for a period of restoration T=100 years. The project under study does not fall into a flood zone for a 100-year restoration period.

Figure 5.16: Extract flood risk map from inland waters (apsfr0008_5) for a recovery period of T=1000 years. The project under study does not fall into a flood zone for a 1000-year restoration period.

As can be seen from the above Figures, the project under study does not fall into a flood zone for any period of restoration (T=50, T=100 and T=1000).

In any case, there is no question of the compatibility of the project under study with the approved River Basin Flood Risk Management Plan of the Water District of Central Macedonia (EL07).

5.2.4 Organized activity receptors

The 400kV electricity transmission line under consideration, on the basis of the requested amendments, shall be established by the Ag. Nikolaos HVC, which connects to the Distomo HVC .

The study area identifies the facilities of the alumina and aluminium production plant (briefly the "Aluminium of Greece" or "ATE" plant) of the BS (Business Unit) Metallurgy of MYTILINEOS S.A.

The facilities of Mytilineos S.A. in the area have been located by an act of the Greek State, as early as 1960, for higher reasons of public interest of a development nature. **Since then, the entire area, acquired through expropriation for public benefit, has been purely industrial in nature**, with industrial use of the land. In particular, the area of expropriation of an area of **7,035,700m^2** was expropriated on the basis of PO **138/D/01.11.1962.**

The existing facilities of ATE include:

- The industrial alumina production complex
- The industrial aluminium production complex
- The accompanying installations, which concern:
  - the anode production industrial complex,
  - the port plant service facilities,
  - the limestone quarry and the lime production facilities, industrial wastewater treatment plants and urban wastewater treatment plants
  - solid waste disposal facilities,
  - water pumping and treatment facilities,
  - other supporting installations of the activity
- The 334MW Electricity and Heat Cogeneration Power Plant
- the pilot bauxite residue treatment plant.

It should be noted that adjacent to the premises of ATE and in particular adjacent to Electricity and Heat Cogeneration Power Plant and within the expropriated area of the Government Gazette138D/1962, in the position "Agios Nikolaos":

v. the Independent Power Station of the company MYTILINEOS S.A. / BS Electricity & Natural Gas (formerly PROTERGIA S.A.), with a rated capacity of 444.48MW with natural gas fuel, for the operation of which has been issued no. Cfi. 23918/01.11.2016 E.T.A..

vi. has been environmentally licensed with No. 114847/6959/09.12.2019 E.T.A. and the construction and operation of a new Power Station of MYTILINEOS S.A. / BS Energy & Natural Gas, with a rated capacity of 826MW, with natural gas fuel.

Figure 5.17: A satellite imagery extract (google earth), showing the expropriated area of the ATE plant in red, with a green outline depicts the installation site of the existing Independent Power Station and with a yellow outline depicts the installation site of the new Power Station of MYTILINEOS S.A. / BS Electricity & Natural Gas.

6 DETAILED DESCRIPTION OF THE PROJECT DESIGN

6.1 ANALYTICAL DESCRIPTION OF THE WORK

6.1.1 Generally

This Environmental Impact Assessment concerns amendment of No. 124363/16.04.2010 E.T.A.., as amended and renewed by 32394/2177/13.11.2019 E.T.A.., with which the connection of Thermal Power Plant Agios Nikolaos 444.48MW with the National System (Independent Power Transmission Operator) was licensed. In particular, the projects that were environmentally licensed with the above E.T.A. concern the following:

- **Electricity Transmission Line 400kV, 10,460m long**, connecting the Thermoelectric Station (THE) of Agios Nikolaos with the existing 400kV dual-circuit High Voltage Transmission Line, which in turn connects the High Voltage Center (HVC) Acheloos with the Distomo HVC και
- **High Voltage Substation (P/S) 400kV – HVC Ag. Nikolaos**.

At this point it is stated that Thermal Power Plant Agios Nikolaos, who is not the subject of this study, has been licensed with the following ETA:

- No. 160645/14.07.2006 ETA of the Directorate of E.A.R.Th. of the Ministry of PEHODE
- No. 167271/23.08.2010 E.T.A.. of the Directorate of E.A.R.Th. of the Ministry of Foreign Affairs, concerning the amendment of No. 160645/14.07.2006 ETA
- No. 182392/09.04.2013 E.T.A.. of the Directorate of E.A.R.Th. of the Ministry of Foreign Affairs, concerning the extension of the validity of No. 160645/14.07.2006 ETA
- No. 23918/01.11.2016 E.T.A.. , concerning the renewal of No. 160645/14.07.2006 ETA

This environmental study concerns the amendment of No. 124363/16.04.2010 E.T.A.., as applicable, with regard to the diversion of the existing 400kV High Voltage Electricity T.L, which connects the Ag. Nikolaos HVC with the National System 400kV and its connection directly to the Distomos HVC through a new exclusive section T.L 2B'B'/400kV double circuit length of approximately 5,198m, for the implementation of an enhanced connection shape of HVC Ag. Nikolaos with the National System. The implementation of the above reinforced connection scheme will allow with the connection of the New Power Station 826MW, the safe absorption of its full generated power, by the National System and will give greater reliability and flexibility to the connection of the HVC Ag. Nikolaos with the System (according to the Terms of Connection

of the new Station – No./m.: Independent Power Transmission Operator /DSSAS 20804/8.10.2019), as the connection is made to the trunk of the National System and in particular to a key HVC with eight (8) Connections to other Substations 400kV (2x HVC Trikala, 2x HVC Larymnas, 2x HVC Acheloos, HVC Heron, HVC Thisvi) and four (4) with other Substations 150kV (2x P/S Aluminium, H/S HERON, P/S Asprochomatos), with direct T.L without being affected by restrictions on the availability of T.L HVC Distomo - HVC Acheloos. In parallel with this modification, significant capacity is released to T.L HVC Distomo - HVC Acheloos, which can be allocated to increase the penetration of Renewable Sources into the Greek Electricity System, taking into account the expansion projects of 400kV, ADMEE, in the Peloponnese. The proposed connection will, finally, facilitate the exploitation of the capacity of the Combined Cycle Unit (MSK) Ag. Nikolaos to contribute to voltage control (Voltage Control) and the stabilization of the trend profile in the National Electricity System.

The amendments proposed in this environmental impact assessment concern the following:

- removal of part of the 400kV Electricity Transmission Line, for a length of 3.833m in its connection to the existing High Voltage T.L 400kV Acheloos HVC – Distomo HVC, with the removal of twelve (12) High Voltage pylons
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5.198m for its direct connection to the Distomos HVC , with the construction of seventeen (17) new High Voltage pylons
- execution of work - addition of equipment, within the HVC of Agios Nikolaos and HVC of Distomo
- opening of a forest road, with a total length of about 4.174m, to serve the construction and operation needs of the new section of the electricity transmission line
- reunification of the Acheloos HVC - Distomos HVC circuit

In particular, the existing and environmentally licensed Electricity Transmission Line, with a total length of 10.460m, is being carried out by the HVC of Ag. Nikolaos and is terminated in its connection with the existing High Voltage Transmission Line 400kV dual circuit HVC Acheloos – HVC Distomos. This amendment proposes the abolition of the last 3.833m of the existing and environmentally licensed T.L electricity 400kV, in its connection with the existing High Voltage T.L 400kV HVC Acheloos – HVC Distomo and the construction of a new T.L of about 5.198m length with its connection directly to the Distomos HVC , as shown in the following satellite imaging extract. The total length of the electricity transmission line from the Agios Nikolaos HVC to the Distomos HVC , taking into account the requested modifications will be 11.825m and will consist of 37 pillars.

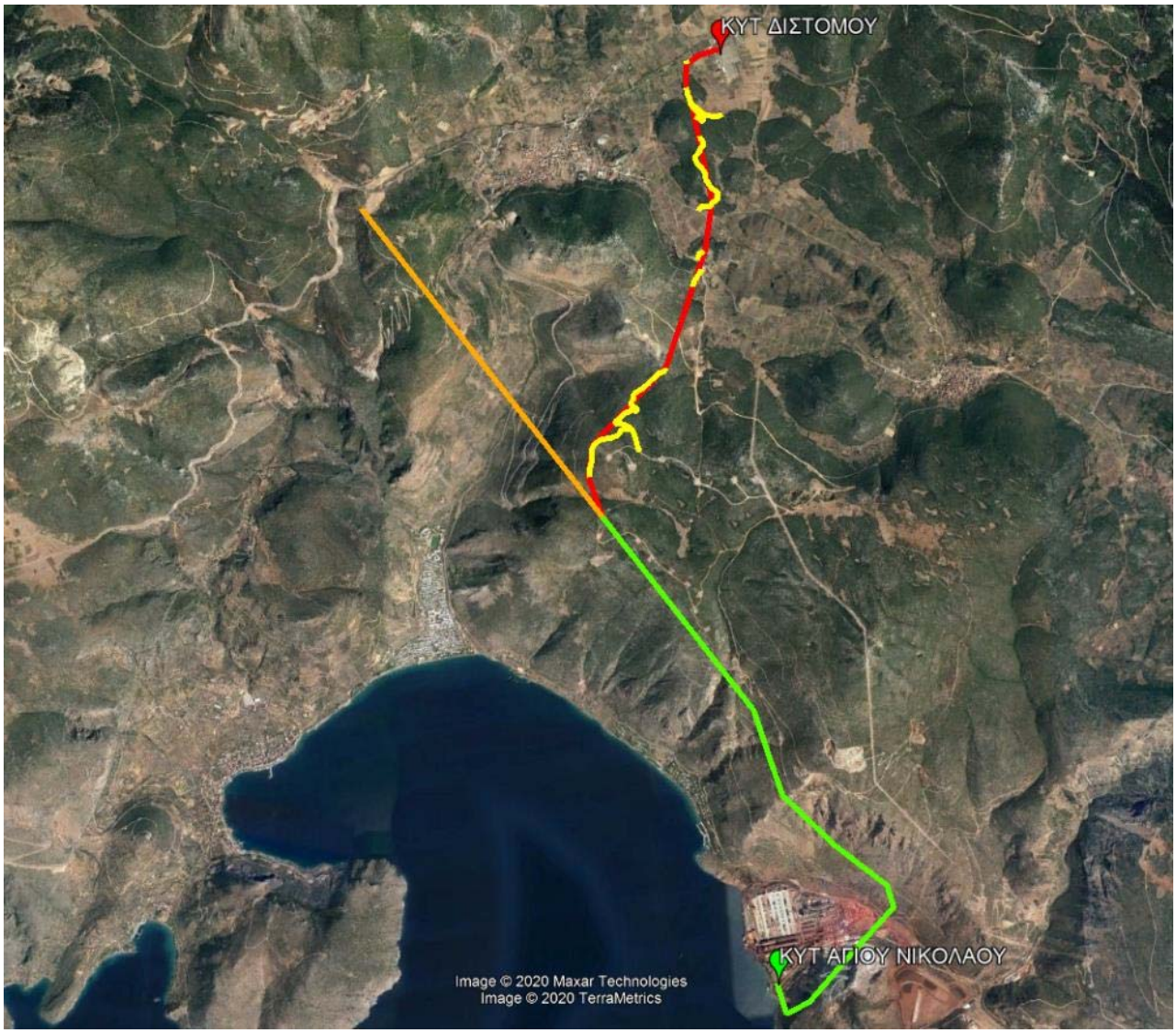


Figure 6.1: Extract of satellite imaging (google earth), showing the environmentally licensed T.L with a green line. 400kV electricity which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L is reflected, which is abolished and with a red line the proposed modification of the route of that T.L Yellow lines show the access roads that will be opened to serve the construction and operation needs of the of the new section.

The following table shows the geographical coordinates of all the pillars - based on the requested modification - of the above High Voltage Transmission Line 400kV, the Greek Geodesic Reference System 1987 (EGSA '87) and the Global Geodesic System WGS '84.

Table 6.1: Coordinates of all the pillars of T.L 400kV electricity, based on the requested modification. The coordinates of the new proposed pillars and the new location of the terminal scaffolds are presented in bold font.

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	φ (°)	λ (°)
ΙΚΡΙΟΜΑ	**385.273,595**	**4.254.984,159**	**38° 26΄ 18,16΄΄**	**22° 41΄ 13,76΄΄**
Π1Ν	**385.181,654**	**4.254.962,070**	**38° 26΄ 17,40΄΄**	**22° 41΄ 09,98΄΄**
Π2Ν	**385.064,859**	**4.254.932,363**	**38° 26΄ 16,38΄΄**	**22° 41΄ 05,18΄΄**
Π3Ν	**384.951,259**	**4.254.846,412**	**38° 26΄ 13,54΄΄**	**22° 41΄ 00,55΄΄**
Π4Ν	**384.931,759**	**4.254.637,913**	**38° 26΄ 06,77΄΄**	**22° 40΄ 59,87΄΄**
Π5Ν	**384.994,243**	**4.254.347,512**	**38° 25΄ 57,38΄΄**	**22° 41΄ 02,61΄΄**
Π6Ν	**385.026,821**	**4.254.129,398**	**38° 25΄ 50,32΄΄**	**22° 41΄ 04,09΄΄**
Π7Ν	**385.087,389**	**4.253.723,896**	**38° 25΄ 37,19΄΄**	**22° 41΄ 06,82΄΄**
Π8Ν	**385.121,365**	**4.253.496,419**	**38° 25΄ 29,83΄΄**	**22° 41΄ 08,36΄΄**
Π9Ν	**385.025,217**	**4.253.019,760**	**38° 25΄ 14,32΄΄**	**22° 41΄ 04,67΄΄**
Π10Ν	**384.878,511**	**4.252.656,327**	**38° 25΄ 02,47΄΄**	**22° 40΄ 58,84΄΄**
Π11Ν	**384.687,608**	**4.252.183,404**	**38° 24΄ 47,04΄΄**	**22° 40΄ 51,25΄΄**
Π12Ν	**384.573,440**	**4.251.900,578**	**38° 24΄ 37,81΄΄**	**22° 40΄ 46,71΄΄**
Π12Α Ν	**384.234,785**	**4.251.580,861**	**38° 24΄ 27,29΄΄**	**22° 40΄ 32,94΄΄**
Π12Β Ν	**384.074,813**	**4.251.429,835**	**38° 24΄ 22,31΄΄**	**22° 40΄ 26,43΄΄**
Π12Γ Ν	**383807,245**	**4251177,230**	**38° 24΄ 14,00΄΄**	**22° 40΄ 15,55΄΄**
Π12Δ Ν	**383.749,323**	**4.250.872,004**	**38° 24΄ 04,07΄΄**	**22° 40΄ 13,35΄΄**
Π12Ε Ν	**383.865,819**	**4.250.472,273**	**38° 23΄ 51,16΄΄**	**22° 40΄ 18,38΄΄**
Π13	384.024,604	4.250.244,325	38° 23΄ 43,84΄΄	22° 40΄ 25,06΄΄
Π14	384.147,488	4.250.067,903	38° 23΄ 38,17΄΄	22° 40΄ 30,23΄΄
Π15	384.364,678	4.249.756,088	38° 23΄ 28,18΄΄	22° 40΄ 39,37΄΄
Π16	384.593,299	4.249.427,922	38° 23΄ 17,62΄΄	22° 40΄ 48,98΄΄
Π17	384.756,165	4.249.194,050	38 ° 23΄ 10,11΄΄	22° 40΄ 55,83΄΄
Π18	384.870,501	4.249.029,887	38° 23΄ 04,84΄΄	22° 41΄ 00,64΄΄
Π19	385.231,891	4.248.511,047	38° 22΄ 48,18΄΄	22° 41΄ 15,84΄΄
Π20	385.368,582	4.248.009,334	38° 22΄ 31,97΄΄	22° 41΄ 21,76΄΄
Π21	385.465,767	4.247.668,073	38° 22΄ 20,94΄΄	22° 41΄ 25,97΄΄
Π22	385.662,333	4.247.458,793	38° 22΄ 14,25΄΄	22° 41΄ 34,19΄΄
Π23	385.947,861	4.247.154,797	38° 22΄ 04,52΄΄	22° 41΄ 46,13΄΄
Π24	386.212,415	4.246.927,908	38° 21΄ 57,28΄΄	22° 41΄ 57,16΄΄
Π25	386.433,088	4.246.739,502	38° 21΄ 51,27΄΄	22° 42΄ 06,36΄΄
Π26	386.483,578	4.246.525,359	38° 21΄ 44,34΄΄	22° 42΄ 08,57΄΄
Π27	386.068,714	4.246.127,224	38° 21΄ 31,24΄΄	22° 41΄ 51,71΄΄
Π28Ν	385.810,894	4.245.866,146	38° 21΄ 22,65΄΄	22° 41΄ 41,24΄΄

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	ϕ (°)	λ (°)
Π29Ν	385.608,430	4.245.660,769	38° 21΄ 15,90΄΄	22° 41΄ 33,02΄΄
Π30Ν	385.414,038	4.245.571,275	38° 21΄ 12,91΄΄	22° 41΄ 25,06΄΄
Π31Ν	385.375,650	4.245.560,360	38° 21΄ 12,54΄΄	22° 41΄ 23,49΄΄
Π32Ν	385.326,234	4.245.759,300	38° 21΄ 18,97΄΄	22° 41΄ 21,34΄΄
ΙΚΡΙΩΜΑ	385.303,997	4.245.863,870	38° 21΄ 22,35΄΄	22° 41΄ 20,36΄΄

6.1.2 Electricity transmission lines

The existing and environmentally licensed electricity transmission line, is 10.460m long and was constructed in accordance with the specifications of overhead transmission lines and the plans for the foundation of transmission line pillars available from Independent Power Transmission Operator. The existing transmission line includes thirty-two (32) double-circuit pillars, each one's height is about 45m and the width reaches 21m. The distance between the pillars varies depending on the terrain of the area, but in general it is 350m – 500m. In difficult areas and where there is no road, the distance of the pillars varies respectively, so that the opening of new roads is kept to a minimum.

The new electricity transmission line, under the requested amendment, will have a total length of about 11.825m and will consist of thirty-seven (37) pillars.

The new section, with a total length of 5,198m, will be constructed in accordance with the specifications of air transport lines and the plans for the foundations of transmission line pillars available from Independent Power Transmission Operator. It will include seventeen (17) new double-circuit towers of series "5" and "6".

Like all overhead power lines, aluminium conductors will be used because they have very good electrical conductivity, low weight and low cost. Aluminum ducts are generally long-circuited. They consist, in other words, of many clones, which are helikoidally surrounded in successive layers, so as to form a conductor that resembles a wire rope. Successive layer clones are rotated in opposite directions to prevent their unwrapping and to achieve a coincidence of the outer radius of one layer with the inner radius of the next layer. The long-circuited conductors are more flexible than the monoclons of equal diameter, so they are more flexible and subject to less stresses. They also present the advantage of being safer in mechanical breakage.

6.1.3 Types of towers

Seventeen (17) new towers (pillars) of series "5" & "6" will be erected in the new section of the 5,198m transmission line. The "5" Series towers are double-circuited in a vertical phase layout, with two (2) peaks and two (2) protective ducts.

The towers will be constructed from angular sheets of construction steel of the type of open floor, Electric Furnace or L.D. High strength steel qualities are used. For uprights, main bridge elements and main foundation elements are used cross sections of a thickness of not less than 3mm. Metric high strength screws of a minimum diameter of 12mm and a maximum of four screw diameters are used for each type of tower. The suspension height from the ground for a normal height tower is 19.95m for type S and R towers and 19,00m for type T and G towers. The meshes of the sides of the towers are symmetrical.

All types of towers have horizontal frames:

- On the lower surfaces of the bridges
- At the top of the legs
- At the slope change points of the uprights

The following table shows the types of new towers to be installed.

Table 6.2: Types of new towers**.**

A/A Tower	Tower Type	
1N	Series '6', angle 75th or finish	Z_6
2N	Series '6', angle 75th or finish	Z_6
3N	Series '6', angle 75th or finish	Z_6
4N	Series '5', angle 75th or finish	Z_5+8
5N	Series "5", Angle 45th	T_5 +8
6N	Series "5", Small Angle	R_5
7N	Series "5", Small Angle	R_5 +8
8N	Series "5", Angle 45th	T_5 +18
9N	Series "5", Angle 45th	T_5
10N	Series "5", Small Angle	R_5 +8
11N	Series "5", Large Openings	G_5 +8
12N	Series "5", Angle 45th	T_5 +8
12A N	Series "5", Large Openings	G_5
12B N	Series "5", Alignment	S_{15}
12Γ N	Series "5", Angle 45th	T_5 +8
12Δ N	Series "5", Angle 45th	T_5 +8
12E N	Series "5", Angle 45th	T_5 +8

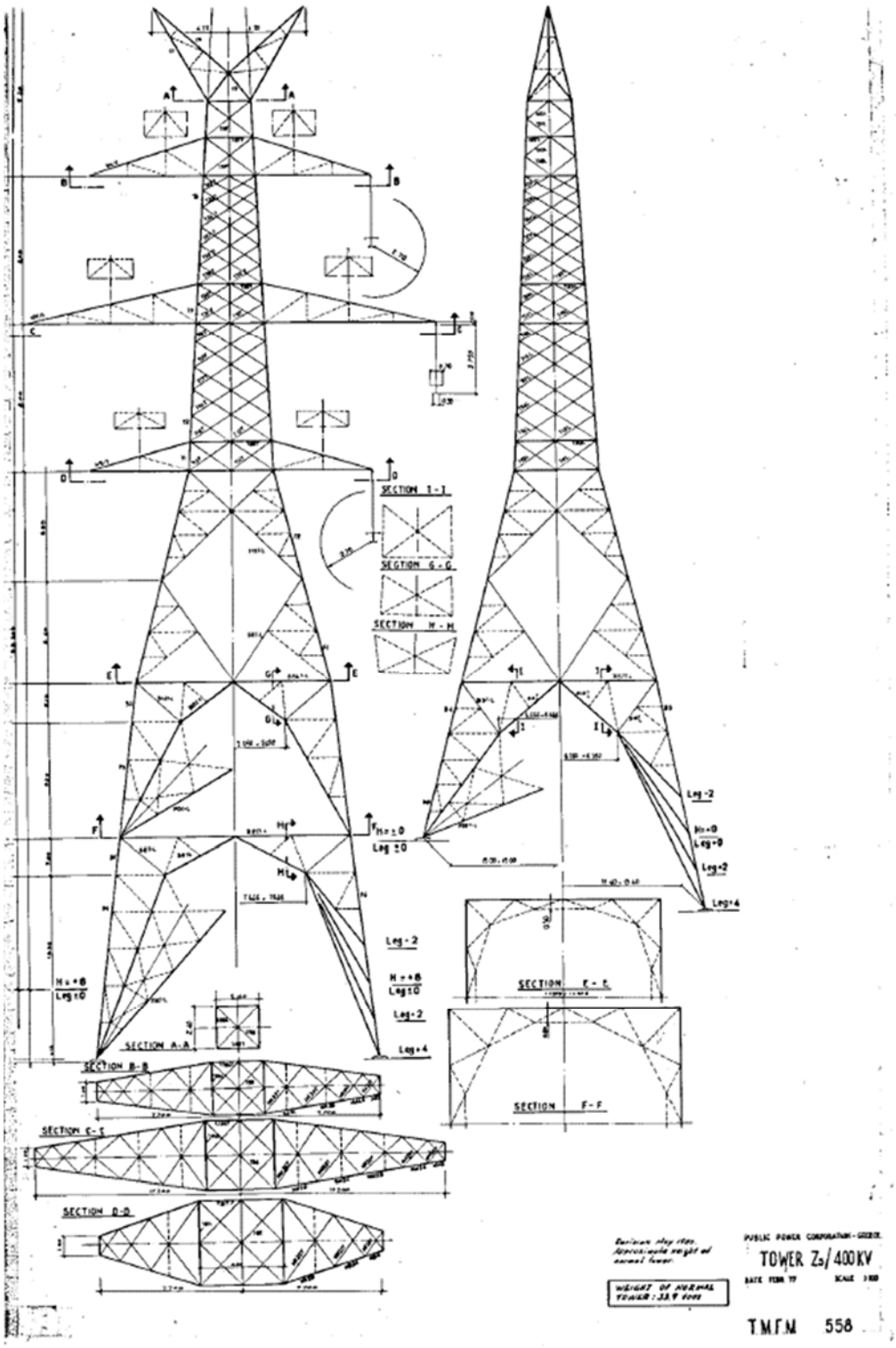


Figure 6.2: 75° or finish angle "5" series pillar, type Z5.

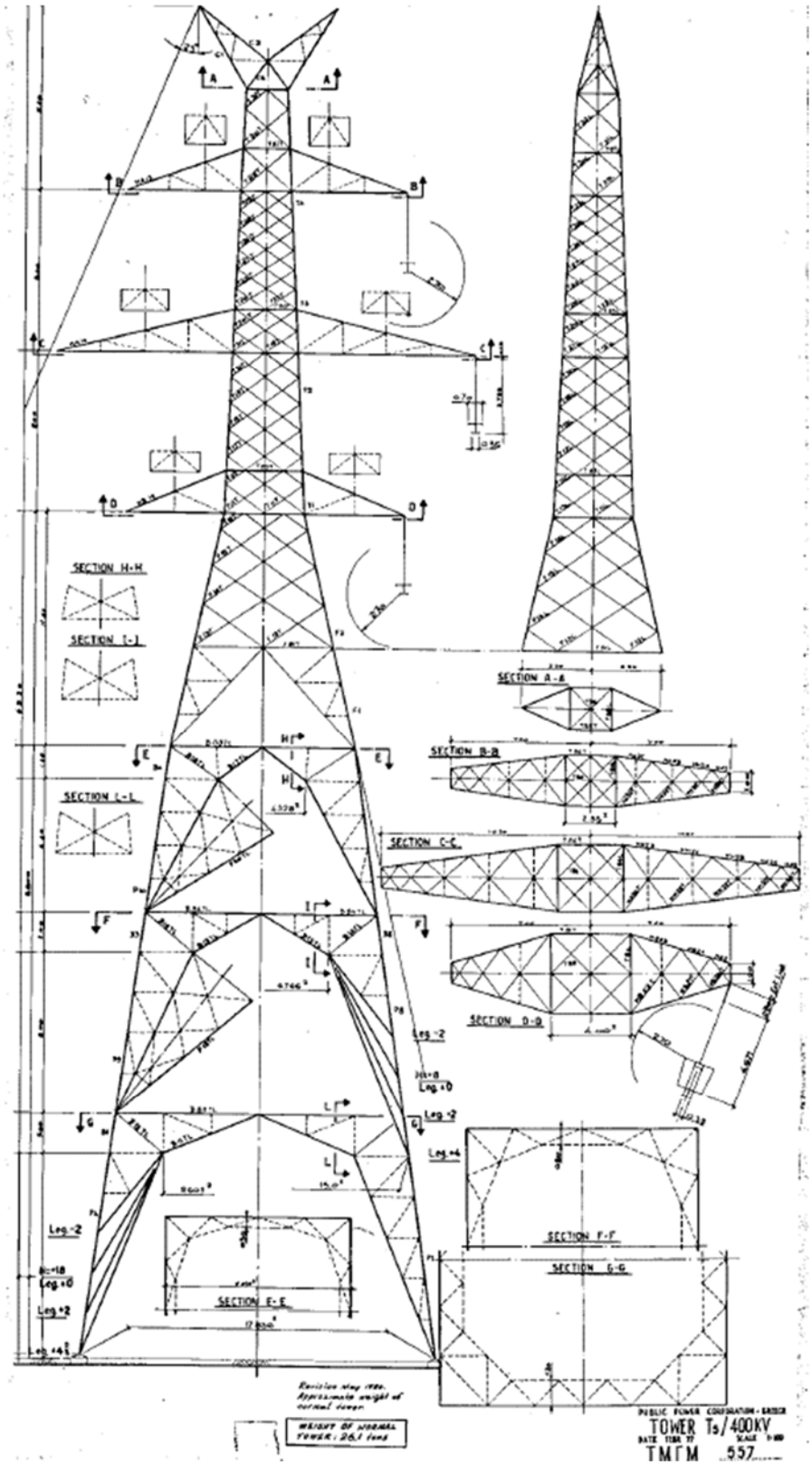


Figure 6.3: 45° angle "5" series pillar, type T5.

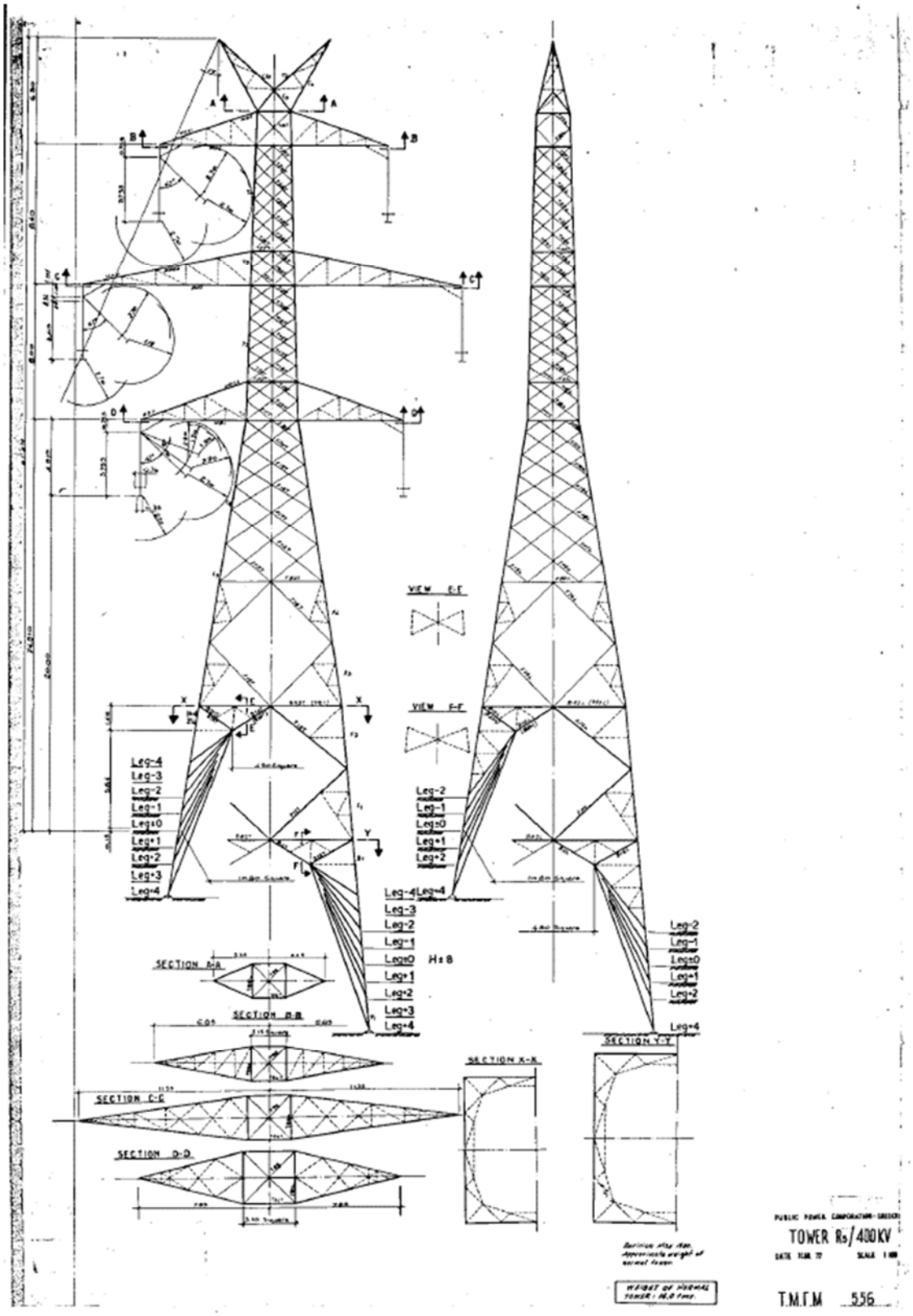


Figure 6.4: Small angle "5" series pillar, type R5.

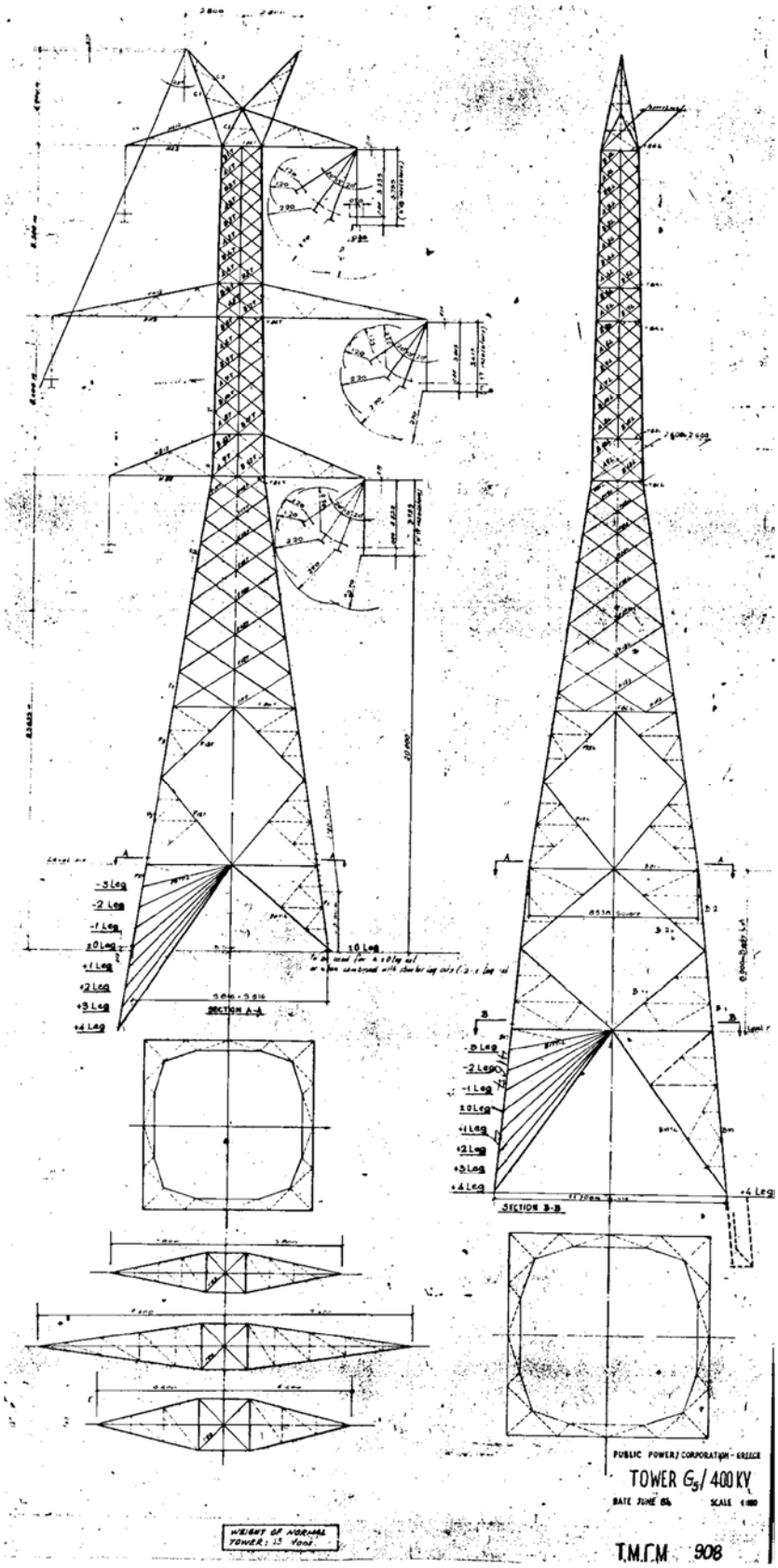


Figure 6.5: "5" series pillar of large G5 openings

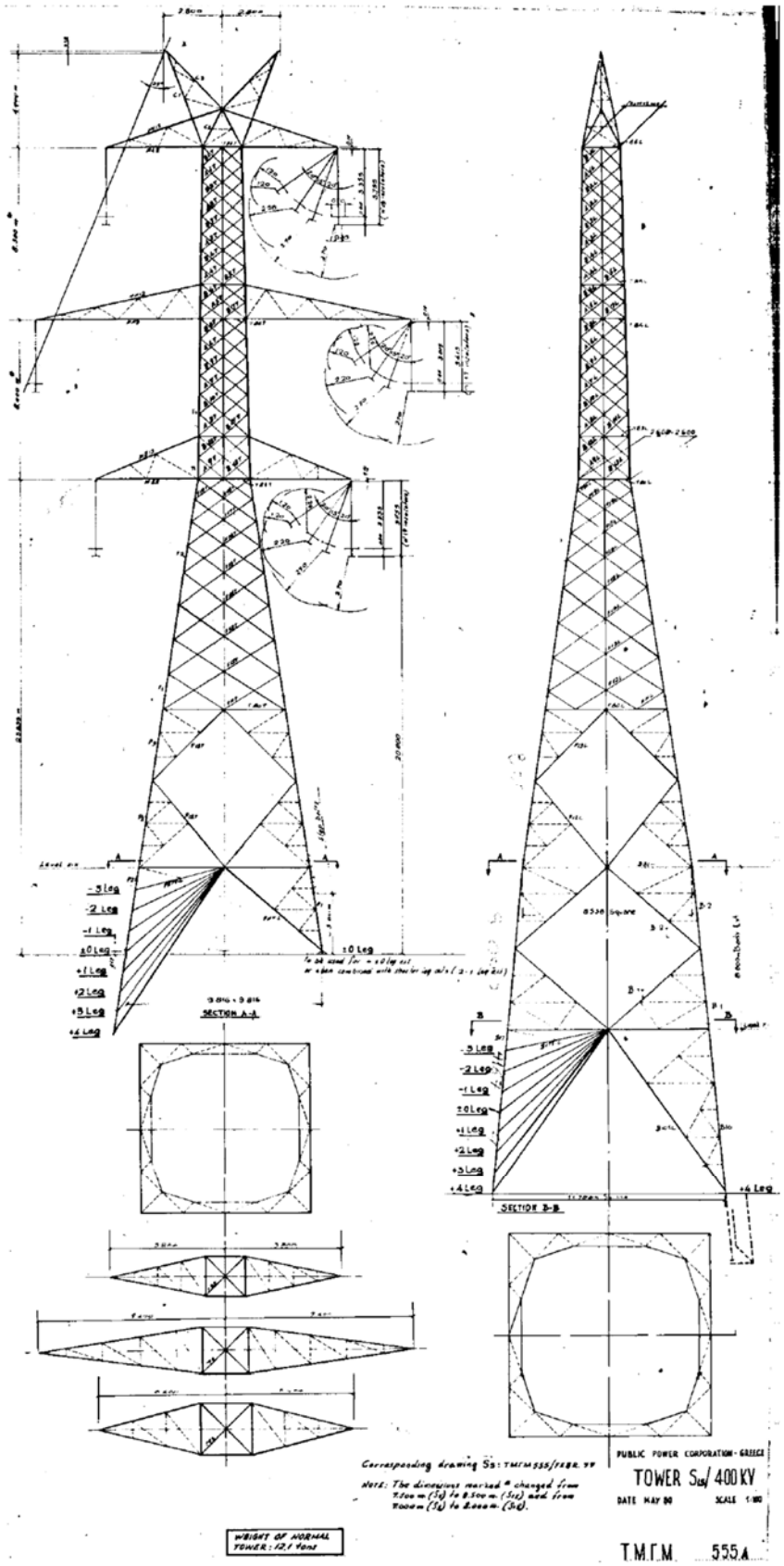


Figure 6.6: Alignment series "5" pillar, type S15.

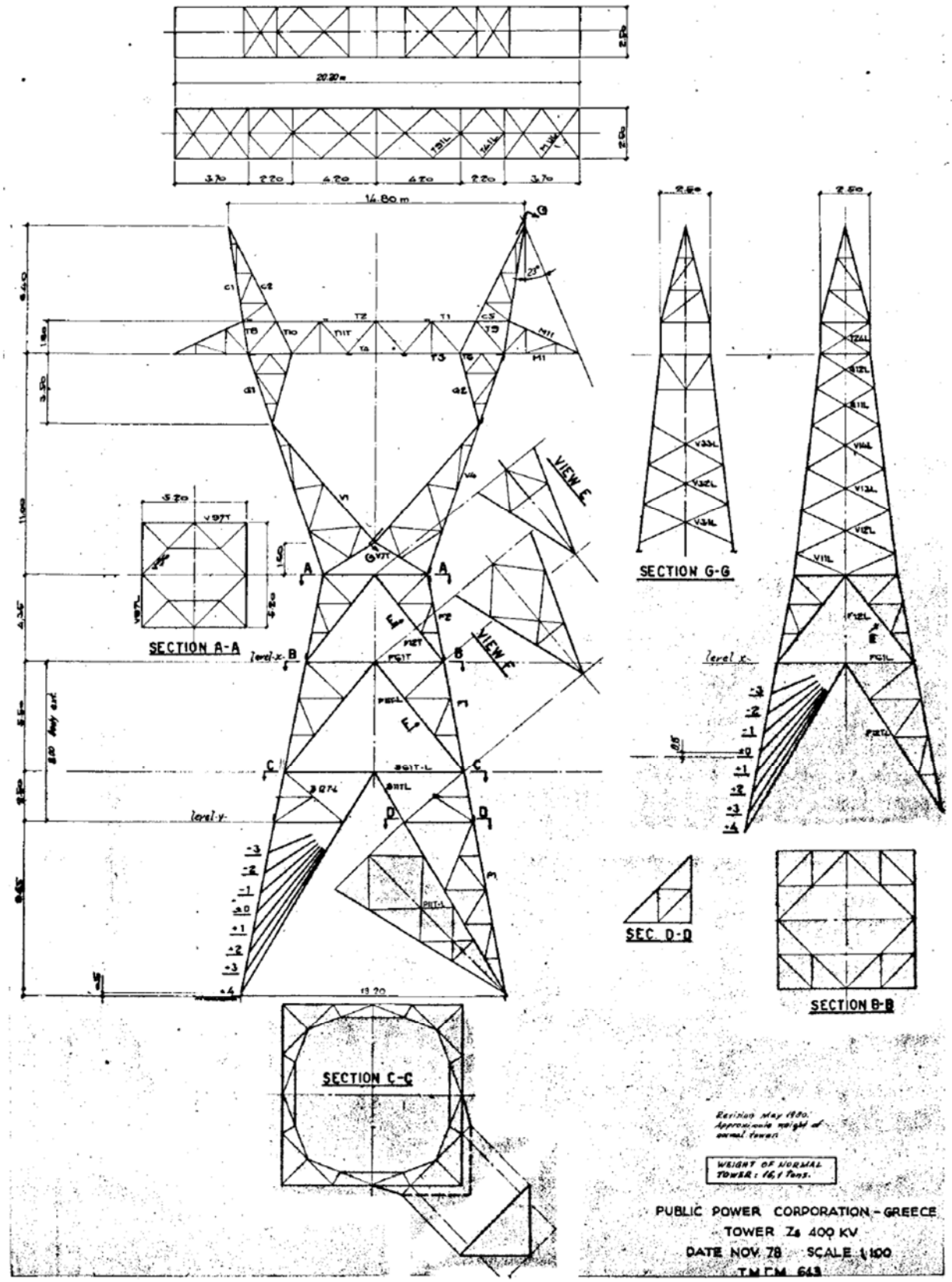


Figure 6.7: 75° or finish angle "6" series pillar, type Z6.

The suspension height from the ground for each normal height tower is 20.0m. For each tower there is also a trunk extension of +8.0m. Especially for the R5 and T5 towers there is also a trunk lengthening of +18.0m. The above table shows the trunk lengthenings for each tower.

This indicates that corner towers are used, where the line changes direction. The point where this change of direction (angle) appears is called a crossing point (intersection). The angle pillars shall be placed at the crossing points so that the transverse axis of the arm divides the angle created by the conductor, thus balancing the longitudinal loads of the ducts in the adjacent openings.

6.1.4 Foundations - Pillar construction squares

Each tower is based on four (4) independent concrete foundations. The steel stems of the foundations (extensions of the uprights of the legs) are surrounded by the concrete of the foundation that is reinforced if necessary by reinforcement of concrete. The strains will be of varying sizes depending on the type of foundation to be applied. However, their lengths and respective theoretical weights are determined by Independent Power Transmission Operator S.A. The following types of foundations are used: rock anchorage, sandal type for various ground voltages, stake type (AUGER), etc. For each type of foundation is determined when ordering the tower steel corresponding stem length. Each tower will be accompanied by four ground rods, one for each foundation. These are steel, hot plated, 2cm in diameter and 2.0m long and are connected each to each foundation, to the corresponding foundation stem, at the bottom of the base, and to a suitable screw, via a single-circuit steel plated hot conductor in order to achieve a good electrical connection of the rod to the tower. For additional grounding, where necessary, a single-stage 1cm diameter steel ground conductor connected to the tower at the first screw above the ground may be used. It takes four such screws of sufficient length for each tower (one for each leg).

For the assembly and installation needs of the towers, an appropriate surface area (square) of dimensions (20m×20m=400m^2) is required. A total of seventeen (17) new squares are planned, in which case the total area of occupation amounts to 6.800m^2.

6.1.5 High Voltage Substation (P/S) 400KV – HVC Ag. Nikolaos

The existing high voltage substation (Agios Nikolaos HVC), owned since 2017 by Independent Power Transmission Operator S.A., includes two (2) 400kV operating scales, following the mixed phase layout adopted in the National Interconnected TRANSMISSION System. The two scales are connected by a 400kV interlocking balance power switch.

Two (2) complete 400kV transmission line gates have also been provided, each comprising two (2) balance disconnectors with one grounder, a 400kV power switch, a line de-coupler with a ground line and means of communication. Also, for each transmission line gate there are transformers (M/S) of tension between switch and line disconnect, for measurements and protection, as well as a voltage M/S for measurements on the end of the line.

A gate of the 400kV lift transformer has been built. For this gate, two (2) balance disconnectors with one grounder are included, as well as one M/S of intensity per phase for measurements and protection.

For outbound and incoming active and inactive energy measurements, the whole device includes two meters, the main meter and the verification meter, as well as a teletransmission system of the measurements. The connection of these two meters (master and verification) is achieved through independent M/S tension and tension wraps.

Teletransmission, remote control, remote control and remote control systems include fere frequency devices, wave traps, Remote Terminal Units (RTU) devices and automatic production adjustment devices, as well as their power supplies.

The following figure shows the boundary of the installation field of the 400KV High Voltage PC – HVC Ag. Nikolaos.

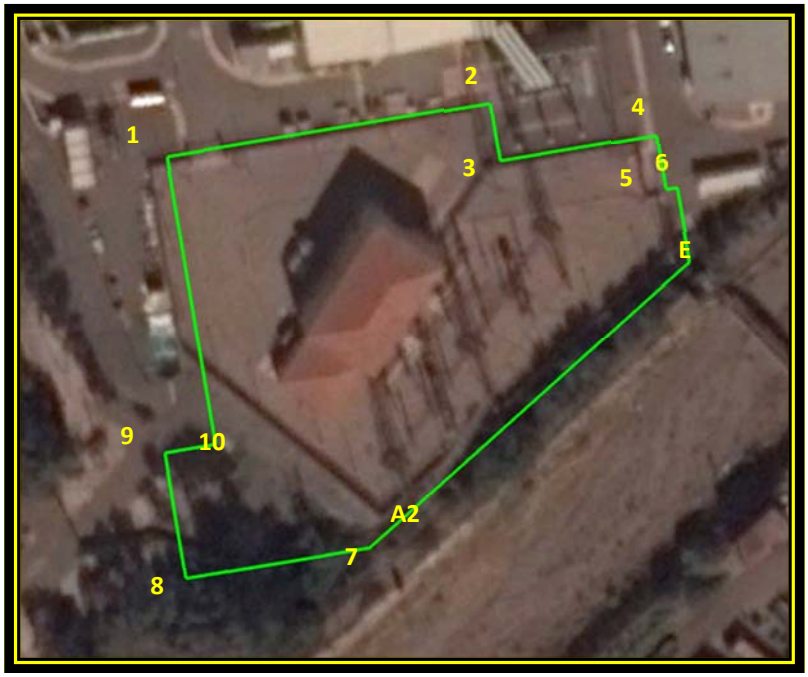


Figure 6.8: View of satellite imaging (google earth), indicating the boundary of the pc's area with its peaks.

The following table shows the geographical coordinates of the high-voltage PC installation site, in the Greek Geodesic Reference System 1987 (EGSA '87) and in the Global Geodesic System WGS '84.

Table 6.3: Coordinates of the tops of the installation field of the high-voltage PC area.

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	ϕ (°)	λ (°)
1	385.283,86	4.245.921,51	38° 21΄ 24,21΄΄	22° 41΄ 19,50΄΄
2	385.341,86	4.245.930,42	38° 21΄ 24,52΄΄	22° 41΄ 21,88΄΄
3	385.343,47	4.245.919,89	38° 21΄ 24,18΄΄	22° 41΄ 21,95΄΄
4	385.371,59	4.245.924,21	38° 21΄ 24,34΄΄	22° 41΄ 23,11΄΄
5	385.373,11	4.245.914,32	38° 21΄ 24,02΄΄	22° 41΄ 23,18΄΄
6	385.375,09	4.245.914,63	38° 21΄ 24,03΄΄	22° 41΄ 23,26΄΄
E	385.377,18	4.245.901,15	38° 21΄ 23,59΄΄	22° 41΄ 23,35΄΄
A2	385.326,08	4.245.856,23	38° 21΄ 22,11΄΄	22° 41΄ 21,27΄΄
7	385.319,13	4.245.850,28	38° 21΄ 21,91΄΄	22° 41΄ 20,99΄΄
8	385.286,21	4.245.845,26	38° 21΄ 21,74΄΄	22° 41΄ 19,64΄΄
9	385.282,72	4.245.868,00	38° 21΄ 22,47΄΄	22° 41΄ 19,48΄΄
10	385.291,87	4.245.869,40	38° 21΄ 22,52΄΄	22° 41΄ 19,86΄΄

At this point it should be noted that before the completion of the diversion (change of way) projects of part of the existing 400kV electricity T.L and its connection to the Distomo HVC , the following work is foreseen in the HVC Ag. Nikolaos, which will be executed within the licensed -with the No. 124363/16.04.2010 E.T.A., as applicable- and in operation HVC AG. Nikolaos. Since the relevant H.T. cable terminal bases (LV Sealing Ends) are already licensed and constructed it is routed:

- Installation of Metal Structures supporting cable terminals in front of the existing gate to HVC Distomos for the connection of the 2nd Y.T. cable system to serve GM 400kV HVC Ag. Nikolaos - HVC Distomo I, Series 5 Towers, double-circuit twin conductors per phase (2B'B'/400).
- Cut 3 RV Sealing Ends in front of an existing gate to ACHELOOS HVC (box 14).
- Transfer, Adjustment and Termination of the cut-off end of the P.S. cable system from the front of an existing gate to ACHELOOS HVC to the front of the existing gate to distomos HVC (box 20), for the connection of the 2nd Y.T. cable system to serve GM 400kV HVC Ag. Nikolaos - HVC Distomo I, Series 5 Towers, double-circuit twin conductors per phase (2B'B'/400). The Gate will be renamed TO HVC DISTOMO I.
- Installation of plates and sealing of A.T. cable channel
- Electrical cable terminal connection with GIS terminals, according to design.
- Modify relevant P.D. line protection settings according to the new conditions configured.

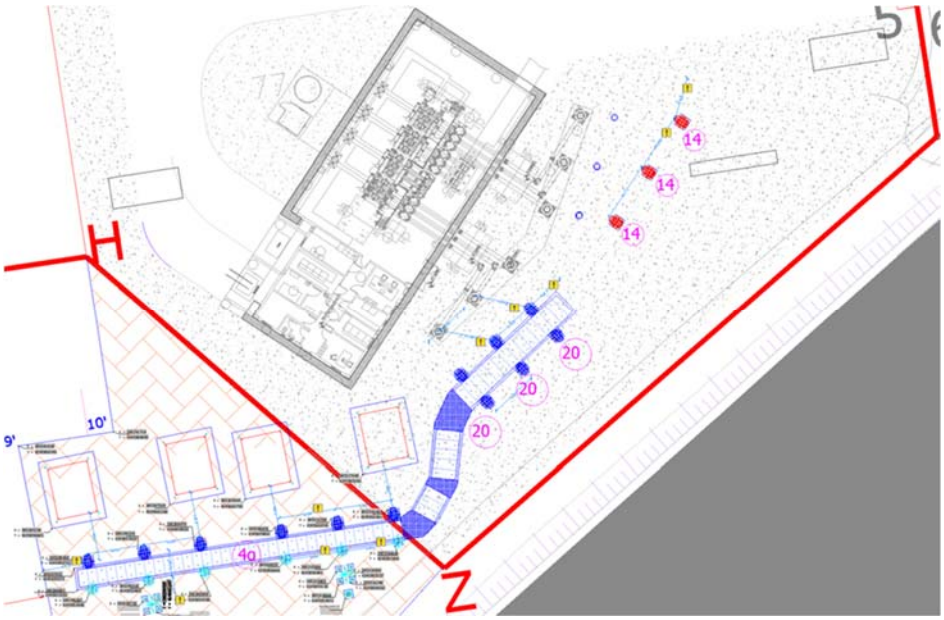


Figure 6.9: General representation of the interventions in the HVC of Agios Nikolaos. At the same time, the above work will also complete the work of implementing the connection of the New Station Ag. Nikolaos II 826MW, licensed under No. RIS/REGIONAL DEVELOPMENT DIRECTORATES/114847/6959/09.12.2019 ETA, with HVC Ag. Nicholas, and described as follows:

- Installation of a gate of the 400kV GIS lift transformer, similar to the one already installed, which serves the connection of the HVC Agios Nikolaos with the Thermal Power Plant Ag. Nikolaos (444,48MW). This gate includes two (2) balance disconnectors with a grounder, a 400kV power switch, a cable disconnector and grounder as well as a volume and voltage M/S per phase on either side of the power switch for measurements and protection and a complete system of protection, measurement and control/teleregulation, in accordance with the applicable National Specifications of the System Operator for unit connections of corresponding criticality. The installation of this gate will take place within the GIS building, without extending it and in particular in an area that had been provided as a future gate according to its original design. It should be noted that in the whole of the above installation process the security procedures of the System Manager will be followed as they will be done with the substation in operation, taking advantage of course the design of this as a double balance so as to isolate one by one the balance, where the relevant work will be carried out.
- The execution of civil engineering works for the extension of a high-voltage underground cable channel in order to accommodate the cable within the boundaries of the 400KV – HVC Ag. Nikolaos.
- Finally, the work will be completed by installing the planned High Voltage cable and shutting it down by configuring the necessary P.S. cable terminals to connect to GIS.

6.2 DETAILED DESCRIPTION OF MAIN, AUXILIARY AND SUPPORTING - PROJECT SESSIONS

6.2.1 Formation of a new road construction

In order to meet the construction and operation needs of the new section of the electricity transmission line, a new forest road, with a total length of about 4.174m, is required. For the purposes of this study, the wider study area was separated into three different areas, namely the southern part concerning pillars P11N, P12N, P12AN, P12BN,..., P12EN, the central section with pillars P9N and P10N and the northern part, with pillars P1N, P2N,..., P8N.

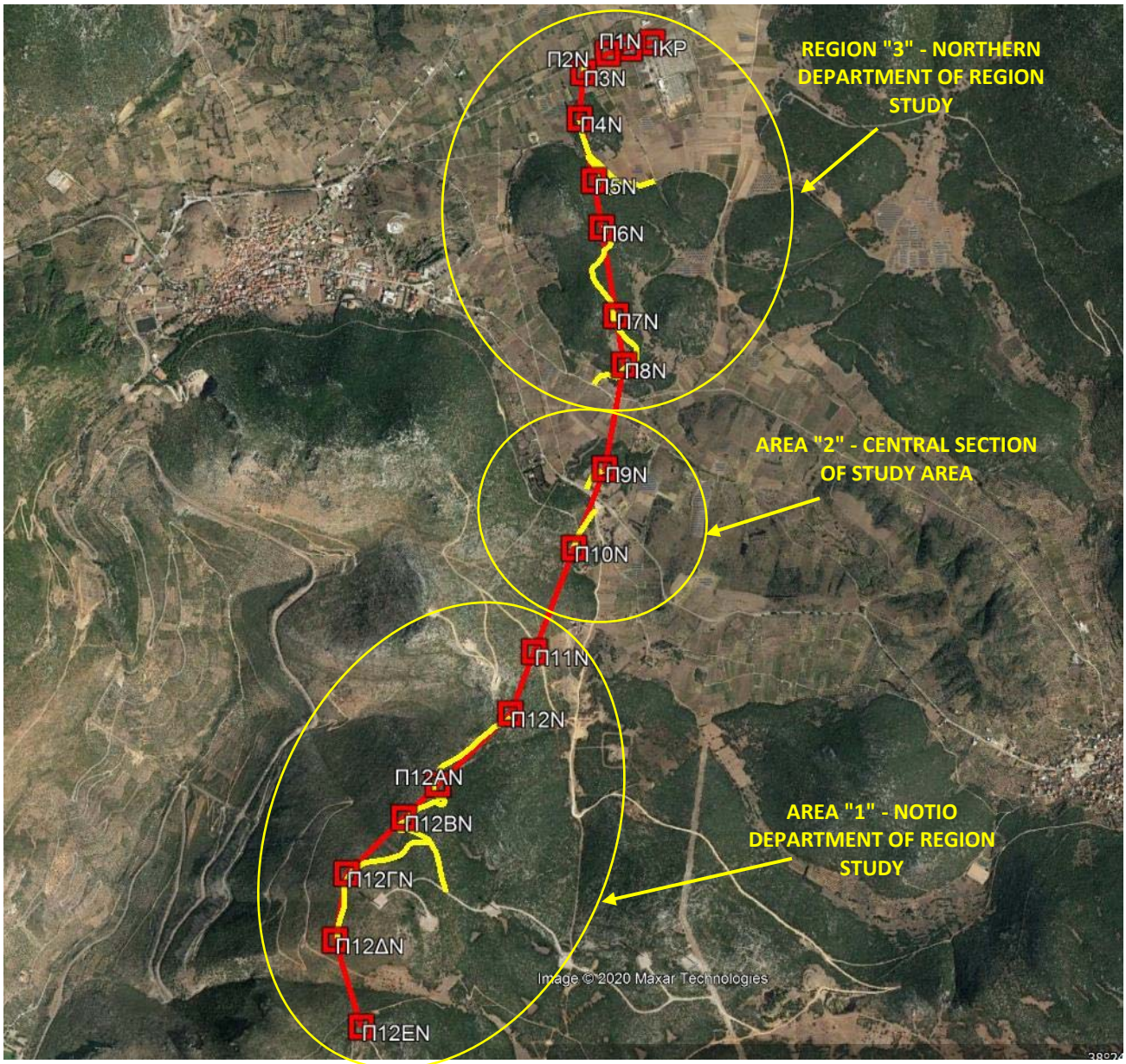


Figure 6.10: General representation of parts of study areas.

Southern Section - Area "1"

Pillars P11N, P12N, P12AN, P12BN, P12GN, P12DN and P12EN are installed in this area. For access to all the squares to be built, it is estimated that two different engravings will be implemented, P1-ROAD1 with a longer length leading to the position of pillar P12N, passing through pillars P12AN and P12BN and P1-DOS2 starting from H.T. 0+240 of the first and ending at pillar square P12DN, passing through pillar square P12GN.

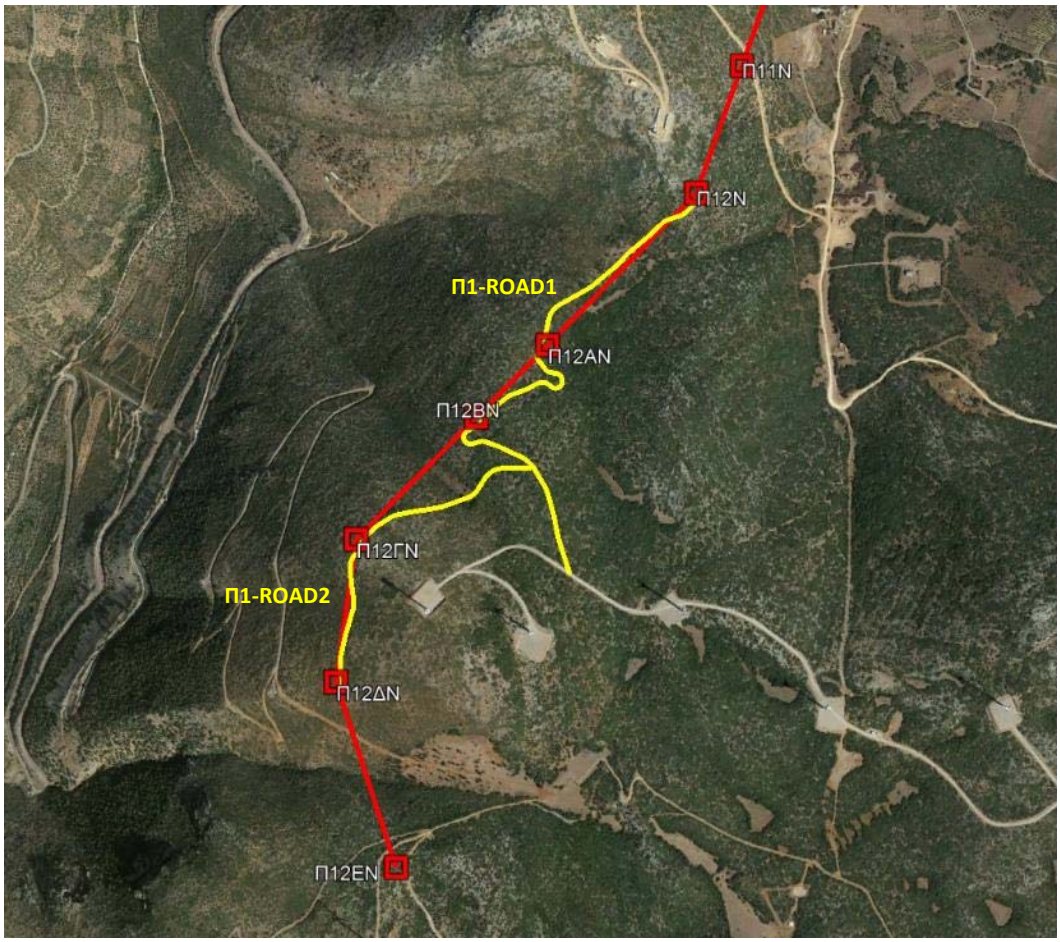


Figure 6.11: General area road layout 1.

Especially for square P11N, it is not necessary to draw up a new access road, as its location is particularly close (approximately 10m) to the existing earthy road leading to a wind farm and it was estimated that it is possible to build the square through local small intervention on the relevant road.

With regard to P1-ROAD1, it moves from its contribution with the existing network in the south to the location of pillar square P12N, through two characteristic manoeuvres in order to maintain the volumes of the required floors in as low quantities as possible, with a total length of about 1.285m.

Regarding its geometric characteristics, the longitudon gradients are locally intense, reaching up to a maximum of 12%, due to the requirement to achieve specific altitudes for the squares of the pillars, while horizontally there are no obstacles, nor other road networks. The morphology of the transit soil is very rocky with locally very steep slopes of up to 35%. The road generally moves in a pit in order to ensure the construction of a triangular water catchment ditch (at least half the way) and to avoid the need to place the road in a mixed cross section (pit-surface) with the coating

The engraving of P1-ROAD2, begins at its junction with P1-ROAD1 and continues until its end in the square of pillar P12DN, with a total length of about 735m. It is a road that is mainly placed in a cove in order to avoid the creation of soils, as due to a high slope of the natural soil, they acquire a particularly high height, not materialable for the character of the project.

Regarding its geometric characteristics, the longitudin gradients are generally mild as its elevation starting point was chosen in direct relation to the final desired altitude of arrival in the square "of pillar P12DN. Horizontally there are no obstacles and the relief is followed, while the morphology of its soil is particularly rocky with locally very strong gradients of up to 50%.

Central section – Area "2"

The pillars P9N and P10N are installed in this area. For access to these squares, two engravings will be implemented, P2-ROAD1 leading to Pillar Square P10N and P2-ROAD2 leading to Pillar Square P9N.

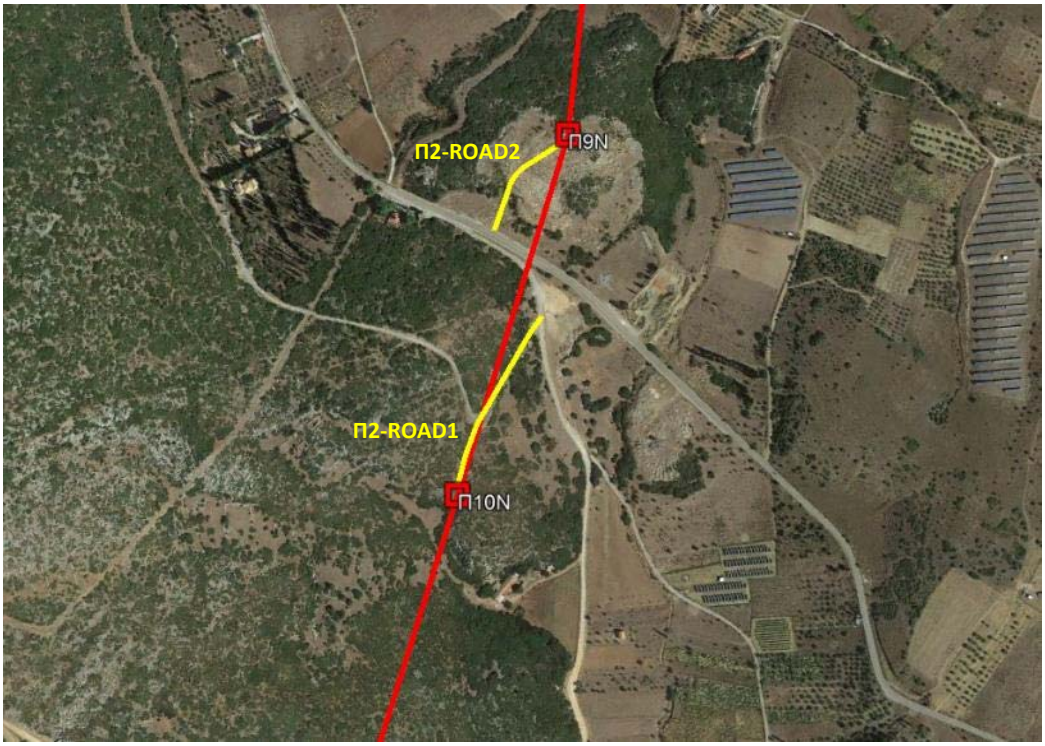


Figure 6.12: General area road layout 2.

Access to the new square spaces takes place through the existing road network both paved and adjacent earthy roads. In particular, the new engraving of the **P2-ROAD1** road begins with the existing road leading south to wind farms and ends at the location of pillar square P10N after about 200m. During its route, a

small widening of the existing earthy road takes place, as it has an average width of about 3m. The construction of the road **Π2-ROAD2**, starts from the national road Iteas - Ag. Luke and finishes at the position of the P9N pillar after a length of 120m, approx

Regarding their geometric characteristics, these are roads on existing engravings with mild gradients in relief level and soil morphology moderately rocky. Especially for the engraving of the P2-ROAD2 road, the possibility of differentiating the excavation depth is highlighted, as macroscopically the soil shows an image of chronic deposits of materials.

North - Area "3"

The pillars P1N, P2N, P3N, P4N, P5N, P6N, P7N and P8N are installed in this area. For access to these squares, four (4) engravings will be implemented, P3-ROAD1 with a longer length leading to the position of Pillar P6N, P3-ROAD2, which is opened for access to Pillar P4N, P3-ROAD3 for access to Pillar Square P5N and P3-ROAD4 for access to Pillar Square P3N.

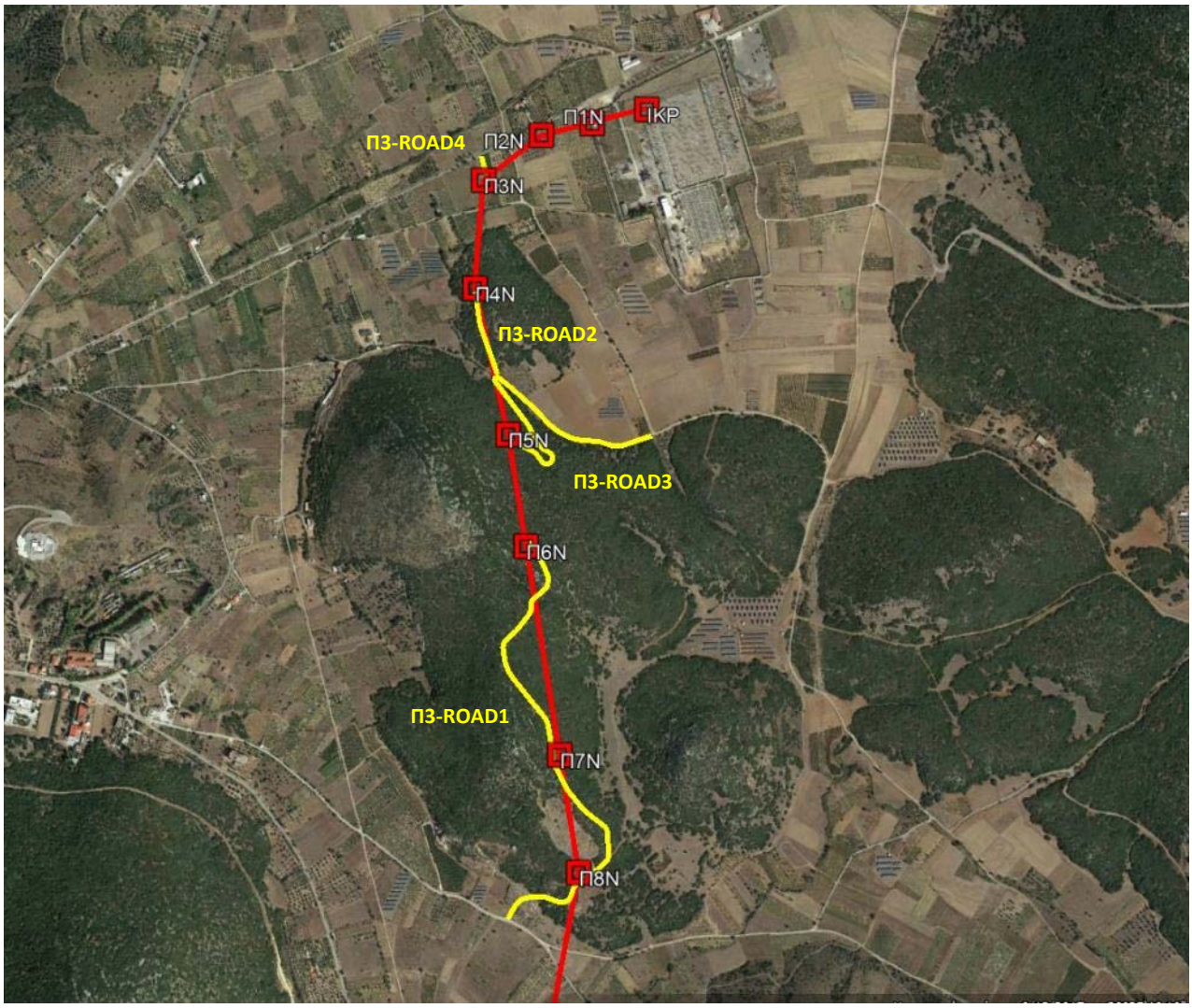


Figure 6.13: General area street layout 3.

Access to the new square spaces is via the existing road network of both paved and adjacent roads. In particular, the new engraving of **P3-ROAD1** starts from the existing paved road and ends at the location of square P6N after about 980m, passing through the squares P7N and P8N. Initially, during its journey there is a slight widening of the existing earthy road, as it has an average width of about 3 – 4m and takes into account the guarantee of accessibility to adjacent locations (existing earthy roads) both altitude and the relative configuration of the new road's roads.

Regarding its geometric characteristics, it is a road partly on an existing engraving with mild gradients initially up to the square of pillar P8N, but then moves in an unformed rocky relief with local large gradients. The passage through the natural snag of the ground approximately before arrival in square P6N is achieved by the relative curve of the road and installation of a technical tubular conductor Ø800. Note the deliberate

choice of not continuing the road to square P5N and the choice of alternative engraving, as during this route it is impossible to observe a slope <12% non-cut, without implementing several horizontal inflections.

The engraving of **P3-ROAD2**, begins from the existing earthy road and ends in the square of pillar P4N after about 166m. It moves in rocky and mild to moderate relief in terms of gradients. The gentle excavation (ory) is chosen in order to avoid large floors.

The design of the **P3-ROAD3** road concerns access to the location of pillar P5N, as well as more generally the improvement of access from the paved road south of the HVC Distomos to the starting position of the above-mentioned P3-ROAD2 road. Initially from the junction with the white road there are mild gradients of up to about 4% and a small widening is carried out on the available deck, as the existing road has an average width of about 3-4m. The climb to the position of square P5N is then attempted by touching the maximum longitudin gradient, combined with a recovering manoeuvre. As far as prane is concerned, they are formed by a triangular run-off ditch, almost the entire length of this section. The total length of the P3-ROAD3 road is 650m.

The engraving of the **P3-ROAD4** road is a small intervention in order to gain access to the position of the pillar from the urban road leading from the settlement of Distomos to the HVC Distomos. The crossing was chosen through a parcel of land with the road having a total length of about 38m, tangent to the natural terrain.

The following table shows the geographical coordinates of the road sections under study (beginning, middle and end), which are being used to meet the construction needs of the proposed project, M.U. the displacement of the 400kV High Voltage Transmission Line. The geographical coordinates of the new routes are given in the Greek Geodesic Reference System 1987 (EGSA '87) and the Global Geodesic System WGS '84.

Table 6.4: Coordinates of the road sections under study, in the Greek Geodesic Reference System 1987 (EGSA '87) and in the Global Geodesic System WGS '84.

ROADS	A/A	EGSA ΄87		WGS ΄84	
		X (m)	Y (m)	φ (°)	λ (°)
Π1-ROAD 1	beginning	384.265,5	4.251.085,5	38° 24΄ 11,23΄΄	22° 40΄ 34,49΄΄
	waist	384.229,7	4.251.497,4	38° 24΄ 24,58΄΄	22° 40΄ 32,78΄΄
	end	384.574,3	4.251.888,5	38° 24΄ 37,42΄΄	22° 40΄ 46,75΄΄

Π1-ROAD 2	beginning	384.190,2	4.251.315,3	38^{O} 24′ 18,65′′	22^{O} 40′ 31,25′′
	waist	383.856,0	4.251.205,2	38^{O} 24′ 14,93′′	22^{O} 40′ 17,54′′
	end	383.765,0	4.250.865,7	38^{O} 24′ 03,87′′	22^{O} 40′ 14,00′′
Π2 ROAD - 1	beginning	384.981,4	4.252.835,5	38^{O} 25′ 08,33′′	22^{O} 41′ 02,97′′
	waist	384.922,0	4.252.752,6	38^{O} 25′ 05,61′′	22^{O} 41′ 00,57′′
	end	384.879,7	4.252.667,3	38^{O} 25′ 02,83′′	22^{O} 40′ 58,88′′
Π2- ROAD 2	beginning	384.939,2	4.252.928,4	38^{O} 25′ 11,23′′	22^{O} 41′ 01,18′′
	waist	384.965,4	4.252.982,2	38^{O} 25′ 13,08′′	22^{O} 41′ 02,23′′
	end	385.014,0	4.253.010,7	38^{O} 25′ 14,03′′	22^{O} 41′ 04,21′′
Π3- ROAD 1	beginning	384.982,8	4.253.409,7	38^{O} 25′ 26,95′′	22^{O} 41′ 02,69′′
	waist	385.072,2	4.253.720,8	38^{O} 25′ 37,08′′	22^{O} 41′ 06,20′′
	end	385.038,2	4.254.142,1	38^{O} 25′ 50,73′′	22^{O} 41′ 04,55′′
Π3- ROAD 2	beginning	384.974,3	4.254.466,9	38^{O} 26′ 01,24′′	22^{O} 41′ 01,72′′
	waist	384.947,8	4.254.545,6	38^{O} 26′ 03,78′′	22^{O} 41′ 05,58′′
	end	384.933,3	4.254.627,5	38^{O} 26′ 06,44′′	22^{O} 41′ 00,53′′
Π3- ROAD 3	beginning	385.274,6	4.254.341,9	38^{O} 25′ 57,32′′	22^{O} 41′ 14,18′′
	waist	384.994,4	4.254.445,0	38^{O} 26′ 00,54′′	22^{O} 41′ 02,56′′
	end	385.001,6	4.254.335,2	38^{O} 25′ 56,98′′	22^{O} 41′ 02,92′′
Π3- ROAD 4	beginning	384.948,7	4.254.894,2	38^{O} 26′ 15,09′′	22^{O} 41′ 00,41′′
	waist	384.952,6	4.254.875,7	38^{O} 26′ 14,49′′	22^{O} 41′ 00,58′′
	end	384.957,3	4.254.857,2	38^{O} 26′ 13,89′′	22^{O} 41′ 00,79′′

6.2.2 Reunification of the circuit of high voltage center Acheloos – high voltage center Distomo

The reunification of the Acheloos HVC - Distomo HVC circuit, which has been environmentally licensed and is used in the current situation for interconnection with the Agios Nikolaos HVC , will take place by removing the flexible connecting ducts of pillar 330AN (Type T6) with pillar P1 (type Z5+8) on both circuits. Then, with the connection of the bridges and the 3 phases carried by 330AN, the physical continuity of the HVC Acheloos – HVC Distomos circuit will be completed. The above work will be done with disabled T.L 400kV HVC Acheloos – HVC Ag. Nikolaos and HVC Ag. Nikolaos - HVC Distomo and applying all the relevant procedures of the National Electricity Transmission Manager.

Figure 6.14: Satellite imaging extract showing the environmentally licensed connection of the existing electricity T.L with T.L 400kV HVC Acheloos – HVC Distomo.

6.2.3 Removal of part of the 400kV Electricity Transmission Line

This amendment proposes the abolition of the last 3,833m of the existing and environmentally licensed T.L electricity 400kV, in its connection with the existing High Voltage T.L 400kV HVC Acheloos – HVC Distomo, as well as twelve (12) existing pillars and the construction of a new T.L of about 5,198m length with seventeen (17) new pillars and its connection directly to the Distomo HVC .

Work on the decommissioning of pipelines and the dismantling of towers includes, but is not limited to:

- The required dismantling of suspension or tensioning equipment, installation of conductor rolling pulleys.
- The removal of pipelines.
- The dismantling of all steel elements of the towers.
- Classification and baling of these.

- The removal and transport to the warehouses of the Independent Power Transmission Operator of all the deposed equipment.

The following satellite imagery extract shows the part of the electricity transmission line to be removed, as well as the corresponding pillars.

Figure 6.15: A google earth extract showing the section of the transmission line under removal, as well as the corresponding pillars to be dismantled.

The following table shows the geographical coordinates of the pillars to be dismantled - on the basis of the requested modification - of the above High Voltage Transmission Line 400kV, in the Greek Geodesic Reference System 1987 (EGSA '87) and in the Global Geodesic System WGS '84.

Table 6.5: Coordinates of the pillars to be dismantled of T.L electricity 400kV, on the basis of the requested modification.

A/A	EGSA ΄87		WGS ΄84	
	X (m)	Y (m)	ϕ (°)	λ (°)
Π1	381.675,525	4.253.616,850	38° 25΄ 32,12΄΄	22° 38΄ 46,21΄΄
Π2	381.881,284	4.253.321,446	38° 25΄ 22,63΄΄	22° 38΄ 54,87΄΄
Π3	382.115,620	4.252.985,015	38° 25΄ 11,83΄΄	22° 39΄ 04,73΄΄
Π4	382.281,370	4.252.747,050	38° 25΄ 04,19΄΄	22° 39΄ 11,71΄΄
Π5	382.487,129	4.252.451,647	38° 24΄ 54,71΄΄	22° 39΄ 20,37΄΄
Π6	382.601,440	4.252.287,534	38° 24΄ 49,44΄΄	22° 39΄ 25,18΄΄
Π7	382.715,750	4.252.123,420	38° 24΄ 44,17΄΄	22° 39΄ 29,99΄΄
Π8	382.872,927	4.251.897,765	38° 24΄ 36,93΄΄	22° 39΄ 36,61΄΄
Π9	383.233,005	4.251.380,808	38° 24΄ 20,33΄΄	22° 39΄ 51,76΄΄
Π10	383.435,858	4.251.089,503	38° 24΄ 10,98΄΄	22° 40΄ 00,30΄΄
Π11	383.601,687	4.250.851,557	38° 24΄ 03,34΄΄	22° 40΄ 07,27΄΄
Π12	383.881,716	4.250.449,466	38° 23΄ 50,42΄΄	22° 40΄ 19,05΄΄

6.2.4 Development of necessary Outdoor Electrical Equipment 2 complete gates for the interconnection of T.L 400kV inside the existing HVC of Distomo

For the interconnection of T.L 400kV with the Distomo HVC , equipment will be installed within the licensed, with the No. 5119/149.08.2009 ETA, and in operation HVC Distomo, without extending it to a neighbouring area, while the relevant terminal scaffolding lines are already licensed and constructed. The development of the two (2) complete gates with the necessary equipment for the 400kV T.L interconnection within the DISTOMOS HVC refers to the already submitted Renewal Envelope 143072/04.08.2009 HVC 400/150kV DISTOMOS as a future possibility.

The work that will take place within the HVC Distomos, concerns the execution of civil engineering projects for the construction of outdoor equipment suspension bases and the extension of underground cable channels. We will then proceed to the installation of the planned EM equipment per portal, which includes at least the following main parts:

- ✓ Two 400kV three-polar scales with electric mechanism
- ✓ One 400kV tripoly switch
- ✓ One set (three) M/S Intensity 400kV at least two wraps
- ✓ An electric tripoly 400kV tripolar coupler at the exit of the gate with 400kV courier at the gate exit with locking mechanism

- ✓ Three N/A Inductive type with three secondary wraps
- ✓ Three 400kV lightning rods
- ✓ One wave trap and one coupling capacitor
- ✓ All required protection systems

The specific characteristics of all the abovementioned equipment as well as the necessary pre-commissioned tests of the above equipment will be determined by signing the Implementation/Association Agreement between the Independent Power Transmission Operator and the producer in accordance with the respective National Independent Power Transmission Operator /DNEM Specifications, which will be in force at the time.

6.3 DESCRIPTION OF PART ELEMENTS OF THE PROJECT

6.3.1 Connections with road network and infrastructure networks

Access to the project under study is via the existing paved road network, but also through the adjacent earthy roads. In order to meet the construction needs of the new section of the transmission line, a new forest, with a total length of about 4,174m, is required, as detailed in section 6.2.1.

6.3.2 Parking spaces

The project under study does not create the need for parking spaces.

6.3.3 Overall assessment of the land area occupied

The amendments proposed in this study concern the following:

- construction of seventeen (17) new towers (pillars), an area of occupation of 20m×20m=400m2, for each pillar and for all the new pillars: 400m^2 × 17 = 6,800m^2
- opening of a new forest road - to serve the construction needs of the new transmission line - of a total length of about 4,174m. The area of occupation of the new roads, as documented in the following table, amounts to approximately 32,769m^2.

Table 6.6: Area of occupation of each road section to be opened.

road	Length (m)	Width (m)	CONSTRUCTION (m^2)
Π1-ROAD 1	1.285	5,0	11.994
Π1-ROAD 2	735	5,0	6.000
Π2-ROAD 1	200	5,0	1.120
Π2-ROAD 2	120	5,0	818
Π3-ROAD 1	980	5,0	6.996
Π3-ROAD 2	166	5,0	1.168
Π3-ROAD 3	650	5,0	4.443
Π3-ROAD 4	38	5,0	230,0
total	**4.174**	**-**	**32.769**

On the basis of the above, **the proposed amendments will occupy an area of 39,569m2.**

Table 6.7: Extent of occupation of environmentally licensed project and proposed modifications

project	Area of occupation of an environmentally licensed project (m^2)	Scope of occupation of proposed amendments (m^2)	Scope of dismantling operations (m^2)	Total take-up after the requested amendments (m^2)
Pillar Squares	15.300	6.800	4.800	17.300
Roads	44.747,09	32.769	-	77.516,09
Substation	5.275	-	-	5.275
Pillars T.L HVC Acheloos - HVC Distomo	2.804	-	-	2.804
total	**68.126,09**	**39.569**	**4.800**	**102.895,09**

The area occupied by the environmentally licensed project, under the current GNP, amounts to 15,300m2 relating to the area occupied by the squares of the pillars, to 44.747,09m^2 from the opening of the roads, 5.275m^2 concerning the installation site of the PC and 2.804m^2 concerning the area of three pillars in place

of the T.L HVC Acheloos – HVC Distomos, for the connection of the line to the new position of the left circuit of the existing 400kV Transmission Line (HVC Acheloos – HVC Distomo). The total area occupied by the environmentally licensed project amounts to 68.126,09m^2.

On the basis of the proposed amendments, it is proposed to remove twelve (12) pillars occupying an area of 4.800m^2 and to propose projects occupying an area of **39.569m^2**. Therefore, the increase in the area of occupation, on the basis of the proposed amendments, amounts to **34.769m^2** (since twelve pillars are removed). The new area occupied by the proposed project, including the proposed amendments, will amount to **102.895,09m^2**.

The new section of the 400kV Electricity Transmission Line will require a slavery zone of 50m (25m on either side of the line at the intervention points) and a total area of 259.922m^2, as shown in the plan attached to this study, as well as in the Google Earth extract below.

Figure 6.16: A google earth extract showing the proposed modification of the high-voltage transmission line and the new slavery zone with a yellow polygon.

In the table below, the geographical coordinates of the peaks of the new slavery zone are presented in the Greek Geodesic Reference System 1987 (EGSA '87).

Table 6.8: Coordinates of the slavery zone of the proposed electricity transmission line, in the Greek Geodesic Reference System 1987 (EGSA '87).

A/A	RECOMMENDED X	RECOMMENDED Y
Δ1	385.279,43	4.254.959,85
Δ2	385.187,65	4.254.937,80
Δ3	385.075,92	4.254.909,38
Δ4	384.975,13	4.254.833,12
Δ5	384.957,01	4.254.639,41
Δ6	385.018,85	4.254.351,99
Δ7	385.051,55	4.254.133,09
Δ8	385.112,11	4.253.727,59
Δ9	385.146,74	4.253.495,78
Δ10	385.049,27	4.253.012,55
Δ11	384.901,69	4.252.646,97
Δ12	384.710,79	4.252.174,05
Δ13	384.594,58	4.251.886,15
Δ14	384.251,95	4.251.562,68
Δ15	384.091,98	4.251.411,66
Δ16	383.830,30	4.251.164,61
Δ17	383.775,00	4.250.873,24
Δ18	383.889,82	4.250.479,27
Δ19	383.841,82	4.250.465,28
Δ20	383.723,64	4.250.870,77
Δ21	383.784,19	4.251.189,85
Δ22	384.057,65	4.251.448,01
Δ23	384.217,62	4.251.599,04
Δ24	384.552,30	4.251.915,00
Δ25	384.664,43	4.252.192,76
Δ26	384.855,33	4.252.665,69
Δ27	385.001,17	4.253.026,97
Δ28	385.095,99	4.253.497,06
Δ29	385.062,66	4.253.720,20
Δ30	385.002,10	4.254.125,70
Δ31	384.969,63	4.254.343,03
Δ32	384.906,51	4.254.636,41
Δ33	384.927,39	4.254.859,70
Δ34	385.053,80	4.254.955,35
Δ35	385.175,65	4.254.986,34

A/A	RECOMMENDED X	RECOMMENDED Y
Δ36	385.267,75	4.255.008,47

6.4 CONSTRUCTION PHASE

6.4.1 Planning and schedule of individual work and construction stages

According to the project plan, work on the implementation of the amendments under consideration is expected to be carried out gradually within twelve (12) months..

6.4.2 Individual technical works of the main project

The work of the full construction of the new towers includes, but is not limited to:

- The construction of access roads to the locations of the towers where necessary and their maintenance during the project.
- The configuration of the ground in the area of the tower.
- Verification of the strands of the towers provided for in the study.
- Excavation, drilling, armament and concrete construction of the foundations.
- The transport of steel of bases (strands), logs and binder to the place of work. Storage, sorting and distribution of steel in the locations of towers.
- The assembly and installation of the base legs for which adjustment and horizontalization should be checked.
- The erection of the extensions and logs of the towers.
- The final arrangement of the soil around the strands as well as the painting of the strands where this is required with special material described in the issue of technical specifications for the anti-scopical protection of the strands.

Ground pipe installation works include:

- Measuring the resistances of all new towers after the construction of the bases and before the wire- Excavation in earthy or rocky soils and in depth specified in the Technical Specifications.
- The placement of the ground duct.
- The re-construction of the excavation and the connection of the pipeline to the tower.
- The installation of appropriate links, where the independent length of the ground pipeline is not sufficient.

Wiring works include:

- The transport to the construction site of all the materials necessary for full wire (insulators, ducts, micromaterials).
- The placement in the work of all the required materials.
- The assembly and installation of insulator chains, rolling pulleys, wire ropes drivers for the traction of phase and protection pipelines (OPGW and OPGW), any arrangement, construction or project required for the roll-out of pipelines over highways, roads, buildings, railways, telephone or electrical lines (Distribution or Transport), bridges, rivers, etc.
- The adjustment and tethering (terminal or suspension as appropriate) of the ducts.
- Installation of tower components that may not have been installed (tension chain lengthenings, tension chain removal beams, etc.), installation of bridges in tension towers.
- The clearance of the site of the towers and the transit slavery zone, the final inspection work of the Line, generally all related work and services required for ...

The works for the demolition of the pipelines and the dismantling of the towers include:

- The required dismantling of suspension or tensioning equipment, installation of pipeline rolling wheels.
- The removal of the ducts.
- The dismantling of all the steel elements of the towers.
- Classification and baling of these.
- The removal and transport to the warehouses of the Independent Power Transmission Operator of all the deposed equipment.

6.4.3 Construction support facilities, such as loan chambers, storage chambers and construction sites

The operation of the project will not require supporting facilities, such as loan and storage cubices.

With regard to the loans materials that will be required for the construction needs of the proposed project, they will be procured from legally operated quarries in the area. From the construction of the proposed project, M.U. from the configuration of the squares for the installation of the pillars, from the opening of the new forest road, from the construction work of the pillars, but also from the decommissioning work of the twelve (12) existing and environmentally licensed pillars, earthworks, M.U. excavations and earthworks, are provided, which are detailed in the table below.

Table 6.9: Table of earthworks of proposed projects.

WORK TYPE	EXPENDITURE (m^3)	EMBANKMENTS (m^3)	EXCESS (m^3)
Π1N	0	0	0
Π2N	20,63	16,22	4,41
Π3N	16,62	17,23	-0,61
Π4N	80,81	335,98	-255,17
Π5N	305,54	160,03	145,51
Π6N	481,43	0	481,43
Π7N	354,4	224,52	129,88
Π8N	178,09	152,73	25,36
Π9N	150,97	90,4	60,57
Π10N	51,11	57,21	-6,1
Π11N	501	16,37	484,63
Π12N	328,74	14,27	314,47
Π12A N	0	1063,49	-1063,49
Π12B N	389,03	403,38	-14,35
Π12Γ N	321,2	50,02	271,18
Π12Δ N	476,83	71,42	405,41
Π12E N	484,25	21,85	462,4
Π1-ROAD 1	7879,42	6899,73	979,69
Π1-ROAD 2	10840,04	401,44	10438,6
Π2-ROAD 1	432,56	93,1	339,46
Π2-ROAD 2	838,24	145,9	692,34
Π3-ROAD 1	4458,81	1058,35	3400,46
Π3-ROAD 2	1242,06	149,86	1092,2
Π3-ROAD 3	5527,67	201,34	5326,33
Π3-ROAD 4	87,14	31,53	55,61
DISINFECTIONS	5.000,0	0	5000,0
PILLAR THEMEDS	136	0	136
total	**40.582,59**	**11.676,37**	**28.906,22**

According to the above table, excavations amounting to 40.582,59m^3 are required from the construction work of the proposed projects, of which 11.676,37m^3 will be used for the necessary excavations. Therefore, the excess of the excavation products to be managed amounts to **28.906,22m^3.**

Surplus materials resulting from the construction phase, which cannot be used in re-operation operations, will be deposited in an environmentally licensed repository or in landfills or in areas where other projects

are carried out, which have approved environmental conditions and in which such materials can be used either in inactive quarries or through alternative management systems..

In any case, account must be taken of the legislation in force, namely D.A. 36259/1757/E103/2010 "Measures, conditions and programmes for the alternative management of waste from excavations, constructions and demolitions (E.C.D.)" (Government Gazette 1312 B' 2010), as amended and in force.

For the construction needs of the project and due to its nature since it is developed linearly, the location of a construction site will not be required. The machinery required for the construction of the project will come daily to the area and will not require the construction of construction facilities, M.U. offices, warehouses of materials, workshops, storage areas of machinery, concrete production complexes, etc. The storage of the machines will take place within the installation site of the HVC Agios Nikolaos or the adjacent existing Independent Power Station of MYTILINEOS S.A. / BS Electricity & Natural Gas.

The mechanical equipment required for the construction of the proposed projects is limited to the classical machinery for the construction of technical works such as:

- excavator – JCB: for the excavation needs to be carried out.
- trucks: for the transport of the necessary raw materials in the project area, but also for the transport of excavation materials.
- concrete transport trucks (barrels): for the construction needs of the foundation projects.
- loader: for loading needs in trucks and unloaded from trucks, bulky and heavy-weight materials.
- small loader (devil): for loading needs in trucks and unloaded from trucks.
- vibratory plate: for condensation needs during the construction of the project.
- special cranes on an appropriate vehicle: for the construction needs of the pillars.
- conductor's winch: for the wireing of the transmission line.

In case a permanent construction installation is required, before the start of construction, it will be submitted to the competent environmental authority, Technical Environmental Study (T.E.P.E.M.), in accordance with the requirements of para. Article 7 of Law 4014/2011, with a view to the approval of the construction site.

6.4.4 Necessary construction materials

For the construction of the air transport line the main materials to be used and supplied by legally operating companies are:

- Concrete foundation
- Steel parts of towers and tissues.
- Pipelines for the wiring of T.L, which include cable of aluminum wires on the outer layers and plated steel wires in the center Floors .
- Insulators, made of porcelain, glass or synthetic materials.

Any loan materials that will be required for the construction needs of the proposed project (sand, gravel, etc.), these will be obtained from legally operated quarries in the area.

6.4.5 Liquid waste outflows

In the construction phase of the projects under study, it is envisaged to produce the usual liquid waste produced in construction projects, taking into account that the pillars consist of pre-fabricated parts, which are not manufactured in the project area.

Chemical toilets will be installed for the collection of urban wastewater, which will be produced by the staff working on the construction of the projects. Considering a construction site of 10 persons, a sewage supply equal to:

50 l/ person/ day x 10 persons = 500 l/ day or 0.5 m^3/day is estimated.

The waste water collected will be made available by means of specialized tankers at the nearest, in-service Wastewater Treatment Facility. Used Waste Oils (ALEs) resulting from construction machinery and equipment will be collected and stored in a temporary waste water storage area until they are delivery to approved ALE collectors. In the construction area there is no provision for washing or maintenance of the construction machinery, as it will be done either in specialized workshops.

6.4.6 Excess or useless materials or solid waste

As detailed in section 6.4.3 from the construction of the proposed project, M.U. from the configuration of the squares for the installation of the pillars, from the opening of the new forest road, from the construction work of the pillars, but also from the dismantling of the twelve (12) existing and environmentally licensed pillars, earthworks, M.U. excavations and earthworks, are planned.

Excavations amounting to 40.582,59m^3 are required from the construction work of the proposed projects, of which 11.676,37m^3 will be used for the necessary excavations. Therefore, the excess of the excavation products to be managed amounts to **28.906,22m^3.**

Surplus materials resulting from the construction phase, which cannot be used in re-construction operations, will be deposited in an environmentally licensed repository or in landfills or in areas where other projects are carried out, which have approved environmental conditions and in which such materials can be used either in inactive quarries or through alternative management systems.

In any case, account must be taken of the legislation in force, 36259/1757/E103/2010 JMD "Measures, conditions and programmes for the alternative management of waste from excavations, constructions and demolitions (E.C.D.)" (Government Gazette 1312 B' 2010), as amended and in force.

In addition, it is expected that small quantities of solid waste, of household waste type, will be produced by the personnel working on the site during the construction phase of the project. This waste will be collected and disposed of in the bins of the area's municipal waste collection system.

Other waste that may be generated during the construction phase of the projects, such as worn spare parts or materials from mobile equipment (eg tires, hoses or metal pipes, etc.), will be delivered - returned to suppliers

Finally, waste such as: mineral oils, petroleum lubricants, oil tankers, spare parts for machinery, batteries - car batteries, trucks, car consumables, trucks, such as pads, oil filters, air filters, etc., will be collected in suitable watertight containers and removed by authorised management companies.

6.4.7 Emissions of pollutants into the air

During the construction phase of the project, small-scale emissions of gaseous pollutants are expected to occur in the immediate area, which will mainly include emissions of particulate matter (dust) during earthworks and exhaust emissions from the operation of excavating and construction machinery, etc.

Emissions of suspended particles

Dust emissions will come from excavations and work on the construction of new buildings, the use of cement, sand and other fine-grained aggregates. Dust is also created by the movement of vehicles on the construction site on non-paved surfaces, as well as by the loading and unloading of materials.

Emissions of particulate matter are not expected to affect concentration limit values in the atmosphere, according to 14122/549/E.103/2011 JMD (Government Gazette 488/B'/30-03-2011), as it will be small-scale taking into account that:

- Appropriate prevention and control measures (e.g. wetting, covering piles) will be taken, which minimise dust emission.
- All work to be carried out will be limited spatially within the extension of the installation site.
- The earthworks are carried out piecemeal during the construction phase and will last for a limited period of time.

Emissions of exhaust emissions of project machinery.

The quality of the exhaust gases emitted depends on the type of engine, its size, the condition of the machinery and vehicles and their operating conditions. The construction vehicles and machinery to be used are expected to be diesel-powered and depending on their category will meet the statutory exhaust emission limits, in accordance with JOINT MINISTERY DECISION D13/0/121/2007 (Government Gazette 53/B'/24-01-2007). The expected exhaust emissions during construction work are not expected to be high due to the fragmentary use and limited duration of the construction phase and therefore the limit values for the concentration of pollutants in the atmosphere are not expected to be exceeded in accordance with JOINT MINISTERY DECISION 14122/549/E.103/201 1 (Government Gazette 488/B'/30-03-2011) and JOINT MINISTERY DECISION 22306/1075/E.103/2007 (Government Gazette 920/B'/08-06-2007).

6.4.8 Noise and vibration emissions

During the construction of the project noise emissions are expected mainly due to the operation of excavating and construction machinery, which will be of relatively low intensity and duration due to the fact that:

- The construction machinery used will meet the noise emission limits, in accordance with 37393/2028/2003 JMD (Government Gazette 1418/B/01-10-2003), as amended and in force.
- The use of the machines will be patchy during the construction period of the project.

- Appropriate noise reduction measures will be taken, such as appropriate planning of construction work to avoid as far as possible the concentration and simultaneous operation of many machinery on the site, etc.

The potential sources of vibration during the construction of the project come from the movement of construction machinery and excavations for the foundation of the installations. These vibrations are not expected to be substantially noticeable.

6.4.9 Emissions of electromagnetic radiation

The construction of the projects under study is not related to the production of significant levels of electromagnetic radiation.

6.5 OPERATION PHASE

6.5.1 Detailed description of the operation and management of the project

During the operation of the project under study, regular inspection and maintenance of the computer equipment and cleaning of the project area, as well as maintenance work, will be carried out if required. During the operation of the projects, control and supervision will be carried out by remote control, remote control and remote control or on the spot.

Periodic checks will be carried out in the area of the overhead transmission line, consisting of cleaning the insulators by aerial or ground means in the control of the pillars.

Ground access for the maintenance of the Air TRANSMISSION Line (insulator washing, control of pylons) will be by aerial or even ground means where possible.

6.5.2 Inputs of materials, energy and water during the operation of the project

During the operational phase of the project under study, small-scale water and electricity consumption is required for the operation of the Agios Nikolaos HVC . The nature of the project under study does not require inputs of materials, nor does it require significant energy and water consumption.

6.5.3 Liquid Waste Outflows

Due to the nature of the project under study, this is not related to the outflow of significant amounts of

wastewater. Any liquid waste resulting from the maintenance of the computer equipment will be collected and delivered to companies authorised to manage it.

6.5.4 Solid Waste Outflows

Due to the nature of the project under study, this is not related to the outflow of significant quantities of solid waste. During the operation of the projects, solid waste will periodically be generated from the maintenance work of the project's equipment. Such waste, if hazardous, will be delivered to authorised companies for proper disposal. If they are not hazardous, they will either be recycled or used (e.g. metal materials) or if they fall into the category of municipal waste they will be disposed of in landfills.

6.5.5 Emissions of pollutants and greenhouse gases into the air from the operation of the project

In the operational phase of the projects under study, no significant emissions of gaseous pollutants into the atmosphere are expected. The project under study concerns the transmission of electricity and not its production, which is related to emissions of gases and particulate pollutants.

6.5.6 Noise and vibration emissions from the operation of the project

Noise during the operational phase of the project is limited to the appearance of the Corona effect on the surface of the transmission lines when the intensity of the electric field on the surface of the conductor exceeds the dielectric strength of the air. It takes the form of intermittent or continuous evacuations. Corona discharges begin if they occur with a gradual increase in voltage in the form of tufts, a few millimeters long starting from peaks, irregularities or protrusions on the surface of the duct, or from points of oxidation, moisture or contamination of the surface, where either it is amplified the electric field (thickening of the dynamic lines), or the dielectric strength of the conductor environment decreases.

When the voltage of the conductor reaches a value of U (the start voltage of the Corona effect), the discharges become continuous and cover the conductor in the form of luminous glamour. The tendency to display the sacrificials is much lower than the U trend, under which the appearance of glamour begins. Pure glamour is accompanied by smooth noise and does not cause radio parasites, on the contrary the thysans are accompanied by a trig and are a cause of radio disturbances. If the conductor has a surface that is completely smooth and clean, then it is possible that no thymuses appear at all, but as soon as the voltage reaches the U limit, the luminous glamour appears.

The Corona effect is influenced by the condition of the surface of the lines, as well as by atmospheric

conditions, rain, air density, humidity as well as wind. With regard to aging lines, it has been observed that Corona losses decrease over time. In conditions of high rainfall, the reduction of losses of aging lines can reach up to 25 to 33%, compared to new pipelines. This is because it has been observed that the new conductors are hydrophobic, while the aging hydrophilics.

6.5.7 Electromagnetic radiation emissions, with reference to the power and frequencies of the emissions

In the environment of electrical energy devices (lines and substations), electrical and magnetic fields of extremely low frequency (ELF) are created, which are integrated into non-ionizing electromagnetic radiation, M.U. those which are incapable of causing biological effects due to ionization. ELF fields are different from electromagnetic waves, such as radio waves emitted by radio and television antennas, as well as mobile phone antennas.

Power Transmission Line

The size of the generated magnetic field in the single-line environment depends on the current on the line. The size of the current in a line is not stable, but varies widely over the course of a day, displaying daily, weekly and annual cycles, causing a corresponding variation in the generated magnetic field. The maximum current values over the course of a day and therefore the maximum values of the generated magnetic field from the line depend on the type of consumers served by the line and the peak hours. The sizes of the electrical and magnetic fields produced in the environment of a line, in addition to the size of currents and voltages, also depend on the specific technical characteristics of the construction of the line, such as:

- The distance of the lines from the earth.
- The layout of the phases on the dual-circuit lines and.
- The distance between the current lines of the line.

In view of the above factors, the following table gives the maximum values of electrical and magnetic fields that can be displayed just below a line, taking into account the most unfavourable conditions of currents, phase and distance arrangements, as well as standard electrical and magnetic field values resulting from measurements by the Office of Non-Ion radiation of the Hellenic Atomic Energy Commission (ESAE) , just below and 25m next to each line.

Table 6.10: Values of electrical and magnetic fields at a height of 1,5m from the ground in the environment of overhead power lines.

		magnetic field (μT)	**Electric field (V/μ)**
400kV lines (metal pillars)	Maximum value (under conductors)	25	6.000
	Standard value (under conductors)	1 - 4	2.000 - 4.000
	Standard price (25m side by side)	0,5-2	200-500
150kV lines (metal tissues)	Maximum value (under conductors)	10	1.200
	Standard value (under conductors)	0,3 - 1,5	500 - 1.000
	Standard price (25m side by side)	0,05-0,2	50 - 100
20kV lines (wooden columns)	Maximum value (under conductors)	5	700
	Standard value (under conductors)	0,2 - 0,5	200
	Standard price (25m side by side)	0,01-0,05	10 - 20

High Voltage Substation

In the outdoor areas of high voltage substations and C.Y.T., electrical and magnetic fields are created exclusively by the lines connected to them and not by their equipment. Measurements carried out by the Office of Non-Ion radiation of the Hellenic Atomic Energy Commission (ESAE) have shown that on the sides of substations that do not cross lines, the levels of electrical and magnetic fields are practically the same as those that would exist without the presence of the substation (even very close to its fence), while on the other sides of the substations passing through lines, there are the standard values of electrical and magnetic fields in the environment of these lines.

6.6 STOPPING OPERATION-RESTORATION

6.6.1 Estimate downtime

The project under study, due to its nature, has a long life span estimated to exceed 50 years.

6.6.2 Demolition of permanent structures, removal of equipment and materials and ways of disposal (procedures, timetable)

At the end of the operation of the project, the existing facilities will be removed and the site restored to its former state. Of the materials that will result from the dismantling of the pillars, those that may be used in the future will be stored. The rest of the materials will be recycled. The steel to be dried and then used as scrap. For materials resulting from the dismantling of the buildings, the provisions of the No. 36259/1757/E103 JMD (Government Gazette 1312 Β΄ 2010) "Measures, conditions and programme for the alternative management of waste from excavations, constructions and demolitions (E.C.D.)" as amended and in force.

6.6.3 Restoration of the project's occupying space and new use of the space

The restoration work, in the event of the closure of the project, essentially includes all the necessary actions to integrate the intervention site into the wider environment. The most necessary work that will take place in the area of the HVC , but also in the squares of the pillars is the removal of all electromechanical equipment and the removal - delivery of all solid waste that may have remained on site to competent and appropriate bodies. Appropriate plantings will be carried out wherever and if necessary.

6.7 EMERGENCY CONDITIONS AND ENVIRONMENTAL DANGERS

During the operation of the project, measures are taken to prevent and avoid any accidents, as well as for the safe operation of the project, which are as follows:

- Covering the entire surface of the Agios Nikolaos HVC with a scythosis of appropriate thickness to protect staff from dangerous step trends.
- Existence of a complete anti-ceramic protection system.
- Existence of an appropriate fire safety and firefighting system.
- Frequent maintenance of the system to avoid sparks.
- Appropriate fencing to avoid unnecessary entry of animals and people within the HVC Agios Nikolaos.

7 ALTERNATIVE SOLUTIONS

Four (4) alternatives to the location of the project were considered for the project under consideration, M.U. four different routes of the new electricity transmission line, including the proposed one, as well as the zero solution. Alternatives to the size and technology of the project have not been considered, as the project under consideration is a modification of an existing project and therefore the choice of the size and technology of the project is one-size-all.

7.1 ALTERNATIVES TO THE POSITION OF THE PROJECT

The alternatives examined with regard to the location of the project under study and in particular the alternative routes of the electricity transmission line for the direct connection of T.L 400kV to the Distomo HVC are presented below:

Alternative 1 – proposed:

Alternative 1 - proposed (Figure 7.1 – red line) has a total length of 5.198m and consists of 17 pillars. This route of the transmission line begins shortly after Pillar P12 of the existing and environmentally licensed electricity transmission line and after a route of approximately 5.198m is completed in the Distomo HVC . The selection of this directive requires the removal of 3.833m of the existing T.L 400kV as well as 12 pillars. The new transmission line will have a total length of 11.825m and will consist of 37 pillars.

Alternative 2: Alternative 2

(Figure 7.1 – magenta line) has a total length of 5.500m and consists of 19 pillars. This route of the transmission line begins just before Pillar P15 of the existing and environmentally licensed electricity transmission line and after a route of approximately 5.500m is completed in the Distomo HVC . The selection of this directive requires the removal of 4.735m of the existing T.L 400kV as well as 15 pillars. The new transmission line will have a total length of 11.225m and will consist of 36 pillars.

Alternative 3:

Alternative 3 (Figure 7.1 – yellow line) has a total length of 4.720m and consists of 16 pillars. This route of the transmission line begins just before Pillar P10 of the existing and environmentally licensed electricity transmission line and after a route of approximately 4.720m is completed in the Distomo HVC . The

selection of this directive requires the removal of 3.240m of the existing T.L. 400kV as well as 10 pillars. The new transmission line will have a total length of 11.940m and will consist of 38 pillars.

Alternative 4:

Alternative 4 (Figure 7.1 – blue line) has a total length of 4.650m and consists of 14 pillars. This route of the transmission line begins just before Pillar P9 of the existing and environmentally licensed electricity transmission line and after a route of approximately 4.650m is completed in the Distomo HVC . The selection of this directive requires the removal of 2.720m of the existing T.L 400kV as well as 9 pillars. The new transmission line will have a total length of 12.390m and will consist of 37 pillars.

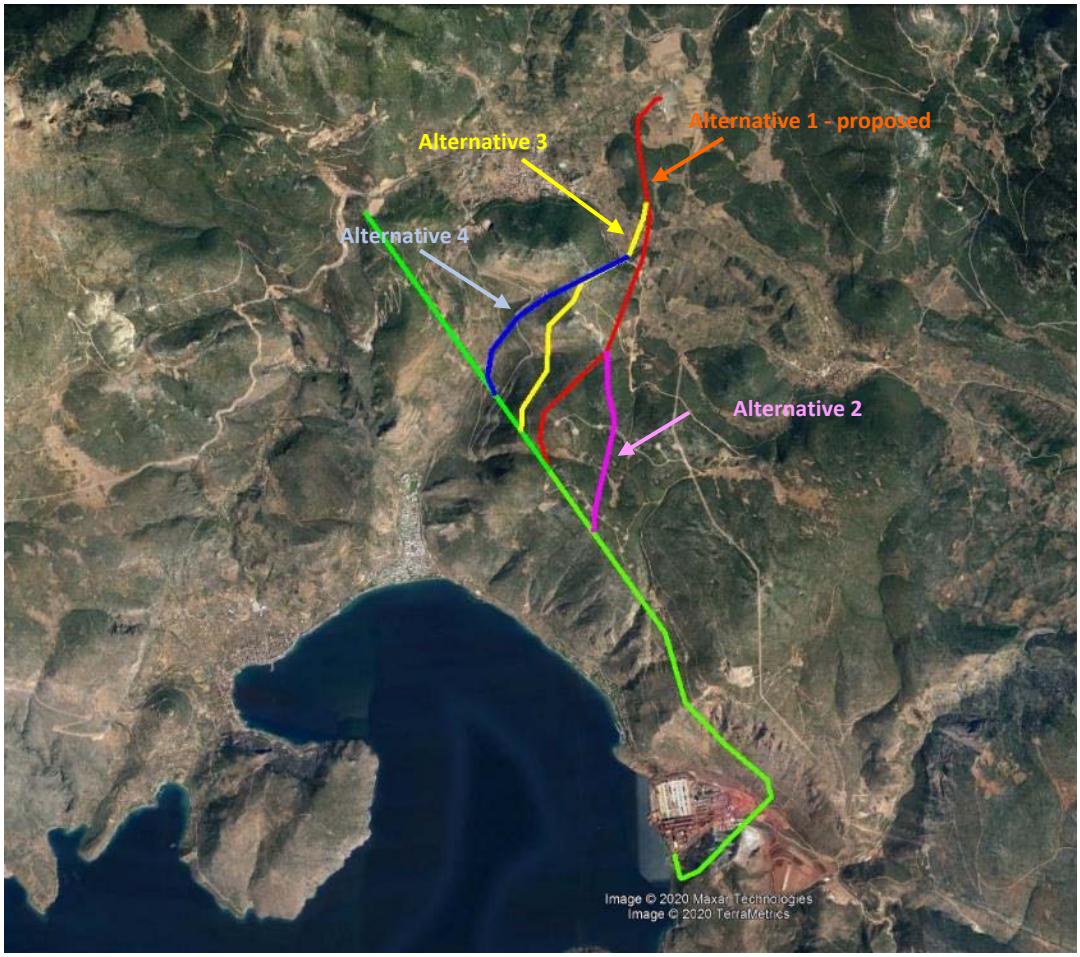


Figure 7.1: A satellite imagery extract showing the existing and environmentally licensed 400kV electricity T.L. and the alternatives to the transmission line.

Table 7.1: Characteristics of alternative electricity transmission line routes.

Alternatives	length (m)	Pillars	Total Length (m)	Total Pillars
Alternative 1 - proposed	5.198	17	11.825	37
Alternative 2	5.500	19	11.225	36
Alternative 3	4.720	16	11.940	38
Alternative 4	4.650	14	12.390	37

Since all the alternatives examined with regard to the route of the electricity transmission line do not vary significantly in terms of the total length and number of pillars of the new transmission line, the following criteria were taken into account in choosing the best solution:

- the harmonious integration of the line into the environment (environmental criteria).
- the fulfilment of technical requirements for the safe operation and easy construction and maintenance of the line.
- visual nuisance in the man-made environment.
- the ownership of the areas through which the alternatives pass.
- economic criteria.
- residential development and proximity to urban centers.
- the terrain.

After examining the above criteria, comparing all the alternatives with each other and taking into account that:

- With the choice of alternative 1, the route of which follows a mostly ridge, the effects on the natural environment are as small as possible, compared to the other alternatives.
- The technical requirements for the safe operation and easy construction and maintenance of the line, are more favourable to alternatives 1 and 2 taking into account the morphology, terrain and accessibility of the area.
- None of the alternatives considered have a significant impact on the visual nuisance of the area.
- All alternatives (in the absence of posted or ratified forest maps) are estimated to pass mainly through areas governed by the provisions of forestry legislation.
- Small parts of the alternatives under study, mainly near HVC Distomo, pass through arable land.
- Looking at all the alternatives, the total length of the proposed diversion, as well as the total length of the new gates, do not show any significant differences in the cost of construction of the proposed projects.

- Alternatives 3 and 4 pass closer to the settlement of Distomo.
- The variations in morphology and analyph of the region, in alternatives 1 & 2 are milder compared to alternatives 3 & 4.

As the most prevalent solution for the diversion of the existing electricity transmission line, alternative 1 – proposed was chosen.

Table 7.2: Comparative evaluation of alternatives.

ALTERNATIVE SOLUTIONS	ENVIRONMENTAL CRITERIA	TECHNICAL REQUIREMENTS	VISUAL DISORDER	OWNERSHIP	ECONOMIC CRITERIA	GUARANTEE IN ASTIC CENTERS	SOIL RELIEF
Alternative 1 - proposed	+	+	+	+	+	+	+
Alternative 2	-	+	+	+	+	+	+
Alternative 3	-	-	+	+	+	-	-
Alternative 4	-	-	+	+	+	-	-

As can be shown from the above table, alternative 1 – proposed, is the only solution that has advantages (+ positive sign) in all the criteria examined for the alternatives.

7.2 THE "DO NOTHING" ALTERNATIVE

In the case of the zero solution, there is no provision for the diversion of the existing 400kV High Voltage Electricity T.L., which connects the Agios Nikolaos HVC to the National System 400kV and its connection directly to the Distomos HVC, via a new exclusive section T.L 2B'B'/400kV dual circuit, for the implementation of an enhanced connection shape of the HVC Ag. Nikolaos with HVC Distomo.

In this case, no negative effects on the natural environment are expected, as no de-production of existing vegetation is foreseen as no new areas will be occupied.

However, negative effects on the social and economic environment at local and hyperlocal level are expected, since the non-implementation of the proposed projects entails the non-implementation of the country's energy policy and, by extension, the European Union.

As mentioned in Chapter 4, all the proposed projects are fully compatible with the country's energy policy and the fight against climate change as it is linked to the gradual withdrawal of lignite plants, the use of natural gas as a bridge fuel, for the 100% transition to RES.

The implementation of the proposed enhanced connection system will allow with the connection of the New Power Station 826MW, the safe absorption of its full generated power by the National System and will give greater reliability and flexibility to the connection of the Ag. Nikolaos HVC with the System, as the connection is made to the trunk of the National System and in particular to a key HVC (according to the Terms of Connection of the new Station – No./m.: Independent Power Transmission Operator /DSSAS 20804/8.10.2019). In parallel with the proposed amendment, significant capacity is released to T.L. HVC Distomo - HVC Acheloos, which can be allocated to increase the penetration of Renewable Sources into the Greek Electricity System, taking into account the expansion projects of 400kV, ADMEE, in the Peloponnese.

On the basis of the above, the zero solution, the non-implementation of the proposed amendments, was rejected.

8 EXISTING CONDITION OF THE ENVIRONMENT

This chapter records, analyses and evaluates the current parameters of the natural and man-made environment in the study area, as well as their evolution trends.

8.1 STUDY AREA

The study area is located in the M.U. of Kyriaki and Distomos, of the Municipalities of Levadea and Distomos - Arachova - Antikyra, respectively, at Region of Viotia, P.E. Viotia has an area of 2.952km^2 and borders North Fthiotida Region, West with Fokida Region, south is bordered by the Corinthian Gulf and borders Attica Region and east is bordered by the Evia Bay and borders Evia. Boeotia is a lowland and very fertile area. The mountainous area is very small. In detail the distribution of soil in categories is as follows: 40% lowland, 38% semi-mountainous and 22% mountainous.

The figure below shows the wider area of Viotia, while the study area is marked with a red circle.

Figure 8.1: Map of Viotia Region, where the red circle encloses the study area.

The study area of the project under study is defined in accordance with Decision 170225/2014 (Government Gazette 135B/27-01-2014) as follows: "For linear projects or activities of subcategory A2, 500m from their axis for areas outside the boundaries of settlements or city plans."

According to the above, the study area occupies an area of about 15.7km2, as depicted in the project entitled "Map of Orientation and Study Area" (Project No. IP-1) and in the satellite imagery extract (google earth) below.

Figure 8.2: A google earth extract showing the outline of the study area in red.

8.2 CLIMATE AND BIOCLIMATIC FEATURES

The climate of Viotia is dry, with mild winters and cool summers. Rainfall is greatest in the mountainous western part and decreases in the east.

The values of the climatic variables shown below come from the weather station Antikyra, whose available meteorological data - from the National Observatory of Athens - are from June 2009. This weather station is located at an altitude of +336m.

The following figure shows in bar charts the average monthly rainfall heights recorded at the Antikyra weather station, for the period June 2009 – August 2020. The average super-annual precipitation is 517.5mm, with the highest prices in the winter months and late autumn. The wettest month occurs in February, with an average monthly rainfall height of 72.7mm, while the month with the least rainfall is

August, with an average monthly rainfall height of 8.5mm.

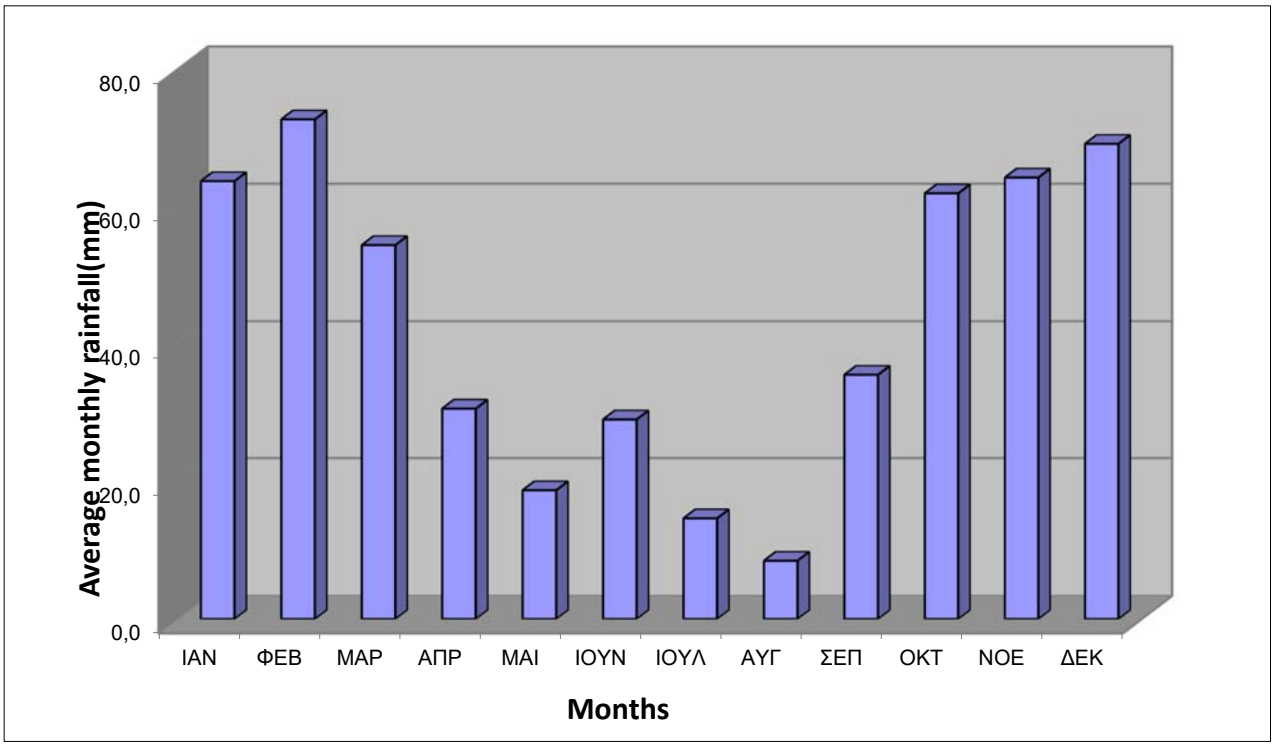


Figure 8.3: Average monthly rainfall heights of Antikyra weather station.

In the following figure, the average monthly temperatures for the period mentioned above are presented in a bar chart. The average monthly temperature of the region is 17.6°C and takes its average minimum value in the month of January (9.6°C) and the average maximum in the month of August (27.4°C).

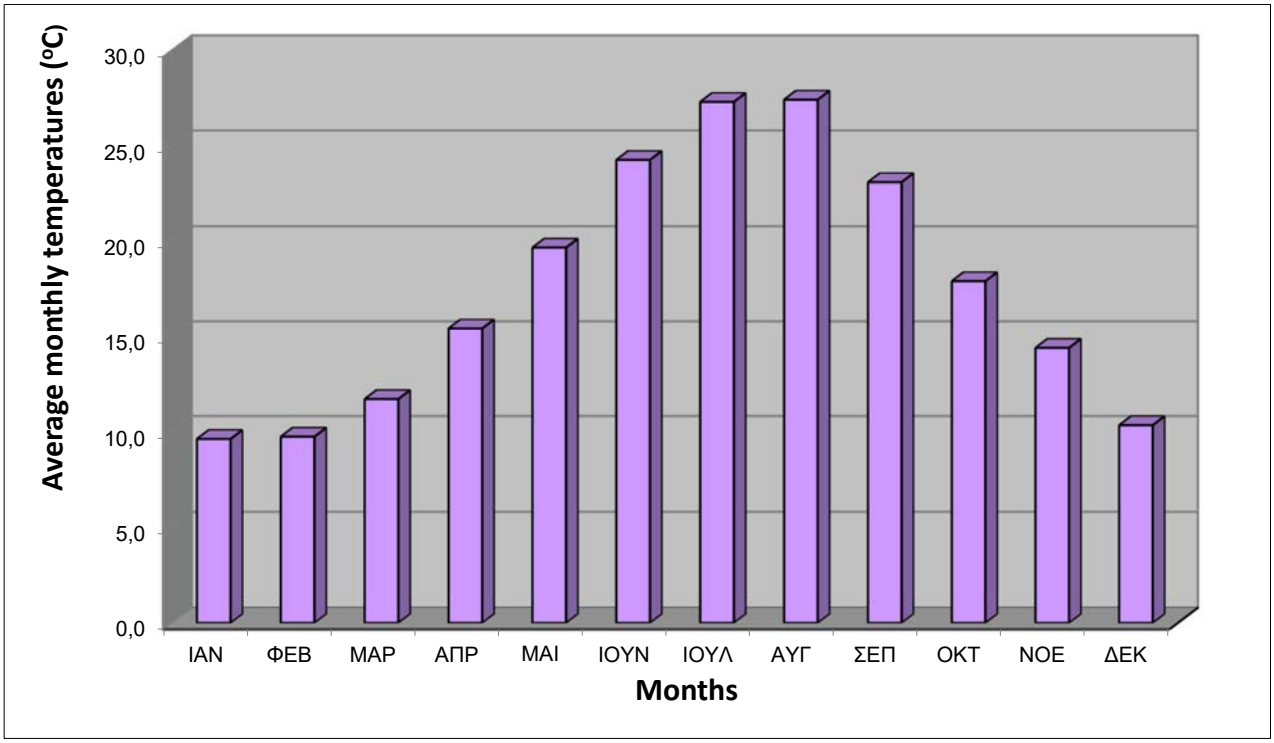


Figure 8.4: Average monthly temperatures of the Antikyra weather station.

Ombrothermal Chart

The rain-thermal chart shows the course of the average monthly temperatures and average monthly rainfall of an area. The intersection points of the two curves formed by the average monthly temperature and precipitation values constitute the dry thermal period. During the dry thermal period the minimum value of the average monthly rainfall is observed, in combination with the maximum value of the average monthly temperature.

Looking at the rain thermal diagram of the Antikyra meteorological station shown in the following figure, a water deficit (dry period) is found in the water balance of the area in the period from early April to mid-September, while in the rest of the period there is an excess of water (wet period).

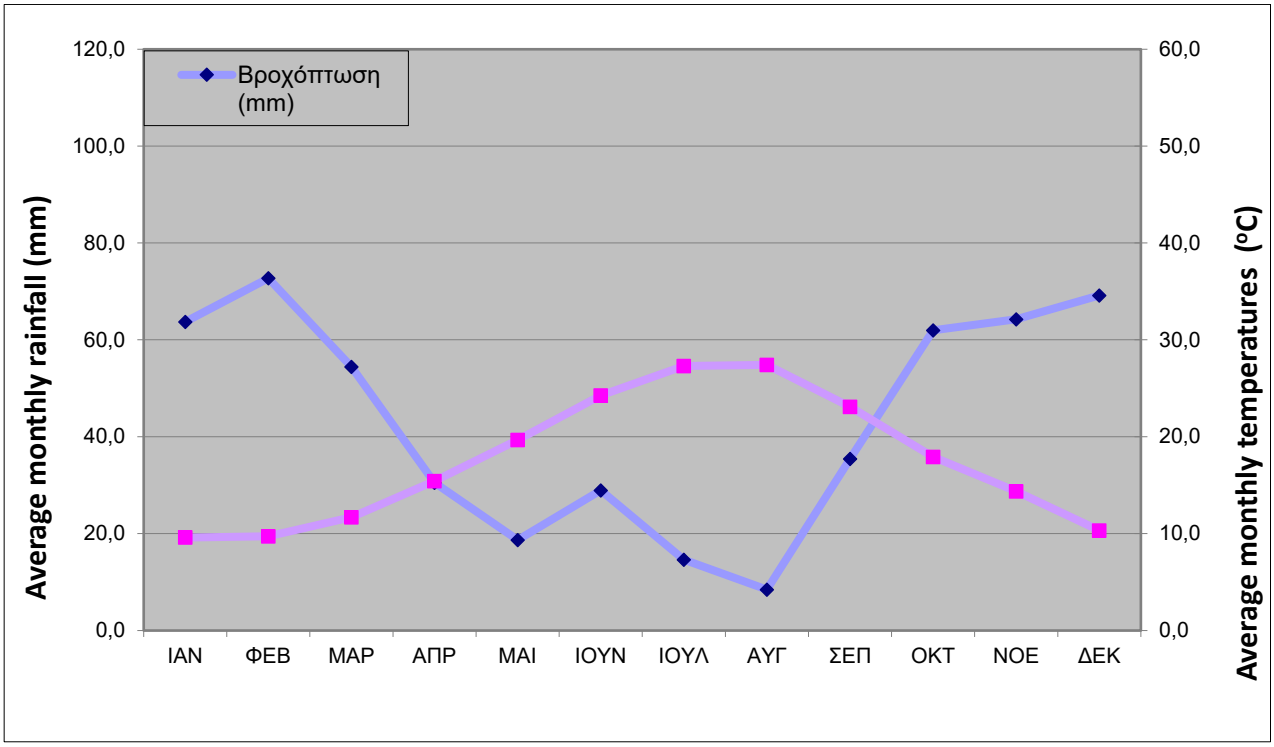


Figure 8.5: Ombrothermal diagram of the weather station Antikyra.

Anemological data

The anemological data used come from the meteorological station of the National Meteorological Service (E.M.Y.) in Patras. The selection of this station was based mainly on its proximity to the area concerned and the longer range of available registrations.

In more detail, the anemological data of the M.S. of Patras relate to records from the period between 1955 and 2003 and are given in a percentage-tabulated form of annual frequencies, for the displayed intensities of the various wind addresses. The data have come from daily measurements at 06:00, 12:00 and 18:00 each day (3 measurements per day), for the whole year, for the relevant reference period. The following table contains the station's anemological data.

Table 8.1: Anemological data of the meteorological station of Patras from the period 1955-2003.

ΕΘΝΙΚΗ ΜΕΤΕΩΡΟΛΟΓΙΚΗ ΥΠΗΡΕΣΙΑ
HELLENIC NATIONAL METEOROLOGICAL SERVICE

Όνομα Σταθμού	Κωδικός Σταθμού	Γεωγ.Μήκος Σταθμού	Γεωγ.Πλάτος Σταθμού	Ύψος Σταθμού (m)	Περίοδος
ΠΑΤΡΑ	16717	37.95°	23.34°		1/1/1956 ΕΩΣ 31/12/2004

ΕΤΗΣΙΑ

Διεύθυνση Ανέμου	N	NE	E	SE	S	SW	W	NW	CLM	SUM
Bf 0	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	26,568	26,568
Bf 1	2,095	3,765	4,498	4,134	1,957	3,865	3,296	3,062	0,001	26,673
Bf 2	3,105	3,981	1,595	2,286	1,491	5,496	3,439	3,384	0,005	24,782
Bf 3	2,521	2,053	0,298	0,468	0,745	3,810	1,315	1,662	0,000	12,872
Bf 4	1,548	1,035	0,126	0,163	0,353	1,883	0,514	0,536	0,000	6,158
Bf 5	0,529	0,370	0,064	0,036	0,111	0,727	0,135	0,136	0,000	2,108
Bf 6	0,127	0,176	0,036	0,019	0,022	0,241	0,067	0,040	0,000	0,728
Bf 7	0,010	0,015	0,001	0,003	0,008	0,025	0,014	0,008	0,000	0,084
Bf 8	0,001	0,006	0,000	0,000	0,000	0,001	0,004	0,000	0,000	0,012
Bf ≥ 9	0,001	0,006	0,001	0,000	0,000	0,004	0,004	0,000	0,000	0,016
SUM	**9,938**	**11,406**	**6,619**	**7,107**	**4,687**	**16,051**	**8,789**	**8,828**	**26,575**	**100,00**

Below are the histograms of frequencies and maximum recorded intensities for M.S. Patras.

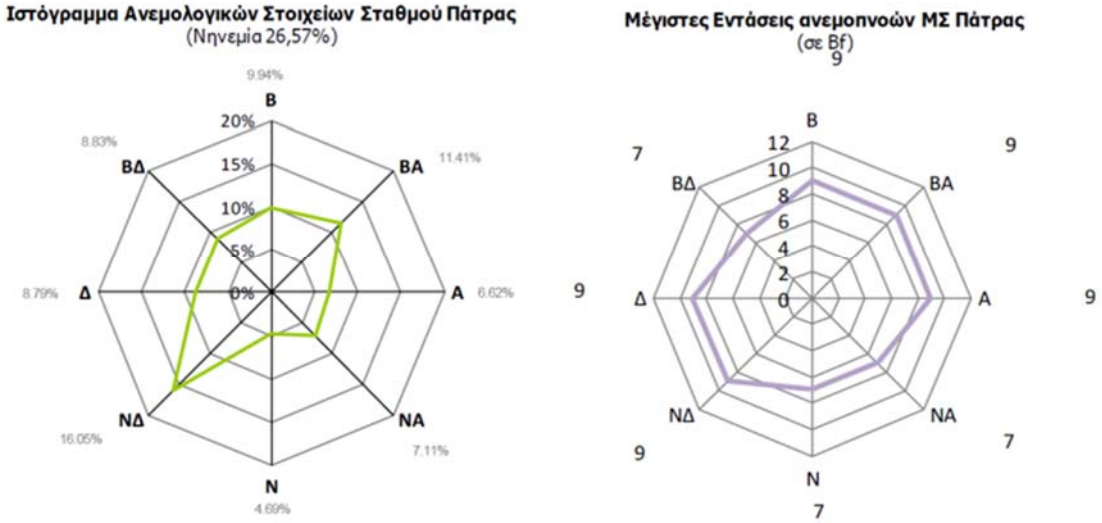


Figure 8.6: Histogram of frequencies and maximum tensions for M.S. Patras (1995-2003).

The analysis of the above data shows the following conclusions::

- Dominant and dominant winds in the area of interest are the winds of the wider northern sector (NW, N and NE) with an incidence rate of 8.82%, 9.94% and 11.4 % per year, respectively (total 30.16% or ~ 110 days / year) with a maximum recorded intensity of 9 Bf (for N and NE) and 7 BF for NW.
- Remarkable are the winds of the SW sector with a frequency of 16.09% per year (~58 days / year) with a maximum recorded intensity of 9 Bf.
- W winds have a remarkable presence with an appearance rate of 8.8% per year and a maximum recorded intensity of 9 Bf.
- West and East winds appear with a higher average intensity (excluding wind gusts) at 9 Beaufort, but have a lower incidence over the year.
- In terms of winds, the area appears to be characterised by a relative distribution of both frequencies and tensions.

Bioclimatic elements

Natural vegetation is the biological expression of the environment and first of all of the climate, because plants are the only living organisms that are native and therefore are in direct contact with the climatic parameters they reflect. The result of the synthesis on the one hand of climatic parameters and on the other hand of the correlation between them constitute the concept of bioclimate.

For the investigation of bioclimate and the determination of the isoclimatic regions of Greece, G. Mavromatis used two methods:

- the distinction of the bioclimatic floors of the Mediterranean bioclimate based on the climatic type of EMBERGER's Ombrothermal pyliqué Q2 and the EMBERGER - SAUVAGE climate chart.
- The distinction of the characters of the Mediterranean bioclimate according to UNESCO-FAO and the rain thermal diagrams of BAGNOULS - GAUSSEN to determine the duration and intensity of the dry season, after calculation of the dry thermal index Xm .

The product of this work was the Bioclimatic Maps of Greece (editions of the Institute of Forest Research 1978), which depicts the Bioclimatic Floors, the Characters of the Mediterranean Bioclimate and the Phytoso-Social Structures of each region. According to these maps the area of the project belongs between the semi-dry and wet climate floor with mild winter (Figure 8.7). The Mediterranean bioclimate character of the region is weak Thermo-Mediterranean to intense mediterranean -Mediterranean (Figure 8.8). The

Region is dominated by the Mediterranean configuration (Figure 8.9).

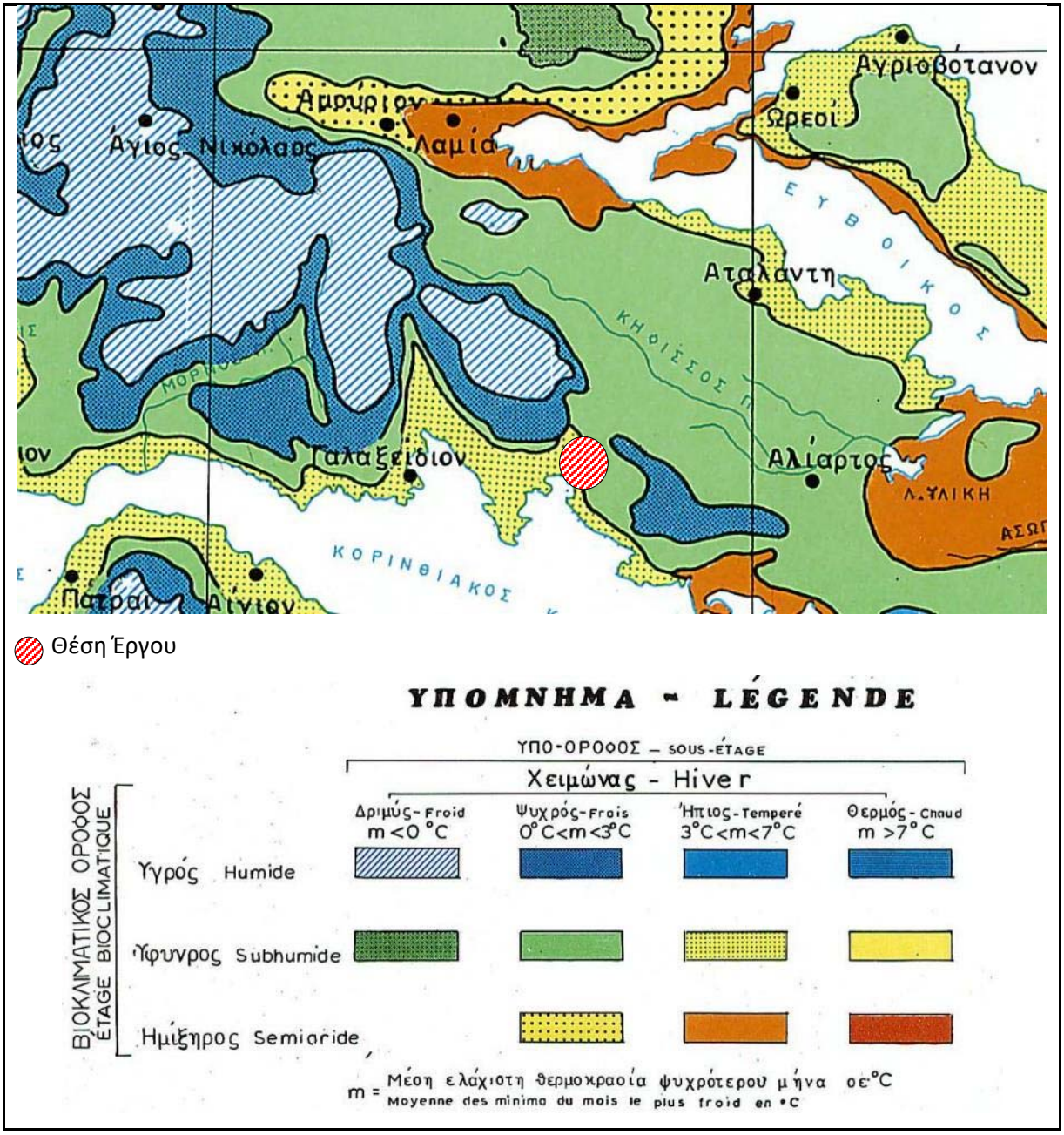


Figure 8.7: Bioclimatic floors (source: Mavromatis, 1978).

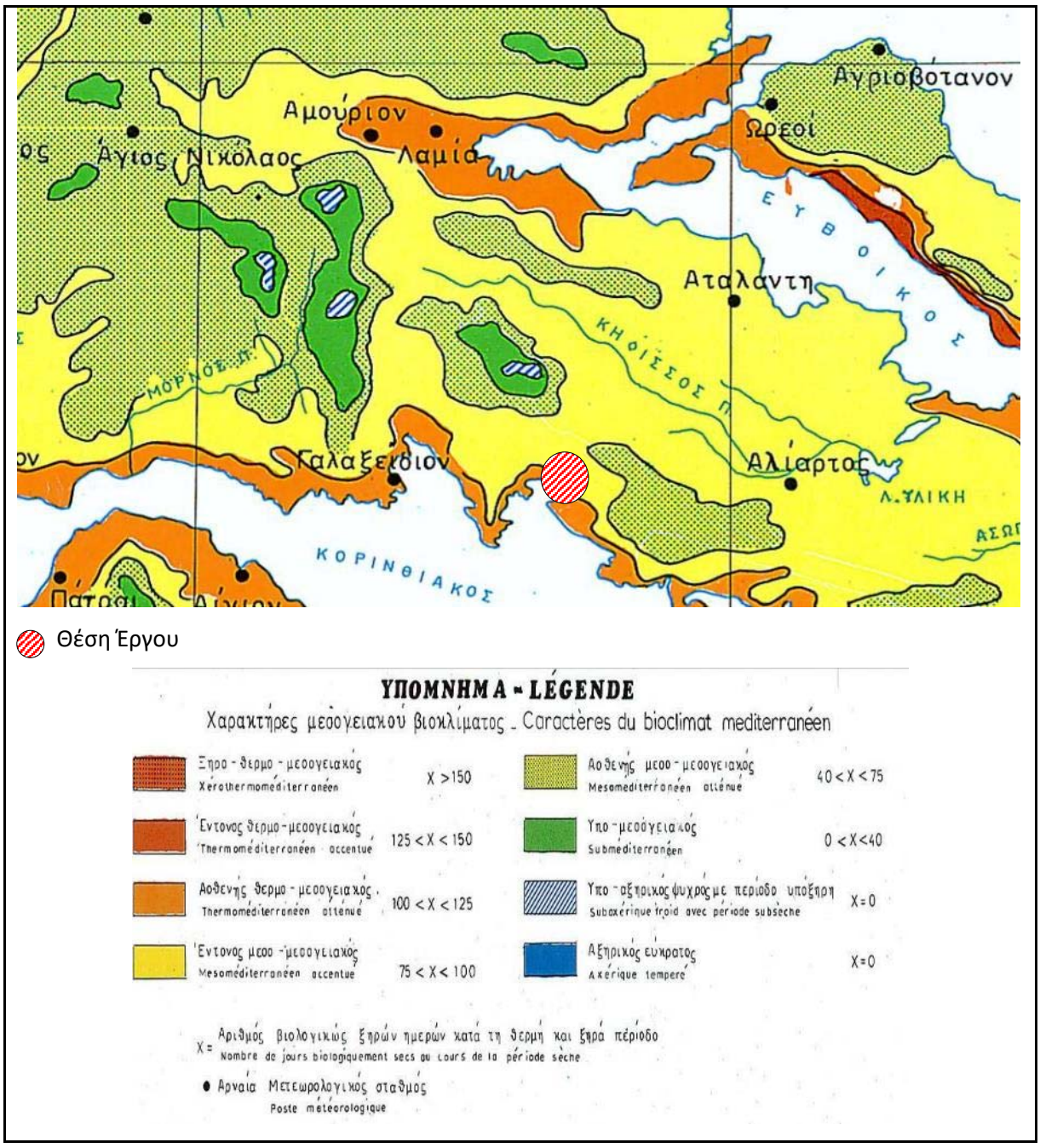


Figure 8.8: Mediterranean Bioclimate Characters (source: Mavromatis, 1978).

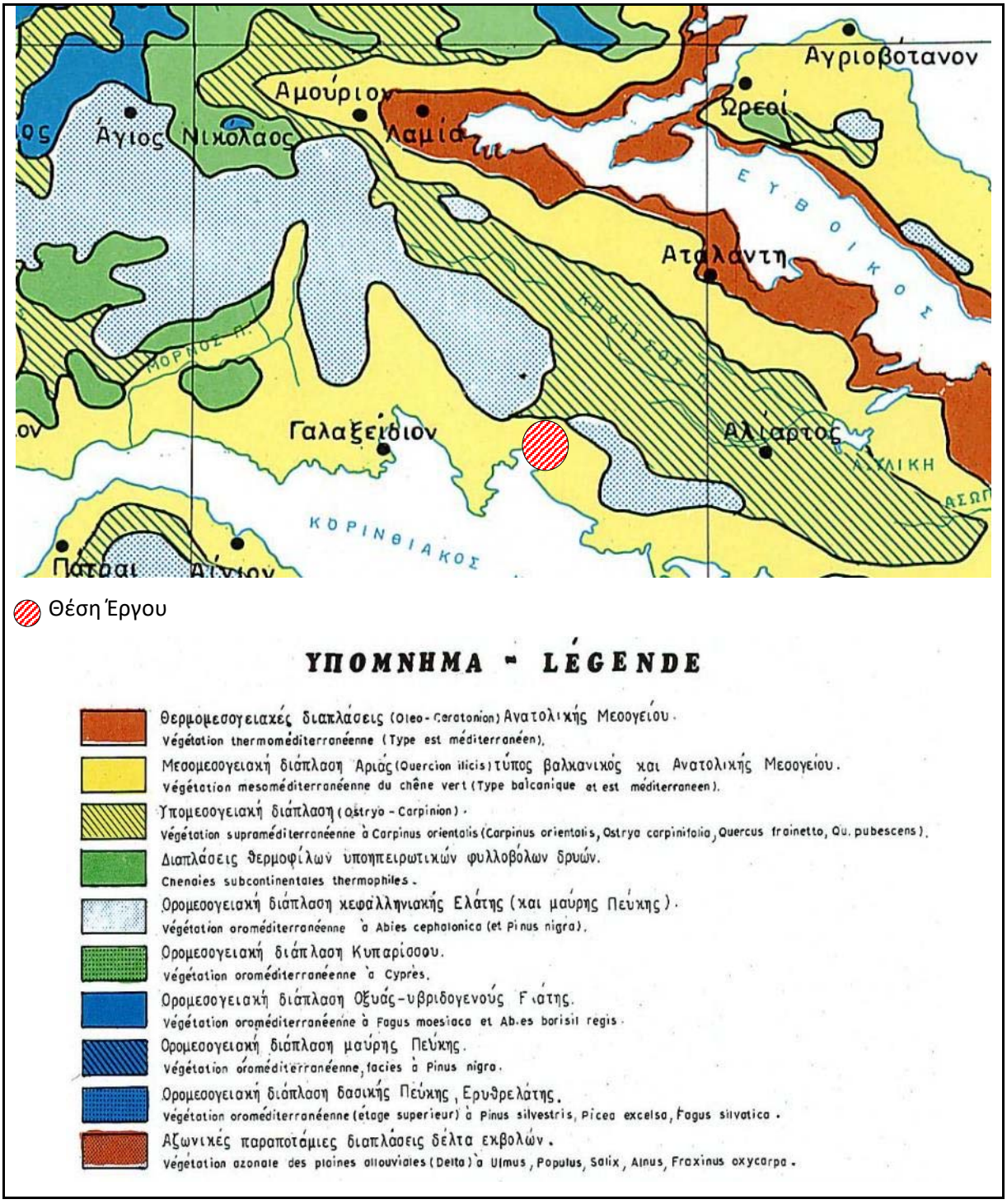


Figure 8.9: Phytoso-social structures (source: Mavromatis, 1978).

8.3 MORPHOLOGICAL AND TOPOLOGICAL CHARACTERISTICS

8.3.1 Recording of a total reference landscape and its individual sections

Viotia is a fertile lowland area and only 22% of its territory is mountainous. The basins of Viotia are surrounded by Elikos, Parnassos, Kithairon, Neraidolakoma, Messapio and Chlomos. The Municipality of Aliartou is located in the center of REGION OF. Viotia and the relief presents a wide variety. It also has mountain volumes, hilly areas and large lowland areas.

The study area is bounded SW by the Corinthian Gulf, south of the hill Fara Pezoula with a peak of +319m, east of Mount Amalia with a peak of +891m, north of the Cut ridge with a peak of +632m and west of the hill Floor with a peak of +432m. Other mountain volumes dominating the area is Kapsala with a peak of +595m , Kounuklias at +688m and Cave at +610m..

An important stream within the study area is the Kalogerikos stream, which runs through the premises of the Alumina and Aluminium Production Plant of ATE.

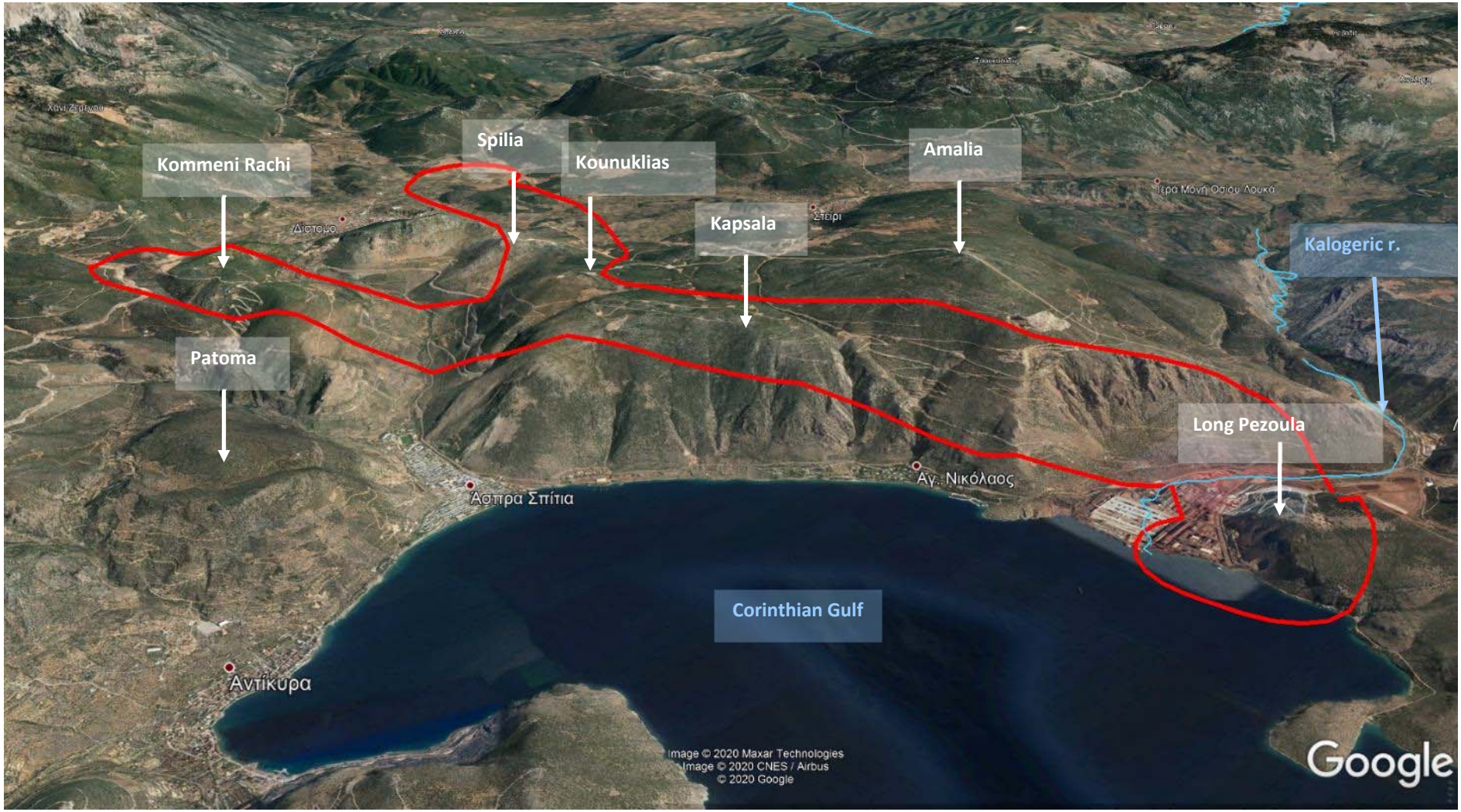


Figure 8.10: Morphological representation of the study area. A red border shows the study area.

8.3.2 Areas related to the European Landscape Convention, which was ratified by Law 3827/2010

The European Landscape Convention, also known as the Florence Convention, as ratified by the Greek State by Law 3827/2010 "Cancelation of the European Landscape Convention" (Government Gazette 30/A/25.10.2010), sets itself the objective of promoting the protection of landscapes, their management and their design and the organisation of European cooperation in local matters..

Each State must legally recognise landscapes as an essential component of the human environment, as an expression of the diversity of their common cultural and natural heritage, and as the foundation of their identity, and establish and implement landscape policies aimed at the protection, management and design of landscapes..

As part of a review of the Regional Spatial Framework of the Region of Central Greece, various "Landscape Zones" were proposed for which general protection/management guidelines are given and which include:

- International landscape zones.
- National and international value landscape zones.
- Regional and national value landscape zones.
- Regionally value landscape zones. International value - Highly degraded zones.
- Regional value - Particularly degraded zones.
- International cultural routes.

Figure 8.11: Excerpt from Charter P.2d "Environment, Cultural Heritage and Landscape" of the Review of the Regional Spatial Framework of the Region of Central Greece.

For the above landscape areas, based on the Review of the Regional Spatial Framework of the Region of Central Greece, general management guidelines are given such as:

- Establishment of a special control of integration into the landscape in the context of the issuance and implementation of building permits, and other technical projects, with the approval of EPAE.

- Promote the extraction of underground holdings and promote the restoration of landscapes with specific policies and programmes.
- Avoid building on land gradients greater than 45% except in landslide areas where gradients are limited to 20%.
- Promotion of road signalling projects protected as Landscapes, position signalling and value-data studies on a regional planning scale to identify specific protection rules that will feed the underlying design.

Closer to the study area, based on the Regional Spatial Framework of the Region of Central Greece, is the International Landscape Zone "Antikyra Bay – Industrial Coast of Bauxite" (Figure 8.11 –(9/D)]. For this area, on the basis of deliverable 2 of the Evaluation, Review & Specialization of the B.C.S.A.A. are proposed:

- Strict control of the diffusion of construction and
- industrial activity in urban planning.
- Completion of GSP design.

The following table lists the assessment of the International Value of the Landscape Zone "Antikyra Bay – Industrial Coast of Bauxite", based on the applicable B.C.S.A.A.:

LANDSCAPE QUALITY		PRESSURES & RISKS	CHARACTERISTICS OF LOCAL UNITS	DIRECTIONS		
Sustainable Development Factors	**Degradation Factors**			**Restoration of Conservation of Special Management of Landscape Protection**	**Feature Development**	**Spatial planning of GSPs, SSOAP, ZOEs, ICM.**
• World-wide declared (UNESCO) Cultural landscape of St. Luke • Standard industrial settlement White Houses	Mining activity		International value	The management of the module must follow its planned co-existence with the strong but interesting presence of the activities of the Aluminium industry of Greece (Mining and port)	• General Directions • Highlight as a tourist destination of the industrial settlement "White Houses"	General Directions

8.3.3 Project-related spatial outbursts

Within the study area, there are no locale flare-ups related to the project.

8.3.4 Elements of the importance and vulnerability of the landscape

Important factors to be taken into account concerning the installation of the project under study are the dominant elements of the landscape, the variable factors (atmospheric conditions, distance, observer position, etc.), as well as the visual vulnerability and absorbing capacity of the landscape.

Visual vulnerability refers to whether the various actions of man are evident within the landscape. Disturbances in higher parts of a landscape are more evident than those occurring in lower places. In contrast, in low positions any disturbance is much less apparent although the details of the operation are more noticeable because the observation distance tends to become shorter. However, it is possible to cover disturbances from vegetation and geomorphic formations (Hatzistathis and Ispikosdis 1995).

The visual absorbing capacity of the landscape is the relative, natural ability of a landscape to accept organized development or management activities and even to maintain its visual character and the integrity of the quality of its view. Factors affecting this ability of the earth or landscape to absorb modifications are slope, vegetation, observation distance, soil, landscape diversity and human activities (Hatzistathis and Ispikos 1995).

In the case of the project under study, its distance from residential areas is sufficient to avoid negative effects due to visual nuisance and noise.

8.4 GEOLOGICAL, TECTONIC AND SOIL CHARACTERISTICS

8.4.1 Geological features

Geotectonically the study area is located in the wider area of the Parnassos- Gionas zone. The Parnassos-Gionas zone was considered to be a site, locally surrounded in the ocean area of Subpelagenic – Pindos (Neothes) and associated with the "High Karst" zone of the former Yugoslavia. The disappearance of the zone in Macedonia and Thessaly is probably due to its coverage of the incubated covers of the internal Greek zones.

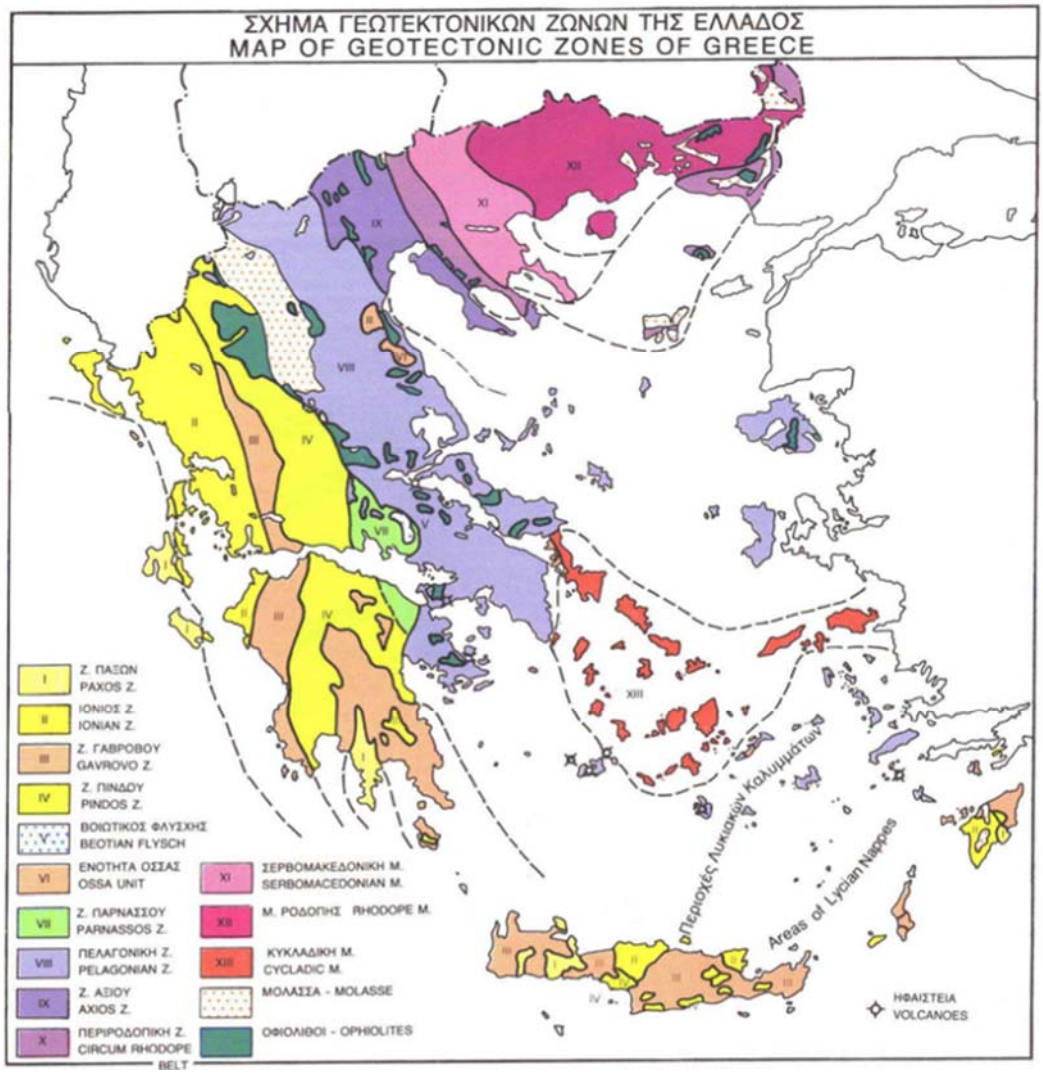


Figure 8.12: Map of Geotectonic Zones of Greece.

Paleogeographically, the Parnassos-Giona zone was located in the immediate vicinity of the inner zones, thus accepting the distant influence of the early (paleo-alpine) serogenetic phenomena that affected them. As a result of the upward movements was the creation of a coastal environment in the area of the zone, suitable for bauxitogenesis but also capable of forming sedimentary discrepancies between limestones, without stopping sedimentation. The final emergence of the zone took place in Ano Okaino after the deposition of puss.

The basic alpine sedimentation of the zone is limestone, a fasting phase with a deposition thickness of 1.800m. A key element of the evolution of the zone are the three bauxite horizons.

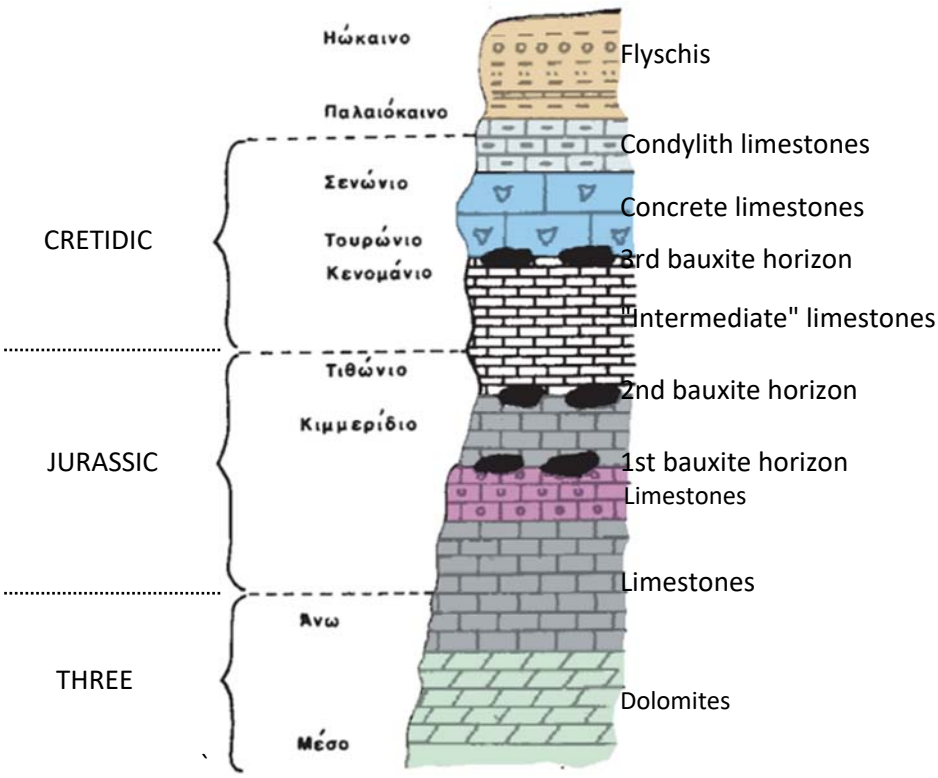


Figure 8.13: Stratigraphic column of Parnassos - Gionas zone.

According to the geological map of the I.G.M.E., scale 1:50,000, F.C. Delphi, the formations found in the wider study area are then described from the most recent to the oldest.

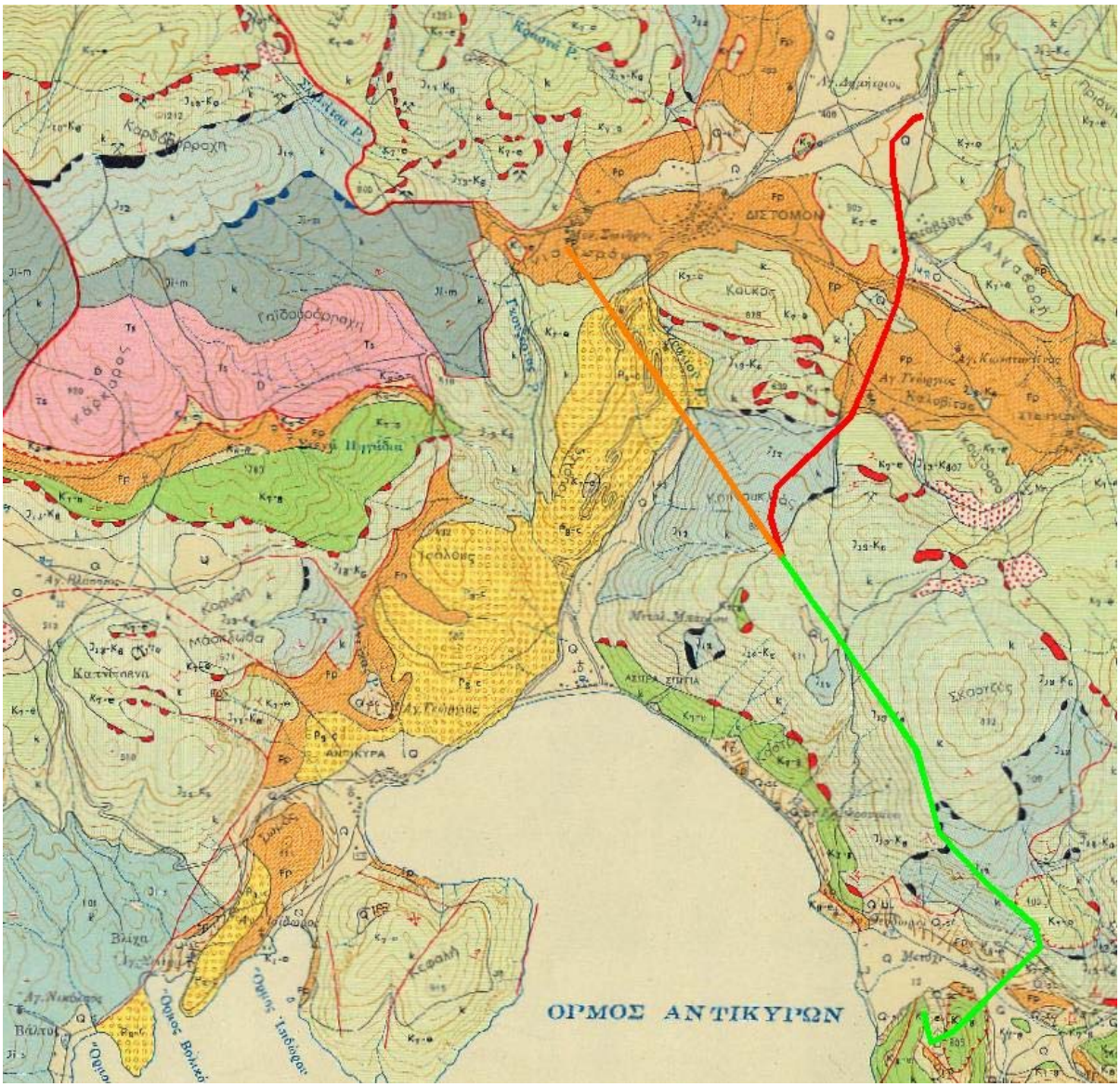


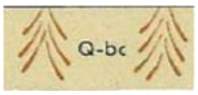
Figure 8.14: Extract of a geological map of I.G.M.E., F.C. Delphi, showing with a green line the environmentally licensed T.L of electricity 400kV which is maintained, with an orange line is reflected the environmentally licensed T.L, electricity 400kV which is abolished and with a red line the proposed modification of the route of that T.L.

METALLIC SEDIMENTS

Quadrant

Q **Modern predations**

Q-sc **Unconnected lateral crowns and crowns**



Coherent lateral crowns

Tertiary

Crokalopagi: limestone mainly crokalopagi with limestone binder

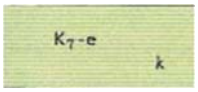
PARNASSOU SERIES - GIONAS

Paleogenes

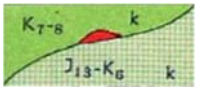
Flysch indivisible :rock system which includes from the oldest to the newest:
-Limestone slate
- Sandstones.
- Conglomerates**.**

Limestones, aged Sedon - Paleo-new: thin-layered, evolving into warts in the upper layers. They are subject to agreement with the red slates of the puss and are subject to agreement with the ruptin limestone.

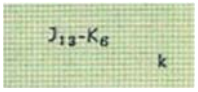
Limestones, of the age of Tronium - Sedonium: ruptator, usually microcrystallic, which in the upper layers fall into white crystalline limestones characterized by fragments of ruptists. They form the roof of the bauxites of the upper horizon.



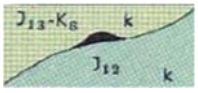
Limestones, aged Upper Cretaceous



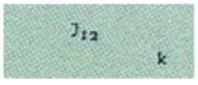
Upper horizon bauxites: usually red chestnuts, oolithic texture, dispersion type mainly. At the top of the case, white and aluminum-rich usually appear..



Limestones intermediate, aged Tithonio – Kenomanium: interlayered to thin-layered, are located between the upper and middle bauxite horizons. The immediate subjects of bauxites are usually white, microcrystallites with corals. Limestones and urns follow. The lower layers of this series contain abundant gasteropods and a multitude of corals and usually fall close to contact in margaic limestones.



Medium-horizon bauxites: erythrophae, amorphous and pisolithic texture. Mostly bammic type.



Limestones, aged Jurassic - Kimmerium: chubby, styre, dark with light spots in places.

The proposed engraving of the electricity transmission line will pass through the formation of modern adjouts (Q), the formation of the puss (Fp) and the limestones ($K_{7\text{-}e}$, J_{13}-K_6, J_{12}).

8.4.2 Tectonic characteristics

The tectonics of the wider region include mainly tangential movements, in the form of tectonic covers, in which the Eastern Greece zone is pushed over the outer zone of Parnassos-Giona. In particular, the intense tangental tendencies developed during alpine serogenesis caused the zone to finally rise and fall, while during the relief phase that followed systems of correct fractures were created. The effects of the above tectonic phases are decisive, in terms of the position of geological formations within the present morphological terrain of the region and the mechanical strength of these.

Special features in the zone are the short-term emerging and interpolation of the three main bauxite horizons.

8.4.3 Seismicity

The country's seismological bodies have proposed its separation into three Categories of Seismic Risk Zones. According to the Greek Earthquake Regulation (EAC 2000), as amended by the ministry decisions D17a/67/1/FN275/03 (Government Gazette 781/B/16-6-03) and D17a/115/9/FN275/03 (Government Gazette 1154/B/12-8-03), the area is part of seismic hazard zone II (medium seismic hazard), with a maximum expected seismic ground acceleration A= 0.24g, where g = gravity acceleration.

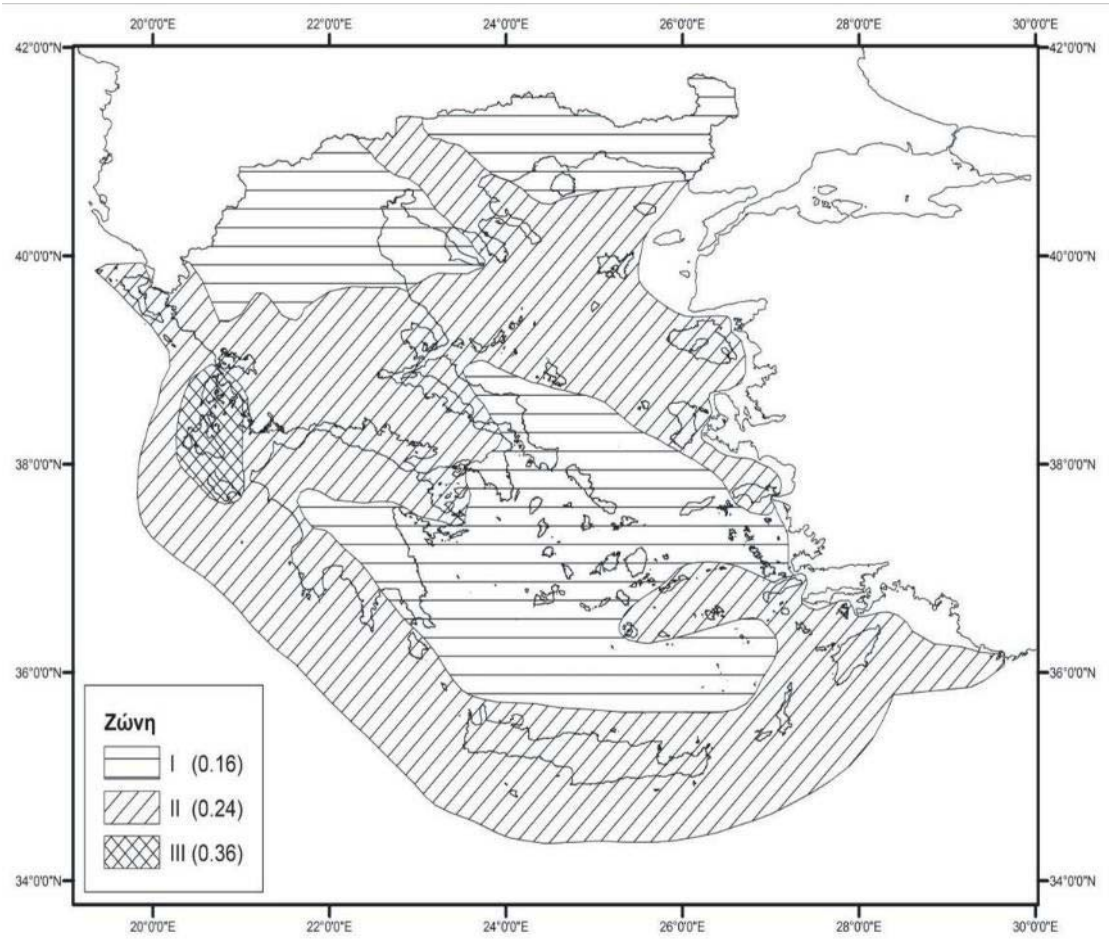


Figure 8.15: Map of Seismic Hazard Zones of Greece.

Based on the available data of the Geodynamic Institute of the National Observatory of Athens, the following figure shows the seismic events with magnitude Ms ≥ 3.0 Richter, which occurred in the wider region, within a 30km radius of the project under study, during the period 1964 - March 2019. Based on the available data, the largest earthquake of 5.4 Richter intensity occurred on 08.04.1970 at a distance of about 10.3km from the area of the factory under study, with a focal depth of 10km in the maritime area of the Corinthian Gulf.

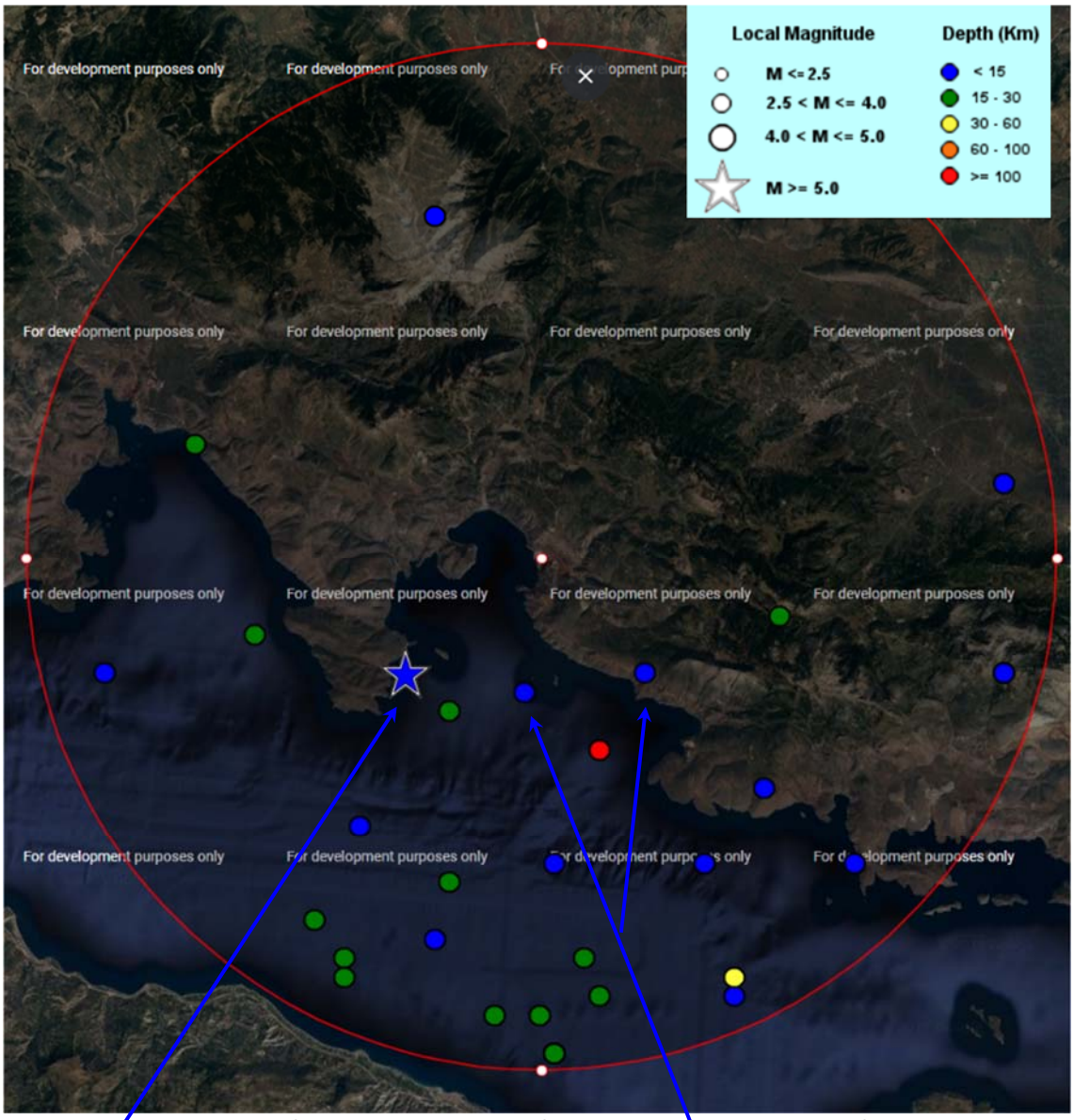


Figure 8.16: Seismic activity of the wider study area for the years 1964-2019 and for earthquakes over 4.0 Richter.

Stronger

Χρόνος Γένεσης: 1970/04/08 13:50:28 (GMT)
Μέγεθος: 5.4 ML
Γεωγρ.Πλάτος: 38.30°B
Γεωγρ.Μήκος: 22.60°A
Βάθος: 10.0 χμ
Επίκεντρο: 28.2 χμ ΔΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 10.3 χμ

Closer

Χρόνος Γένεσης: 1989/05/07 10:46:47 (GMT)
Μέγεθος: 4.1 ML
Γεωγρ.Πλάτος: 38.29°B
Γεωγρ.Μήκος: 22.68°A
Βάθος: 1.0 χμ
Επίκεντρο: 23.4 χμ ΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 8.1 χμ

Χρόνος Γένεσης: 1999/06/25 07:42:14 (GMT)
Μέγεθος: 4.3 ML
Γεωγρ.Πλάτος: 38.30°B
Γεωγρ.Μήκος: 22.76°A
Βάθος: 11.0 χμ
Επίκεντρο: 18.0 χμ ΝΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 9.4 χμ

8.4.4 Soil Characteristics

Based on the Soil Charter of Greece (Institute of Soilology – Lipasmatology and Climatology of the Ministry of Agriculture), which was drawn up on the basis of existing data and work of the Institute of SoilOlogy of Lipasmatology and Climatology, the Institute of Chemistry and Agriculture "N. Kanelopoulos" and the former Geological Service of C.L.P., the soils found in the study area are shown in the following figure.

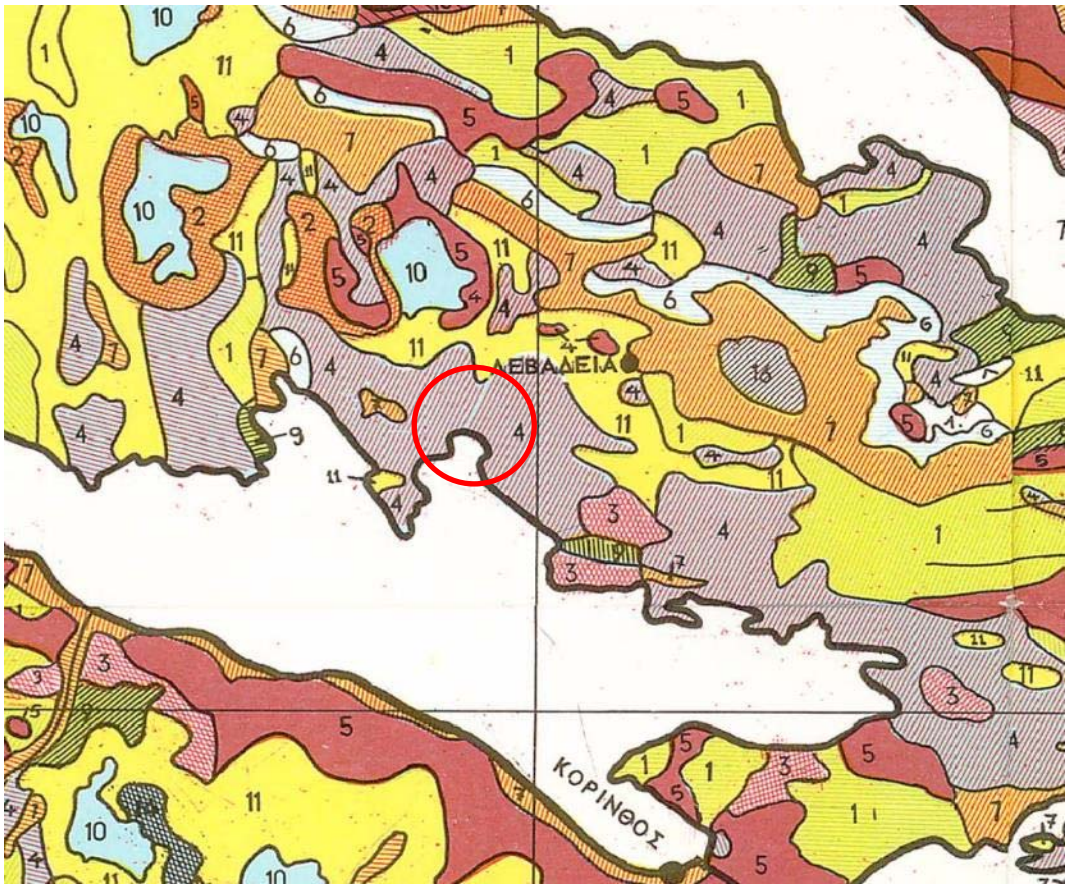


Figure 8.17: Extract of a soil map of Greece, where the red circle encloses the study area.

The soils found in the study area are as follows:

Limestone Redzine and Orphn Mediterranean

The main types of soils found in the study area are the following:

1. **C2C7-919-1-G2BN:** type of soils presented in hard limestones on steep slopes and at the bottom of slopes. In terms of soil characterization it is a rock with no corrosion and steep surface slope. From an ecological point of view they are included in the area of broadleaf leaves and a moderate degree of

anthropogenic effect on vegetation with northern and southern exposures.

2. **A7A8-111-1-G9EE:** type of soils presented elsewhere at the bottom of the aisles and in an open valley. In terms of soil characterization it is deep with no corrosion and light surface gradient. From an ecological point of view they are included in the area of unleaf broadleaf and for cultivated land with flat exposures.
3. **C5C7-825-1-G2NN:** type of soils presented in hard limestones in the middle and bottom of the aisles. In terms of soil characterization it is rock and shallow with no to moderate erosion and moderate surface gradient. From an ecological point of view they are included in the area of broadleaf leaves and a moderate degree of anthropogenic effect on vegetation with northern and southern exposures.

8.5 NATURAL ENVIRONMENT

8.5.1 General elements

The chloride composition of the wider area of the project is included in the coverage limits of the Oleo Ceratonion sub-area (olive and carob sub-area), the Mediterranean Vegetation Zone Quercetalia ilicis (Dur leaf belt), according to the classification of phytosocial units by Braun – Blanquet.

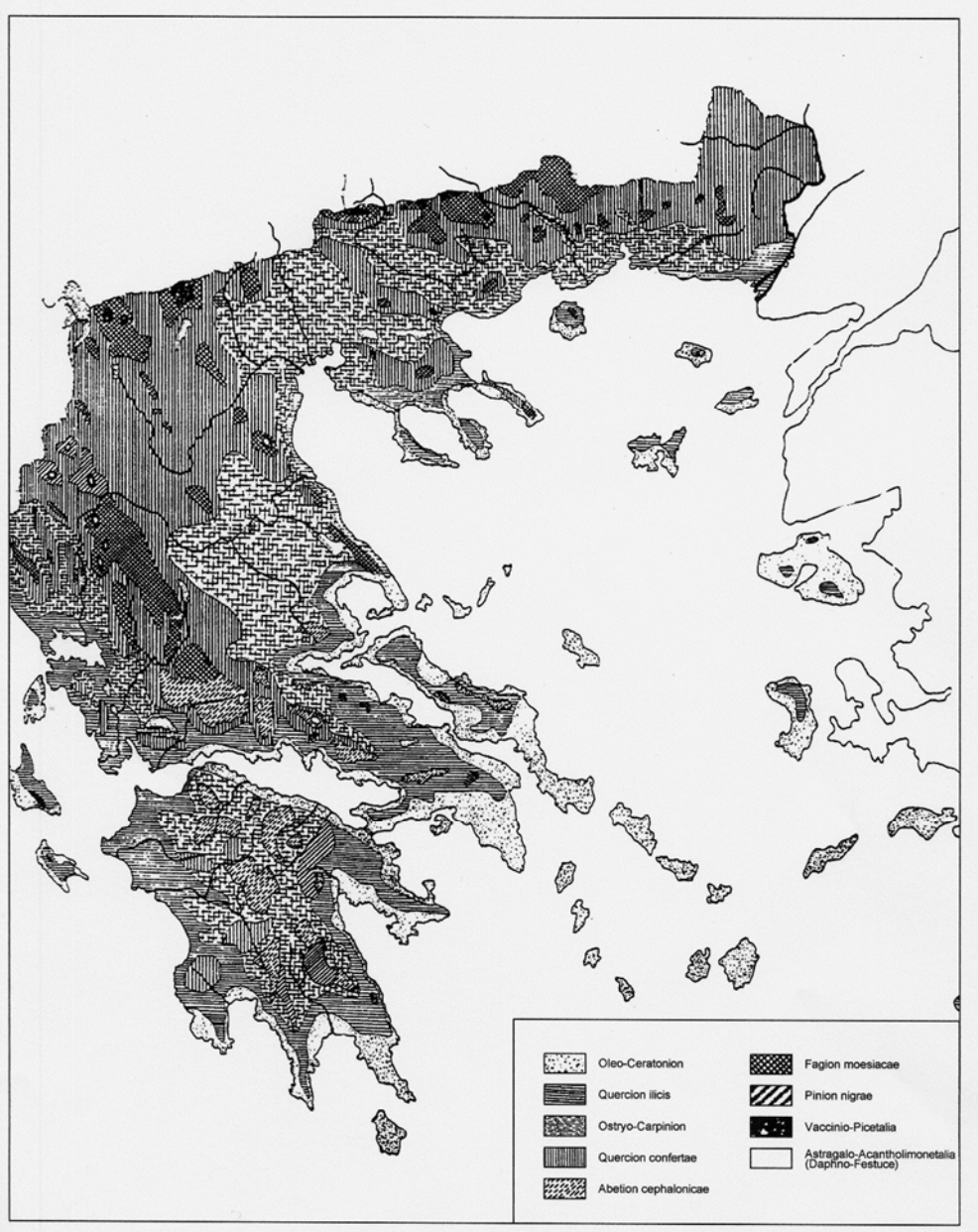


Figure 8.18: Map of Phytosocial Structures of Greece v. S. Dafi (classification of units according to the Braun – Blanquet system).

The Quercetalia ilicis zone occupies Western Greece, Eastern Greece and Northeastern Greece and consists of two sub-areas. On a large scale, the coastal, hilly and sub-mountainous vegetation sub-area **Oleo Ceratonion (olive and carob sub-area)** to which the study area belongs is found. This zone is found from sea level up to 700-800m and appears in exhibitions facing south. The main characteristics included are schinos (Pistacia lentiscus) and wildebeth (Oela oeaster). On a much smaller scale is found the sub-area Quercion Ilicis, which appears above the Oleo Ceratonion and in place of the aria. The position of the main characteristic species in this sub-area is occupied by the querqus coccitera. The immediate study area has

few species of tree vegetation populations, bushy vegetation is characterized as rich, while finally herbaceous vegetation shows populations with moderate or relatively low frequency.

The Oleo Ceratonion sub-area occurs in the driest Southeastern and Eastern Greece (up to Pelion), in the islands of the South Aegean, in the lower positions of the south Halkidiki and in some islands of the Ionian Sea.

This sub-column can be distinguished in two growth areas:

- In the lower, warmer of Oleo-Ceratonietum and in the relatively colder of Oleo - Ientiscetum. The first growth area extends to the lower region of Crete and the islands of the southern Aegean, to the Southeastern Peloponnese and Attica. In these areas natural plant society has long been degraded and when the areas are not cultivated agriculturally, they are covered by compounds of toast (garique, tomilaris) in which they dominate, thorny, semi-thames, such as: Poterium spinosum (Sarcopoterium the thorny), Genista acanthoclanda (Genista the thorn branch), Euphorbia acanhtothamnos (Euphoria the thorn) etc., as well as various lips (Lamiaceae), such as: Corydothymus capitatus (Head thyme) , Salvia officinalis (Salvia pharmaceuticals, Sage), Salvia pomifera (Salvia the apple tree, Wild Sage), Phlomis fruticosa (Asfaka), Balotta acetambulosa (Lychnaraki) etc..
- At higher altitudes and further north horizontally, the growth space of Oleo - Ientiscentum appears. He presents his greatest spread in the South and Eastern Peloponnese, Attica, Eastern Greece up to Pelion and at the feet of Halkidiki. In this growth space appear, despite the dryness of the climate, wonderful clusters of Pinus halepensis (Pine the Aleppo), which spreads beyond the boundaries of Oleo – Ientiscentum. The plants found are the following: Olea europaea var. Silvestris (Agrielia), Pistacia Ientiscus (Schinos), Erica manipuliflora (Heather the vertebral), Myrtus communis (Myrtos the common), (in wetter places), Quercus coccistera (Drys the granules Ronicera etrusca (Honeysuckle), Rosa sempervirens (Wild Rose), Smilax aspera (Arcudovatos), Styrax officinalis (Styrax the Pharmaceutical, Sturaki), Rubia peregrine (Rizari) etc. And from an agricultural point of view, the cultivation of olives, citrus fruits, peanuts, etc. dominates.

The predominant vegetation of the area is bushy, followed by meadows and crops. The rocky areas are located only in places where there is no woody vegetation, ie in places with vertical rocks - right slopes

The fauna of the wider region, is the usual fauna of the Greek countryside with species such as foxes (Vulpes vulpes), jackals (Lupuella spp.), badgers (Meles meles), weasels (Mustella nivallis), hares (Lepus Europaeus) etc. Birds such as otus scops, urura epops, carya (Corvus monentula) and magpie (pica pica) make up the birdlife of the region.

8.5.2 Areas of the National System of Protected Areas

With regard to the areas of the National System of Protected Areas, in accordance with No. 50743/2017 JMD (Government Gazette 4432B/15.12.2017) revised the national list of areas of the European Natura 2000 Ecological Network area.

The nearest protected areas of the European Ecological Network Area Natura 2000 (Directive 92/43/EEC) to the project under study are the following:

- "Corinthian Gulf" (GR 2530007) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 200m SW of the existing T.L and about 1.800m SW of the proposed amendments.
- "Parnassos National Park" (GR 2410002) which has been designated as a Special Protection Zone (Z.E.P. or S.P.A.) and is located at a distance of about 1.600m NW of the proposed amendments.
- "Southeastern Parnassos-Parnassos National Park-Tithoreas Forest" (GR 2450005) which has been designated as a Special Conservation Zone (SCI)and is located at a distance of about 9.500m NW of the proposed amendments.

Figure 8.19: Extract of satellite imaging (google earth), showing the environmentally licensed T.L with a green line. 400kV electricity which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L which is abolished and with a red line the proposed modification of the route of that T.L Also reflects the protected lines of the European Ecological Network Natura 2000 (green shading) and the Wildlife Refuges Life (brown shading) of the area.

Also, in the wider area of activity are located the following Wildlife Refuges:

- "All Saints (Delphi – Desfinas – Chrysos)" (Government Gazette 343/B/1987), at a distance of about 16,0km West of the proposed amendments.
- "Latsoudi (Distomo – Styrio)" (Government Gazette 961/B/1995), at a distance of about 6.0km East of the proposed amendments.
- "Asprochoma-Psilo-Prodol-Kelari (Arachova)" (Government Gazette 1043/B/1976), at a distance of about 9,8km NW of the proposed amendments.

In any case, both the entire licensed project and the proposed amendments do not fall within areas of the National Protected Areas System.

8.5.3 Forests and forest areas

For the study area there are no ratified or posted forest maps.

In any case, in accordance with Chapter 6 of L. 998/1979 "Allowable interventions in forests, forest areas and public areas referred to in points (a) and (b) of paragraph 5 of Article 3 of this Law', in particular in accordance with paragraph 5 of Article 53 'Infrastructure projects', **the installation of power stations by conventional fuel and accompanying works only** on public land referred to in points (a) and (b) of Article 3(5) of Law 998/1979 and in the absence thereof in forested areas and forests.

Also, in accordance with Article 46 'Extraordinary nature of permissible interference with resused land', in public and private forests and woodlands **declared resusperable, no intervention provided for in the provisions** of Chapter 6 of Law 998/1979 or by any other provision, **with the exception of those referred to in Article 48(1) is permitted, paragraphs** 1, 3, 4 and **5 of Article 53 (installation of conventional fuel power stations and their accompanying works)**, paragraph 1 of Article 54, paragraph 1 of Article 55 and paragraph 5 of Article 57 of Chapter 6, and the provisions of Article 16 of Law 998/1979.

Also, in accordance with Article 45(5) of Law 998/1979, for national and regional road, irrigation and water supply projects as well as **networks for the transmission and distribution** of natural gas, petroleum products and **electricity in forests, forest areas and public areas referred to in points (a) and (b) of Article 3(5)** of Law 998/1979, **in the case of no definitive technical studies have been carried out, the competent forestry authority shall, in this case, give an opinion on the dossier of the Environmental Impact Assessment (EE)** taking into account the limitations and conditions laid down by forestry legislation for the implementation of those projects on those areas. At the completion of the final studies of the projects, the project operator is obliged to submit to the competent forestry authority the relevant dossier for the adoption of a designation act..

In any case, after the finalization of the project design, a request for the issuance of a designation act will be submitted to the competent forestry office. However, based on the above, the project under study is compatible with the provisions of forest legislation

8.5.4 Other important natural areas

There are no other significant natural areas in the immediate area of intervention, other than those mentioned in the previous sections.

8.6 ANTHROPOGENIC ENVIRONMENT

8.6.1 Spatial Planning - Land Uses

As mentioned above, the project under study falls within the administrative boundaries of the M.U. Distomos of the Municipality of Distomos - Arachova - Antikyra, but also of the Municipality of Kyriaki, the Municipality of Levadia of Viotia Region, for which the General Urban Plans of M.U. Distomos and M.U. Kyriakou have been approved, respectively.

General Urban Plan of M.U. Distomos of the Municipality of Distomos - Arachova - Antikyra.

The Decision 3124/128532 (Government Gazette 432/A.A.P./31.12.2012) "Approval of a General Urban Plan (G.U.P. .) of Municipal Unity M.U. (M.U.)of Distomo, Municipality of Distomos - Arachova - Antikyra", concerns the entire area of the M.U. , through which the electricity transmission line under study passes.

The following is an excerpt of the project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. of M.U. Distomos, indicating the electricity GM under consideration.

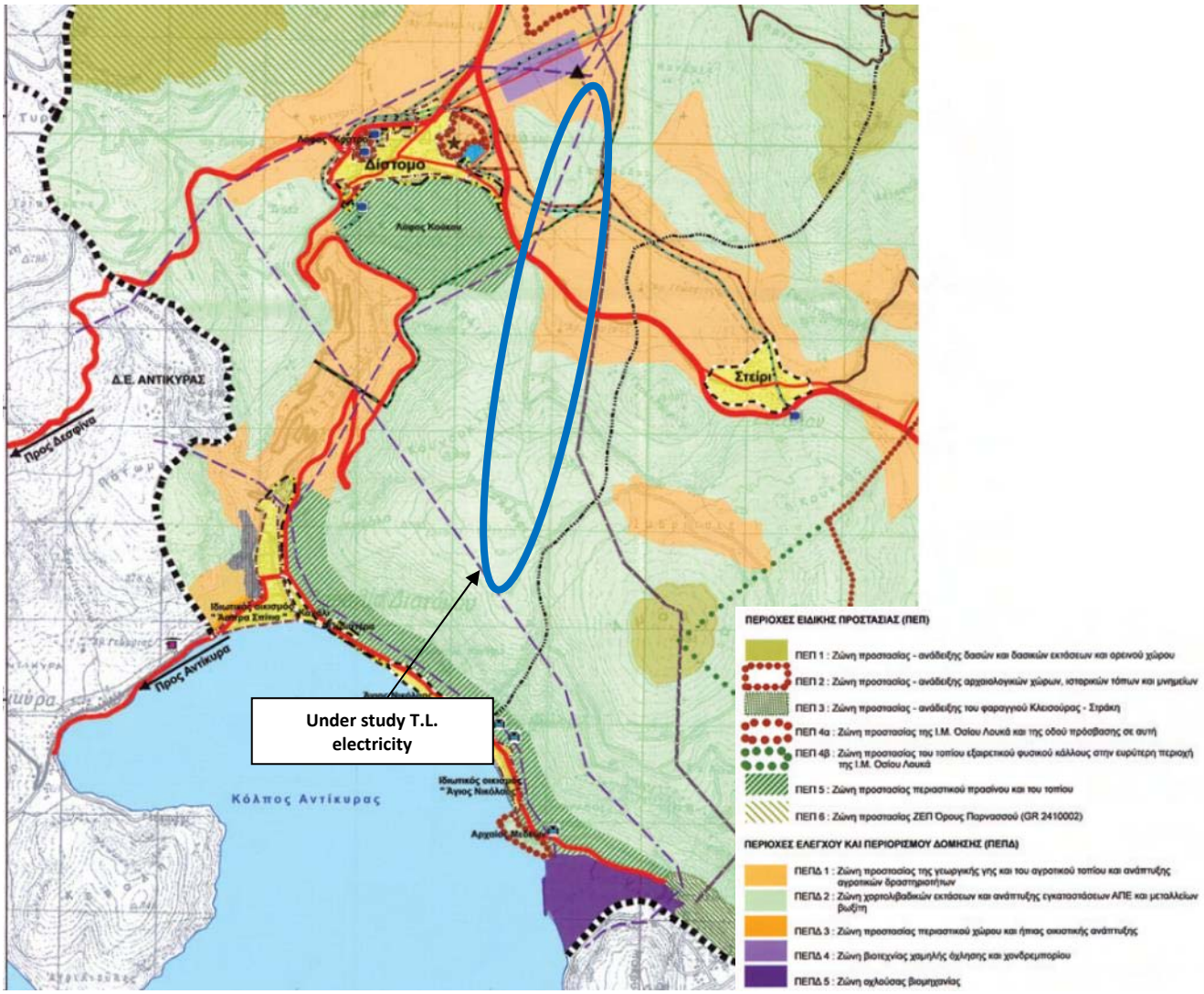


Figure 8.20: An excerpt of a project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. . of M.U. Distomos, with a purple dotted line, depicts the existing electricity T.L, while the blue lack indicates the route of the proposed amendment.

According to the organization of land uses and environmental protection of the M.U. , the proposed amendments pass mainly through the Areas of Control and Restriction of Construction (PEPD):

- PEPD 1: Zone for the protection of agricultural land and the rural landscape and the development of agricultural activities (the smallest part of the T.L under consideration falls)
- PEPD 2: Zone of grassland and development of RES facilities and bauxite mines (most of the T.L concerned falls)

Facilities and technical infrastructure networks are permitted in both the WFP1 and the WFP2 zone.

General Urban Plan of M.U. Kyrakis Municipality of Levadia

The Decision- 3529/149006 (Government Gazette 273/A.A.P./12.12.2016) "Approval of the General Urban Plan (G.U.P.) of the Community of Kyriaki, Municipality of Levadia", concerns the entire area of the M.U. , through which the existing electricity transmission line passes, in the area near HVC Agios Nikolaos.

The following is an excerpt of the project entitled "Land Uses and Environmental Protection" of the approved G.U.P. . of the M.U. Kyriaki, which indicates the area through which the electricity T.L under study passes.

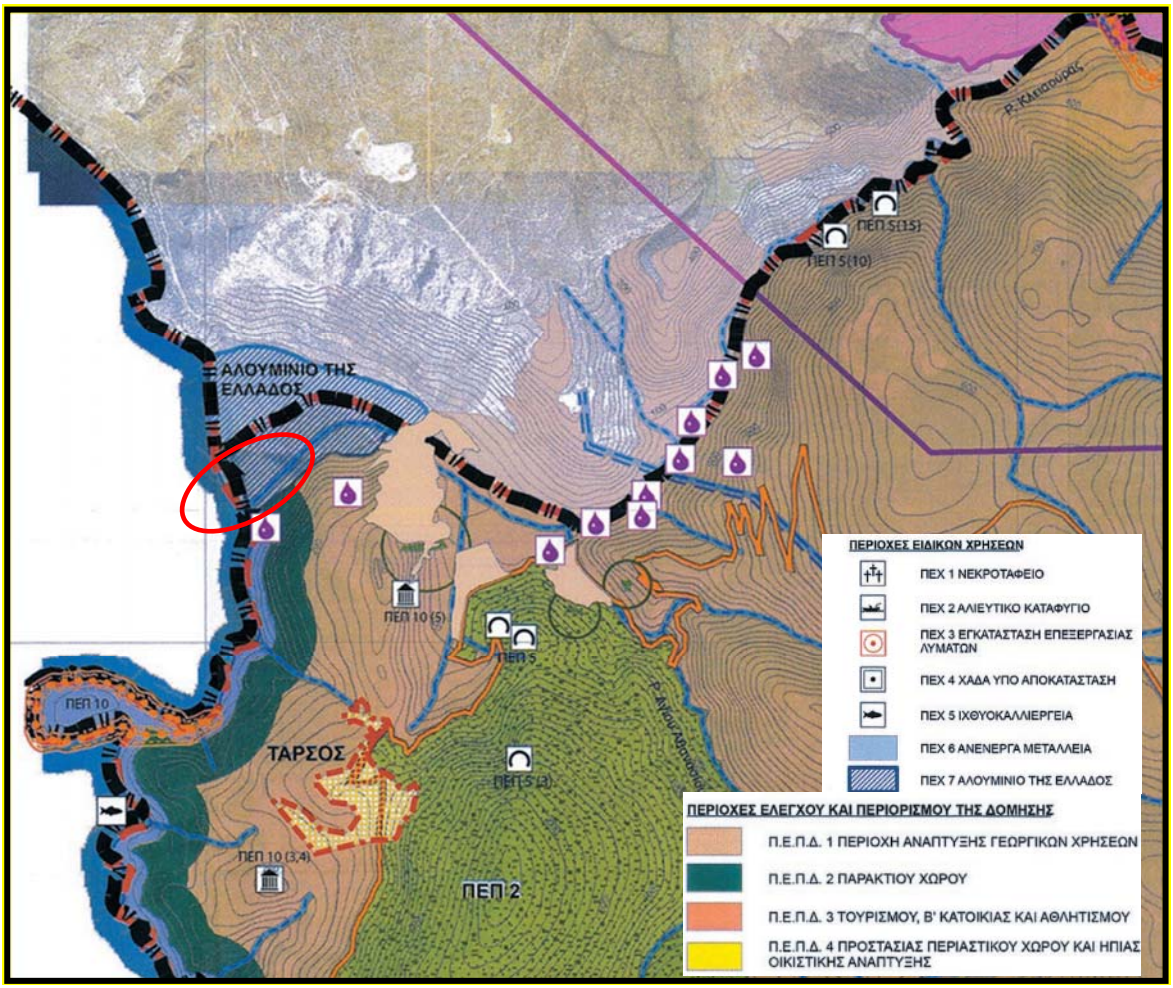


Figure 8.21: Excerpt of a project entitled "Land Uses and Environmental Protection" (Plan No. P.2) of the approved G.U.P. . of the M.U. Kyriaki, where the red shortage includes part of the existing T.L electricity**.**

According to the organization of land uses and environmental protection of the M.U. , part of the electricity under study passes through the Areas of Control and Restriction of Construction (PEPD):

- PEPD 1: Area of development of agricultural uses.
- PEPD 2: Coastal area.

Small part of the electricity T.L, as well as the substation (P/S) of High Voltage 400kV – HVC Ag. Nikolaos pass through the Special Uses Area (PEX) 7: Aluminium of Greece.

Both in the agricultural development area and in the coastal area, facilities and technical infrastructure networks are permitted, inter alia.

8.6.2 Structure and functions of the anthropogenic environment

The nearest settlements in the project under study are:

- Tarsos, located at a distance of about 1.000m South-East of the existing electricity transmission line. The settlement of Tarsos was established by No. 3149/16.11.1987 Decision of the Prefect of Viotia (Government Gazette 1187/D/14.12.1987).
- The Steiri is located at a distance of about 2,0km South-East of the new proposed electricity route of T.L. The settlement of Seri was institutionalized with the No. 3354/27.07.1986 Decision of the Prefect of Viotia (Government Gazette 926/D/06.10.1986).
- Distomo, located at a distance of about 800m West of the new proposed route of the electricity transmission line. The settlement of Distomo was established by No. 36642/20.06.1972 Decision of the Prefect of Viotia (Government Gazette 156/D/07.07.1972).

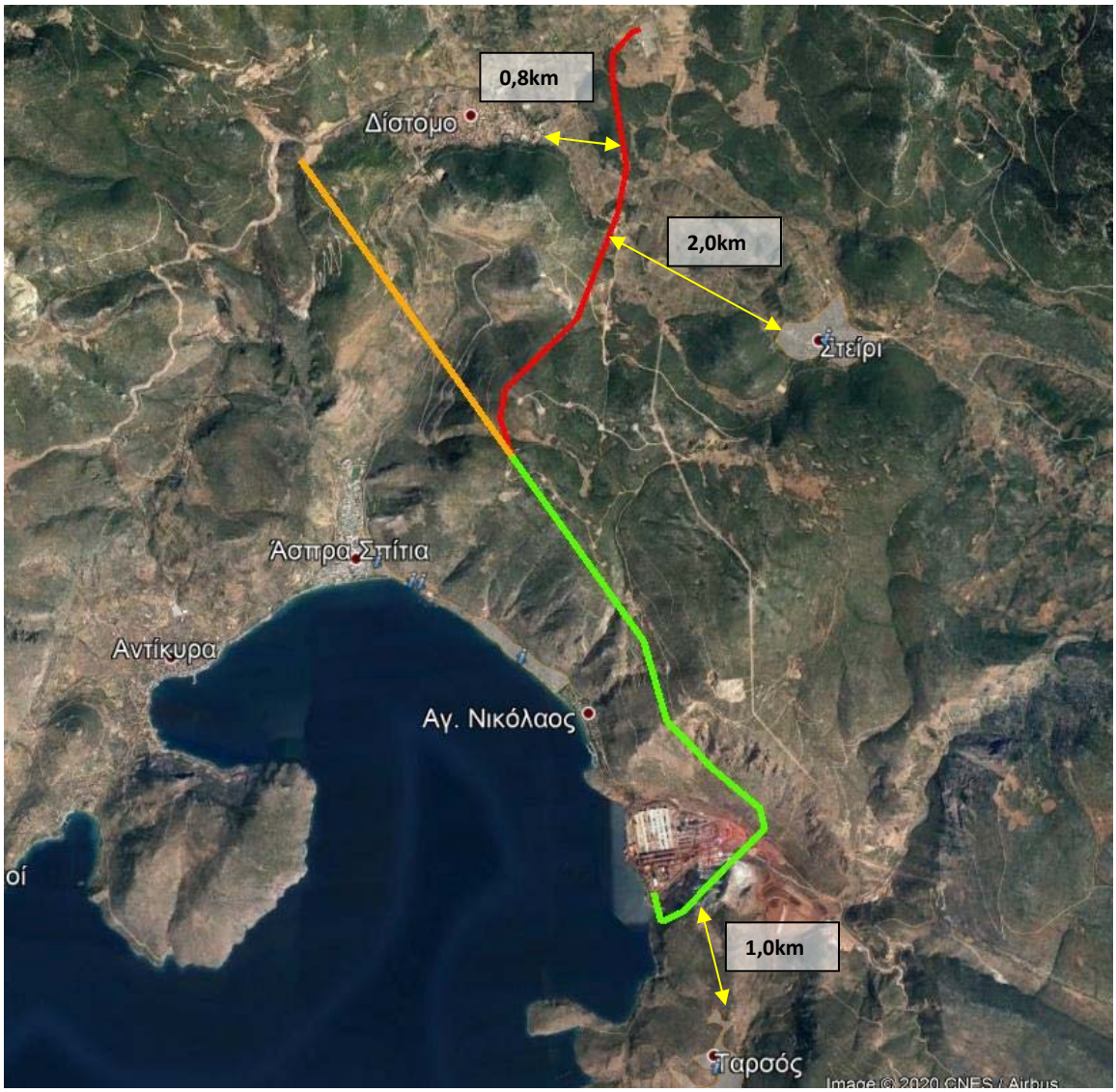


Figure 8.22: A google earth extract showing the project under study, as well as the nearest demarcated settlements.

8.6.3 Cultural heritage

An important archaeological site of the area is the remains of the wall of the acropolis of Fokikos Medeon, which is built on the hill of Agioi Theodoroi, at a distance of 800m SW of the existing electricity transmission line.

The low walled hill of Agioi Theodoroi, on the east coast of the gulf of Antikyra, has been identified by scholars with the ancient city of Fokikos Medeon. At the time Pausanias visited it, the city was deserted. The citadel is surrounded by strong fortification from the east, north and west sides of the hill, while the steep southern sides of the hill offer natural fortification on the side of the sea. The walls, dating back to

the 4th century BC, are constructed according to the irregular isostructure system of wallwork, without binders in the joints with large stonework.

The first excavations were carried out in 1907 by the archaeologist Georgios Sotiriadis, while in the 1960s a part of an extensive ancient cemetery was excavated with uninterrupted use from the Meso-Hellenic era (2100/2000 – 1600 BC) until the 2nd century BC. A characteristic feature of the monument is the existence of a small side room.

An archaeological site of similar importance, at a distance of about 1.500m from the existing electricity T.L and more than 3.000m from the proposed modification, is the monastery of St. Luke, which was built in the 10th century and belongs to the list of UNESCO World Heritage Sites. It is built on the western slopes of Elicus, under the citadel of ancient Steiri and is one of the most important monuments of the Mid-Byzantine period in Greece. The church was dedicated to St. Luke (29 July 896 - 7 February 953), whose remains have been in the Monastery since 1986, when it was transferred from Venice.

The year 2012 and with the GPAPK/BBMA/TAXMAE/85715/20176/2942/288/20-20 8-2012 MD (Government Gazette 287/AAP/13.9.2012), Zones A of Absolute Protection and Zone B of Protection of the Monastery of St. Luke, Regional Unit of Viotia were established. The protection zones of this archaeological site are indicated in the satellite imagery extract below, while the activity in question is at a safe distance from them.

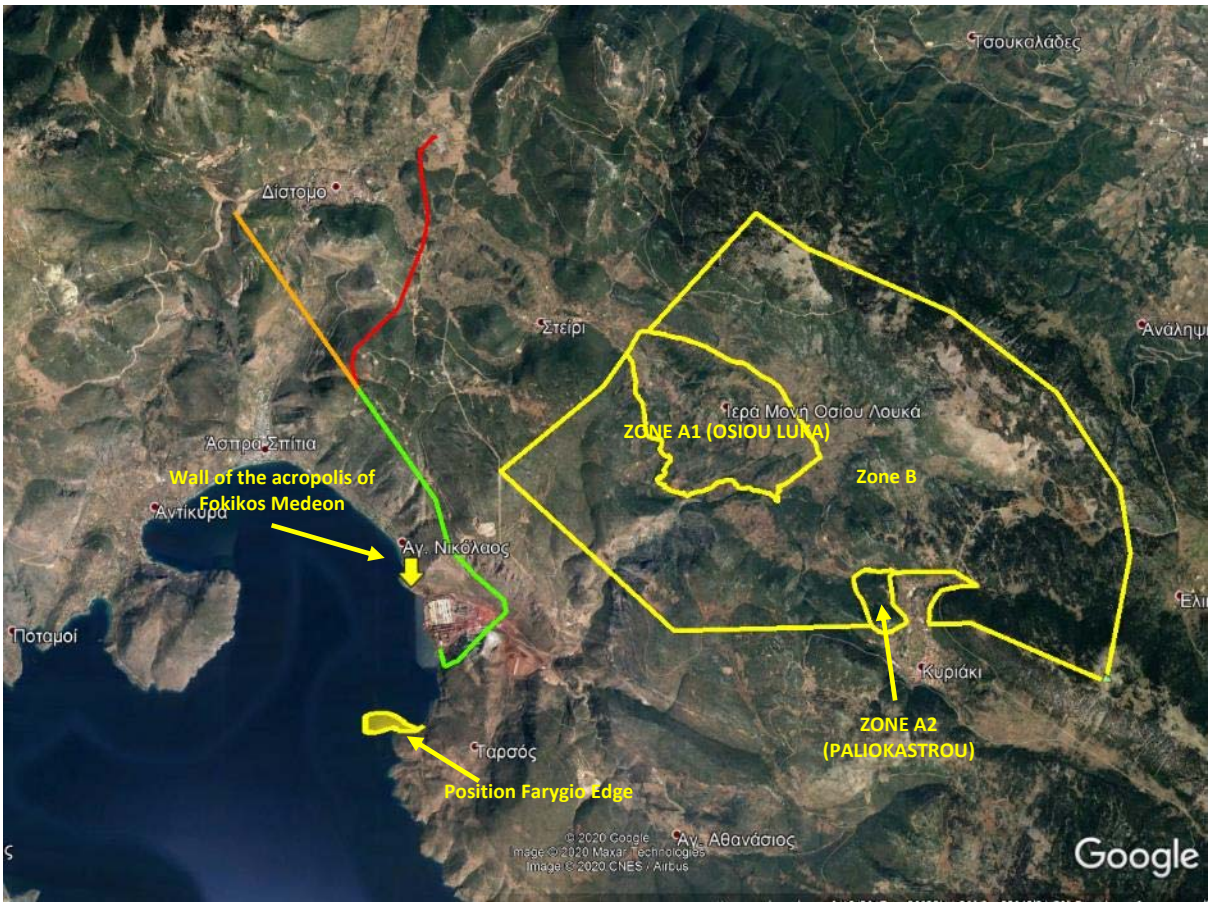


Figure 8.23: A google earth extract, showing the environmentally licensed 400kV electricity T.L which is maintained, with an orange line, the environmentally licensed 400kV electricity T.L which is abolished and with a red line the proposed modification of the route of this T.L Also in yellow are the archaeological sites of the area.

At a distance of about 1.000m SW of the existing T.L. declared by EPAO/GDA/ARCH/A/F43/22714/1420 (Government Gazette 603/B/22.05.2001) as an archaeological site the location Farygio A tip (Puntas Tarsos area – White Houses of Viotia) for the protection of the surviving settlement remains of the late Roman empire. These are ruins of houses, a new ancient water tank and a wall that runs through the neck of the Punta Peninsula.

8.7 SOCIAL - ECONOMIC ENVIRONMENT

8.7.1 Demographic situation and development trends

The project under study and the study area are mainly located within the administrative boundaries of the Communities of Steiri and Kyriaki, the Municipal Units M.U. (M.U.)of Distomos and Kyriaki respectively, the Municipalities of Distomos - Arachova - Antikyra and Levadia respectively, both of the Regional Unit (of

Viotia.

According to the institutional framework "New Architecture of Self-Government and Decentralized Administration – Kallikrates Programme" of Law 3852/2010 (Government Gazette 87/A/07-06-2010), which is valid from 01-01-2011, the administrative division of Greece has been reformed and the boundaries of the self-administrative units, the way in which the institutions are elected and their responsibilities have been redefined. According to the above institutional framework, the new Municipality of Levadia, based in Livadia, came from the union of the Municipalities of Levadea, Charonia, Dalia, Koronia and the Community of Kyriaki, which were abolished. The new Municipality of Distomos - Arachova - Antikyra based in Distomo came from the union of the Municipalities of Arachobis, Distomos and the Community of Antikyra, which were abolished.

The Municipality of Levadia has a population of 31.315 inhabitants (2011 census) and consists of twenty (20) Communities. The Municipality of Distomos - Arachova - Antikyra has a population of 8.188 inhabitants (2011 census) and consists of three (4) Communities: Antikyra, Arachobis, Distomo and Steiri. The Municipalities of Levadia and Distomos - Arachova - Antikyra, are administratively subject to the Decentralized Administration of Thessaly and Central Greece and in particular to the Region of Central Greece which, according to the new institutional framework for Local Government 1st and 2nd degree, consists of five (5) Regional Units (Viotia, Evia, Evritania, Fthiotida and Fokida. The new Municipality of Levadia consists of five (5) Municipal Units (M.U.): Levadia, Chireonia, Dalia, Koronia and Kyriaki. The new Municipality of Distomos - Arachova - Antikyra consists of three (3) Municipal Units (M.U.): Distomo, Arachova and Antikyra.

The populations of the Communities of Kyriaki and Distomos, according to the 2011 census (EL.STAT.), are presented in the table below.

Table 8.2: The Communities of Kyriaki and Distomos with their populations (census 2011) (source: EL.STAT.).

Communities	D.C. & P.C.	population
Kyriakiou	Kyriakiou	2.298
	Total S.A..	**2.298**
Distomo	Distomo	3.192
	Steiri	689
	Total S.A..	**3.881**

The following table shows the evolution of the population over time, for each M.U.

Table 8.3: The Communities of kyriaki and Distomos with the evolution of the population over time (years 1991, 2001 and 2011) (source: EL.STAT.).

M.U. .	Communities	population		
		1991	2001	2011
Kyriakiou	Kyriakiou	2.482	2.161	2.298
	Total S.A..	**2.482**	**2.161**	**2.298**
Distomo	Distomo	4.556	3.561	3.192
	Steiri	922	826	689
	Total S.A..	**5.478**	**4.387**	**3.881**

The following table shows the percentage change in the Communities of Kyriaki and Distomo, according to the data in the figures for the years 1991 to 2011.

Table 8.4: Percentage population change of the Communities of the M.U. of Kyriaki & Distomos.

M.U.	*Communities*	Percentage population change (%)	
		1991 - 2001	2001 - 2011
Kyriakiou	Kyriakiou	-12,93	6,34
	Total S.A..	**-12,93**	**6,34**
Distomo	Distomo	-21,84	-10,36
	Steiri	-10,41	-16,59
	Total S.A..	**-19,92**	**-11,53**

According to data from the National Statistical Office, the population of M.U. Kyriaki in the decade 1991 - 2001 decreased by 12.93% and in the decade 2001 - 2011 showed an increase of 6.34%. M.U. Distomo in the decade 1991 - 2001 showed a decrease of 19.92% and in the decade 2001 - 2011 it showed a decrease of 11.53%.

8.7.2 Productive structure of the local economy

According to the data of the 2011 (ELSTAT) in the Municipality of Levadia, of the total permanent population (31.315 inhabitants) the employees are 10,673 people. In the Municipality of Distomos - Arachova - Antikyra the number of employees amounts to 2.693 people. The following table shows employment by productive sector for the two municipalities.

Table 8.5: Employees by sector of production activity.

municipality	primary	Secondary	tertiary	Total employees
Levadeon	1.259 (12%)	2.539 (24%)	6.875 (64%)	**10.673**
Distomo - Arachova - Antikyra	151 (6%)	1.083 (40%)	1.459 (54%)	**2.693**

8.7.3 Employment data

Of the total of 31.315 inhabitants (2011 census) of the Municipality of Levadia, 13.088 people constitute the economically active population of the Municipality. Of these, 2.415 are unemployed, while 10.673 are employed in the primary, secondary and tertiary sectors of employment. In the primary sector 11.8% of employees are employed, in the secondary sector 23.8% are employed and finally 64.4% are employed in the tertiary sector. The economically inactive population of the Municipality of Levadia amounts to 18.227 people and concerns students - students (4.465 persons), pensioners (7.589 persons), persons dealing with household (3.811) and others (2.362 persons).

Table 8.6: Economically active and inactive population, employed by sector of economic activity and unemployed of the Municipalities of Levadea and Distomos - Arachova - Antikyra (source: EL.STAT., census 2011).

municipality	total	Financially active						Financially inactive
		Total financial active	Employed				unemployed	
			Total employees	primary sector	secondary sector	tertiary sector		
Levadia	31.315	13.088	10.673	1.259	2.539	6.875	2.415	18.227
Distomo - Arachova - Antikyra	8.188	3.269	2.693	151	1.083	1.459	576	4.919

Of the total of 8.188 inhabitants (2011 census) of the Municipality of Distomos - Arachova - Antikyra, 3.269 people constitute the economically active population of the Municipality. Of these, 576 people are unemployed, while 2.693 are employed in the primary, secondary and tertiary sectors of employment. In the primary sector 5.6% of employees are employed, in the secondary sector 40.2% and finally 54.2% are employed in the tertiary sector. The economically inactive population of the Municipality of Distomos - Arachova - Antikyra amounts to 4.919 people and concerns students - students (1.191 people), pensioners (1.820 people), persons involved in domestic (1.370) and others (538 persons).

8.7.4 Per capita income

The following diagram has been created by ELSTAT data and shows the gross domestic product per capita of REGION OF. Viotia for the period 2000 - 2017.

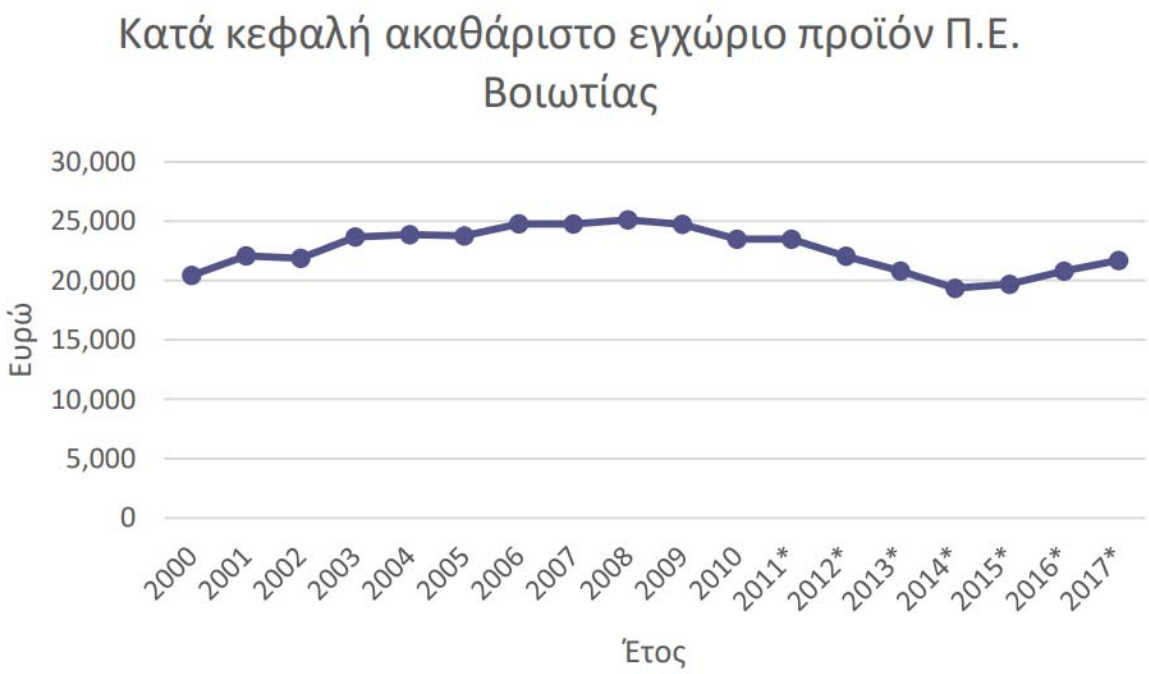


Figure 8.24: Per capita gross domestic product for RU Boeotia for the period 2000 - 2017.

As shown above, per capita income has been on the rise from 2000 to 2008, and then declined until 2014 mainly due to the impact of the global economic crisis on the Greek economy. Since 2014 it appears to be recovering, reaching 21.678 euros in 2017.

8.8 TECHNICAL INFRASTRUCTURE

8.8.1 Land, sea and air transport infrastructure

Road network

In more detail, the Region of Central Greece is crossed by the PATHE road axis, as well as by the main railway line of the country. This is an important factor in enhancing the competitiveness of the Region at national level and gives similar characteristics to the companies operating in its area.

The National Network that crosses the Region amounts to 1.191 kilometers, while the provincial network covers 3.473 kilometers. The situation of the intra-provincial road network presents problems and significant weaknesses, making road communication quite difficult during the winter months.

More specifically, the Region of Central Greece includes the following Main Roads:

- Athens - Lamia - Thessaloniki (PATHE).
- PATHE - Chalkida - Kimi.
- Lamia - Amfissa - Antirio - Patras.
- Lamia - Karditsa - Trikala - Panagia/Igoumenitsa (E65).
- Thebes - Eleusis (PATHE).

In addition, the following Secondary Roads are included:

- Thebes - Livadia - Itea (Delphi bypass).
- Lamia - Karpenisi - Agrinio.
- PATHE - Glyfa.
- Edipsos/Istia - Chalkida.
- Aliveri - Karystos.
- Livadia - Lamia - Dodokos.

As far as Viotia is concerned, its road network occupies 550km of provincial network and 123km of secondary national network.

Rail network

The length of the Greek rail network amounts to about 2,450km, with a density of 18km per 1,000km2, which is also the smallest in Europe (the corresponding value in the EU of 15 is 44, while in the EU 25 is 50km). This significant lag is largely due to the lack of conditions for the development and operation of rail transport. However, the Region of Central Greece has a strategic role in the railway network, which takes the form of a central trunk with branches, rather than the form of an integrated interregional network

The railway infrastructure of the Region is developed in the northwest - south-east direction, along the upgraded international line Piraeus - Athens - Thessaloniki - Idomeni, which also traffics most of the total transport project (approximately 50%) of the OSE and serves most of the main urban centers of the Region,

mainly after upgrading the line to Chalkida with its suburban type connection with Athens. In addition to this main axis, the railway network of the Region is complemented by its branches from Oinoi to Chalkida and from Lianokladi to the port of Stylida.

Maritime transport

The role of the commercial/passenger ports of the Region of Central Greece is limited to meeting the needs of its island area and has equivalent importance. The subsystems of maritime (coastal) transport play a decisive role in the interconnection of the islands of the region, which are few but have a developed / developing tourist character, with the continental area.

Air transport

In the Region of Central Greece there is only one airport, that of Skyros that connects the island with Athens (Operational Programme of Central Greece 2012 - 2014).

8.8.2 Environmental infrastructure systems

According to the Special Secretariat for Water, in the wider study area, the nearest Wastewater Treatment Facility (EL) with code EL2410040110 is located south of Arachova and at a distance of about 9 km NW of the modifications under study. The body of the unit is the Municipality of Distomos - Arachova - Antikyra and its operation began on 13.02.2002. The settlements served by biological cleaning through the sewerage network, the settlement of Arachova the biological cleaning does not accept or process industrial sewage. The capacity of the constructed facility is 7.330 inhabitants equivalent. The average annual supply of the installation is 1.600m^3/day, while the maximum is 2.200m^3/day.

It is also mentioned that in the settlement of Apra Spitia or Distomo Beach there is a biological urban wastewater treatment plant that covers the needs of this settlement and the municipal unit of Antikyra.

Finally, within the industrial facilities of the facory of ATE operates a biological station, which accepts through a sewage network the urban sewage of the existing activities of Mytilineos S.A..

With regard to the disposal of municipal waste, both the Municipality of Levadia and the Municipality of Distomos - Arachova - Antikyra deposit their mixed waste in the Livadia landfill. The collection of recyclable packaging materials is carried out by the Municipalities, while their transhipment is carried out by the

FODSA of the 1st M.U. Viotia and the materials to be recycled are driven by the Livadia landfill to the Sximatari recycling center of recyclable materials .

Also, in and near the study area, in particular within the Alumina and Aluminium Production Plant of ATE, the following environmental infrastructure systems are identified:

- the installation for the treatment of liquid industrial waste from the various plant facilities.
- the urban wastewater treatment plant of the plant.
- the site of disposal of inert waste.
- landfill for hazardous waste.
- the place where bauxite residues are dispose of.

Figure 8.25: A satellite imagery extract showing the study area with a red outline, showing the environmental infrastructure systems of the alumina and aluminium production plant.

8.8.3 Water supply, electricity, gas and telecommunications installations

The communities of Distomo and Steiri have an autonomous **water network** and together with the network of the community of Kyriaki are mainly supplied by the water pipeline of Mornos. Since there are no surface waters in the area, the remaining needs (industrial and urban) are covered by drilling.

Within the study area and close to the projects under study, the following electricity installations are located:

i. The Independent Power Station of MYTILINEOS S.A. / Electricity & Natural Gas BS (formerly PROTERGIA S.A.), with a rated capacity of 444,48MW with natural gas fuel.

ii. The construction and operation of a new Power Station of MYTILINEOS S.A. / Energy & Natural Gas BS, with a rated power of 826MW, with natural gas fuel is under way.

Also, in the wider area there is a number of high and highvoltage transmission lines, as well as substations and highvoltage centers, as presented in the Extract of the Charter of the Ten-Year Development Programme (IAS) of the National Electricity Transmission System 2021-2030.

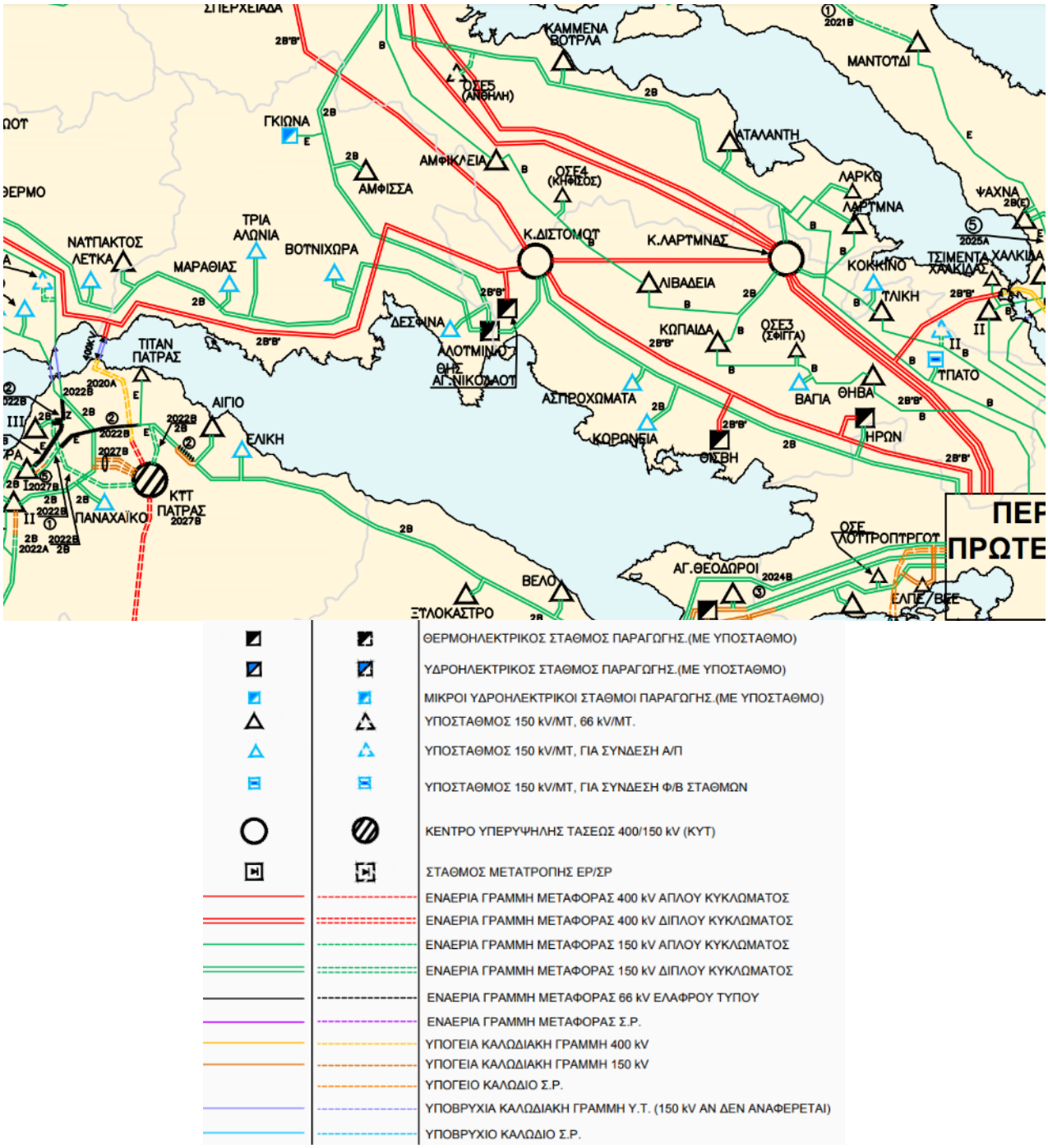


Figure 8.26: Extract Map of the Ten-Year Development Programme (ICP) of the National Electricity Transmission System (ESME) 2021 - 2030.

Natural gas networks in the study area under consideration are located an existing branch of high-pressure natural gas of the EFA, from the Mavroneri - Antikyra pipeline of diameter DN 500 (20΄), which covers the energy supply of the power plants of the region.

Finally, the study area is connected to **telecommunications networks** and no specific problems are recorded.

8.9 ANTHROPOGENIC PRESSURES

8.9.1 Existing sources of pollution

The main anthropogenic pressures in the environment of the study area concern the following:

- The movement of vehicles on the road network, resulting in the emission of CO, NOx and hydrocarbons from petrol engines and additional smoke and SO_2 from diesel engines.
- The heating of the houses, resulting in the emission of CO, SO_2 and particulate matter (mainly soot) during the winter months.
- The use of water resources to ensure the supply of drinking water to settlements.
- The factory "Aluminium of Greece" – the BS Metallurgy of Mytilineos S.A., which has been operating in the region since 1966.

8.9.2 Exploitation of natural resources

There is no extensive exploitation of any natural resource in the study area.

8.10 ATMOSPHERIC ENVIRONMENT - AIR QUALITY

8.10.1 Main sources of air emissions

This section describes the air quality in the study area, based on the record and measurements systematically carried out by the "Aluminium of Greece" plant – the TED Metallurgy of Mytilineos S.A. The main sources of pollutant emission in the atmosphere of the study area, in addition to the emission sources of that plant, also concern:

- the movement of vehicles on the road network resulting in CO emission. , NOx and hydrocarbons from petrol engines and additional smoke and SO2 from diesel engines.
- heating of homes, resulting in the emission of CO, SO2 and particulate matter (mainly soot) during the winter months.

8.10.2 Assessment and evaluation of the existing quality of the atmospheric environment

The factory "Aluminium of Greece" – the BS Metallurgy of Mytilineos S.A. has installed in the area and operates a station measuring the quality of the atmosphere in the Monastery of Osios Loukas, at a distance of about 5km northeast of the facilities under study.

The station continuously records values for nine (9) total parameters. Of these, five (5) relate to meteorological parameters: relative humidity (RH,%), wind direction (WD, deg), wind speed (WS, m/s), precipitation (rain, mm), temperature (T, oC) and the rest to pollutants SO2 (μg/m3), NOX (μg/m3), NO2 (μg/m3), PM10 (μg/m3).

The annual arithmetic averages of the parameters recorded by the station are presented in the following table and no exceedance of the permitted limits is observed.

Table 8.7: Measurements from St. Luke's Station (annual prices).

parameter	Unit of Measure	Value (annual arithmetic average)	Average annual price (μg/Nm^3)
NO_X	μg/Nm^3	8,14	30
NO_2	μg/Nm^3	5,96	40
SO_2 (winter season)	μg/Nm^3	5,54	20
PM_{10}	μg/Nm^3	14,47	40
temperature	°C	16,57	-
Relative humidity	%	59,02	-
Wind direction	deg	158,15	-
	dir	South East	-
Wind speed	m/s	1,70	-

8.10.3 Changes over time and evolutionary trends

No quantitative and qualitative changes are expected regarding the emission of gaseous pollutants and air quality in the study area

8.11 ACOUSTIC ENVIRONMENT - VIBRATIONS

8.11.1 Main sources of environmental noise or vibration

The main source of noise in the study area is the factory "Aluminium of Greece" – the TED Metallurgy of Mytilineos S.A., which has been operating in the area since 1966, respecting the limits laid down by its

Environmental Terms. Other sources of noise and vibration do not exist in the area, which develops away from large urban centers. A minor source of noise in the study area is vehicle traffic.

8.11.2 Assessment and evaluation of the existing quality of the audio environment

Considering the lack of other sources of noise in the area, in addition to the alumina and aluminium production plant, the quality of the acoustic environment of the area is considered very good.

8.11.3 Changes over time and evolutionary trends

No changes in the emission of environmental noise or vibrations are expected over time, as there are no other sources of environmental noise emission in the study area.

8.12 ELECTROMAGNETIC FIELDS

In April 2018, measurements were made of the levels of the low-frequency electrical and magnetic field in the environment of the power plants in Agios Nikolaos, the exposure of which is attached to a corresponding Annex to this study.

This report of the EAE was prepared at the request of MYTILINEOS S.A. The measurements were carried out by a branch of the Office of Non-Ionized Radiation of the EEAE with a view to recording the levels of low-frequency electrical and magnetic fields for the verification of compliance or not with Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016) "Harmonisation with Directive 2013/2016/ 35/EU 'on minimum health and safety requirements with regard to the exposure of workers to risks arising from natural factors (electromagnetic fields) and repealing Directive 2004/40/EC' which harmonised national law with Directive 2013/35/EU of the European Parliament and of the Council of 26 June 2013.

The measurements were performed according to the standard ELOT IEC 61786: 2003, Measurements of magnetic and electric fields of low frequencies in relation to human exposure - Special specifications for the instruments and instructions for the measurements.

Series of measurements relating to magnetic induction and electric field intensity were carried out at points where it was considered by the EEAE step that measurements had to be carried out in order to check the most 'burdened' electrical and magnetic fields, positions and conditions of public exposure and to check

compliance with the safe exposure limits set out in the legislation in force., as well as in other posts indicated by the applicant.

In particular, measurements were made of the levels of the low-frequency magnetic and electrical field in the environment of the Combined Cycle Unit of THERMAL POWER PLANT, while measurements of the levels of the low-frequency magnetic field were made at points where electrical equipment is installed and in the environment of voltage lifting transformers. Measurements of low-frequency magnetic and electrical field were also carried out in places where medium- and low-voltage electrical equipment is installed, as well as in medium- and low-voltage cable transit areas serving the installation. Finally, low frequency magnetic field measurements were performed at various workplaces within the power plant's premises. In total, the measurements were performed at 44 locations

On the basis of the results obtained from the measurements made and taking into account the action levels for the exposure of workers to low-frequency electrical and magnetic fields as defined by **Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016),** the following are mentioned::

- Low action (AL) values for magnetic induction size as defined in DP 120/2016 were not found to be exceeded. More specifically, the values obtained by magnetic induction B (μT) at all measuring positions range from 0.94% to 27% of the values of low action levels specified in Table B2 on pp. 9287 of PD 120/2016 for the frequency range 5Hz to 32kHz.
- The values of high levels of action (AL) for the size of magnetic induction as defined in DP 120/2016 were not found to be exceeded. More specifically, the values obtained by magnetic induction B (μT) at all measuring positions range from 0.64% to 18.6% of the values of high action levels specified in Table B2 on pp. 9287 of DP 120/2016 for the frequency range 5Hz to 32kHz.
- The values of low action levels (AL) for the size of the electric field intensity as defined in DP 120/2016 were not found to be exceeded. More specifically, the values obtained by the intensity of the electric field E (V/m) at all measuring positions (except position K42) range from 8.44% to 59.5% of the values of the low action levels specified in Table B1 on pp. 9286 of PD 120/2016 for the 5Hz to 32kHz frequency range. The corresponding value at the measuring position K42 was below the lower end of the measurement value interval of the instrument used.
- The values of high action levels (AL) for the size of the electric field intensity as defined in DP 120/2016 were not found to be exceeded. More specifically, the values obtained by the intensity of the electric field E (V/m) at all measuring positions (except position K42) range from 7.9% to 35.8% of the values of the high action levels specified in Table B1 on pp. 9286 of PD 120/2016 for

the 5Hz to 32kHz frequency range. The corresponding value at the measuring position K42 was below the lower end of the measurement value interval of the instrument used.

In line with the conclusions of the EEAE measurement report, it can be reported that low and high action (AL) values for magnetic induction and electric field intensity have not been exceeded, as defined by Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016) "Harmonisation with Directive 2013/35/EU "on minimum health and safety requirements with regard to workers' exposure risks arising from natural factors (electromagnetic fields) and repealing Directive 2004/40/EC' which harmonised national law with Directive 2013/35/EU of the European Parliament and of the Council of 26 June 2013.

8.13 WATER

8.13.1 Management Plans

8.13.1.1 Management Plan for the River Basins of the Water Department of Eastern Central Greece

The Water District of Eastern Central Greece (YD07), has an area of 12.291km^2 and includes the entire Regional Units of Evia (and Skyros), Viotia and Sporades, large parts of Fthiotida Region (87.2%) and Fokida (42.2%) and small parts of West Attica (8.2%), East Attica (13%) and Magnesia (1%). Most of the Water District is characterized as lowland to semi-mountainous. The main lowland areas of the YD are the valleys of Sperchios and Boeotic Kifissos - Kopida, while smaller are the plains of Istia and Artakis in Evia. The lakes of the water district are Yliki (20Km^2), Paralimni (11Km^2) and Dystos (5Km^2).

In accordance with Decision No. 902 (Government Gazette 4673/B/29.12.2017) approved the 1st Review of the River Basin Management Plan of the Water District of Eastern Central Greece and the corresponding Strategic Environmental Impact Assessment. According to the approved above mentioned decision, Eastern Central Greece **(YD EL07),** this consists of seven (7) River Basins (LAPs), which are presented in the table below.

Table 8.8: Water catchment areas of Eastern Central Greece (YD EL07).

Λεκάνη Απορροής Ποταμού (ΛΑΠ)	Έκταση ΛΑΠ (km²)
Σπερχειού (EL0718)	2.315
Εύβοιας (EL0719)	3.681
ΒΑ Παραλίας Καλλιδρόμου (EL0722)	919
Βοιωτικού Κηφισού (EL0723)	2.719
Άμφισσας (EL0724)	786
Ασωπού (EL0725)	1.362
Σποράδων (EL0735)	497
ΣΥΝΟΛΟ έκτασης ΥΔ 07	**12.279**

The existing and environmentally licensed high-voltage electricity transmission line of 400kV (HVC Agios Nikolaos) falls under the River Basins (LAP) Asopos (EL0725) and Amfissa (EL0724), while the proposed amendment falls under the LAP Amfissa (EL0724) & LAP Boeotic Kifissou (EL0723).

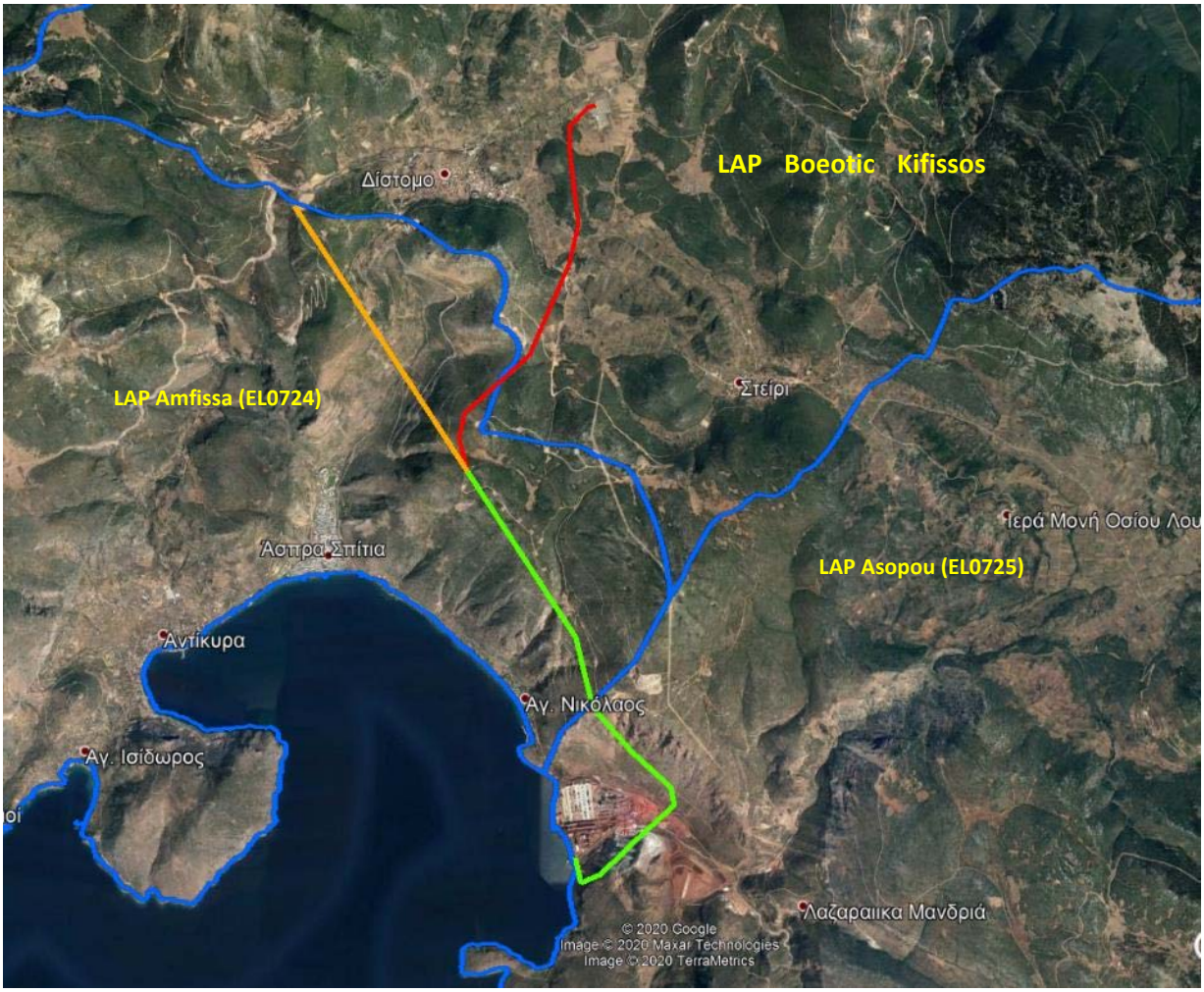


Figure 8.27: Satellite imaging extract showing the existing and proposed electricity transmission line as well as the limit of LAP Assos (EL0725), LAP Amfissa (EL0724) & LAP Boeotic Kifissos (EL0723).

8.13.1.2 Flood Risk Management Plan for River Basins of the Water Department of Eastern Central Greece

As part of Greece's adaptation of the Community Directive 2007/60/EC on flood risk assessment and management, the Preliminary Flood Risk Assessment was carried out by the EGY in 2012 and has defined the Potentially High Flood Risk Zones collected information on flood events from the relevant risk and disaster management bodies at local and central level, evaluated and recorded their data in territory-specific spreadsheets. In particular, the Preliminary Flood Risk Assessment included the following steps:

- The recording of historical floods with their main characteristics and the identification of significant historical floods based on their consequences.
- Identify areas where flooding is likely to occur and assess the potential negative effects of future flooding, taking into account historical flood data and changes in flood conditions since then.
- Determining Potentially High Flood Risk Zones.

According to the 1st Revision of the CIP under Directive 2007/60/EC, pursuant to the EGY/YPEKA 31822/1542/e103 JMD , the study area does not fall within a Potentially High Flood Risk Zone, as shown in the following figure:.

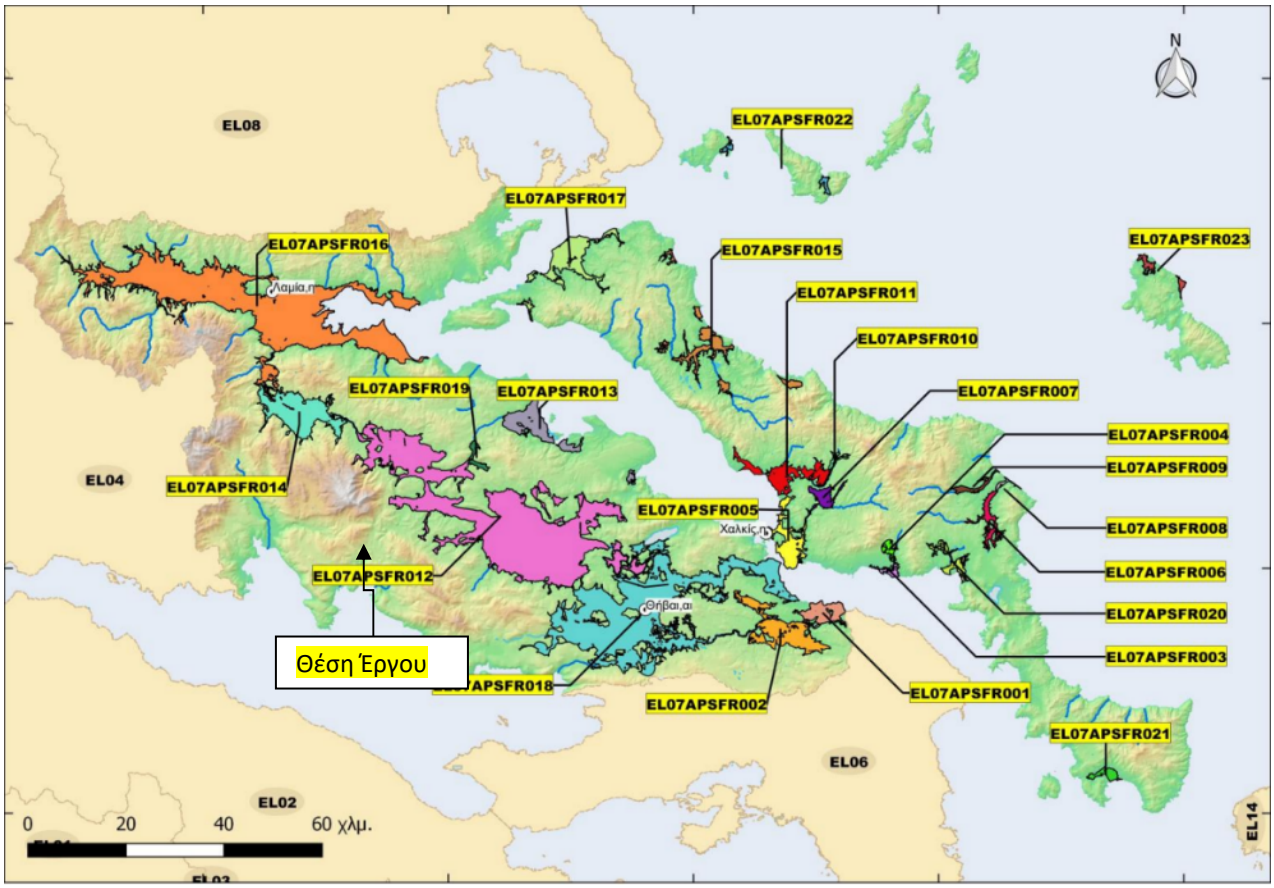


Figure 8.28: Extract from the Map of The Potentially High Flood Risk Zones, based on the 1st Review of the CIP.

With the Decision 41375/328/2018 (Government Gazette 2682/B/06.07.2018 the River Basin Flood Risk Management Plan of the Eastern Central Greece Water District (EL07) and the corresponding Environmental Impact Assessment Strategy) have been approved. The Flood Risk Management Plan is structured in two stages as follows

- Stage 1: Preparation of Flood Risk Maps and Flood Risk Maps.
- Stage 2: Preparation of Flood Risk Management Plans (MSPs), Preparation of Strategic Environmental Impact Studies (SSPs) and Consultation

In particular, flood risk maps have been prepared and approved for each POTENTIALLY HIGH FLOOD RISK ZONE, based on the spatial distribution of the flood flood surface for each recovery period (T=50, 100 and 1000 years).

- Flood Risk Maps based on the spatial distribution of the flood surface from river flows compiled correspond to the following scenarios:

- floods with a high probability of exceeding a 50-year reset period, floods with an average probability of exceeding a 100-year recovery period,
- floods with a low probability of exceeding a 1000-year reset period.

As detailed in section 5.2.3.2, the project under study does not fall into a flood zone for any period of restoration (T=50, T=100 and T=1000).

8.13.2 Surface water

From the River Water Systems (PS) recorded under the Management Plan, closer to the study area is the Klisouras stream (EL0725R000300028N). This stream is close to the existing line, but at a distance of more than 5km from the proposed modifications. The Klisouras stream ends up in the sea area on the eastern coast of Antikyra Bay. According to the approved management plan, the length of the Klisouras stream amounts to 8.03km and its catchment area to 135.8km2. According to the Management Plan, the ecological status of the stream is classified as moderate and its chemical status as good.

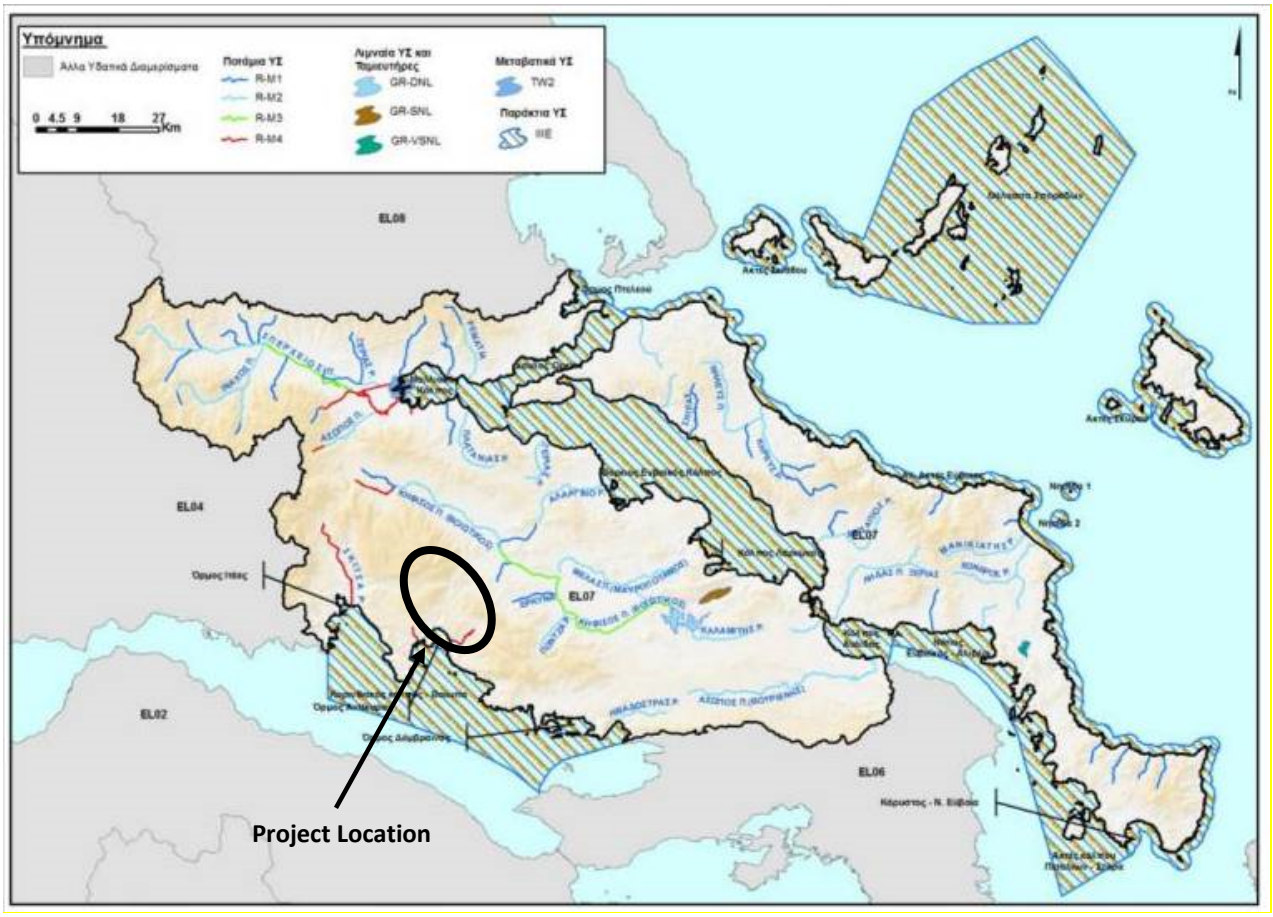


Figure 8.29: Extract Map of Surface Water Systems in YD EL07.

In the immediate area of the project under study is recorded the Coastal Bay of Antikyra (EL0724C0017N), whose ecological and chemical status are characterized as good.

In the study area there is no surface water system that falls within an area intended for water abstraction for human consumption and has been included in the Register of Protected Areas.

8.13.3 Underground water

With regard to groundwater, the study area is located the Underground Water System "Antikyra - Kithairon". (EL0700230). The "Antikyra - Kithairon" (EL0700230), an area of 900km^2, develops in the masses of carbon rocks that form the southern coastal region of the Eastern Central Greece Water District. From the Gulf of Itea to Fokida to Porto Germeno in Attica. It is a particularly extensive area in which many important aquifers, mainly karstic form, are developed, which are in direct hydraulic communication with the sea, where they are unloaded with large coastal and brackish sources.

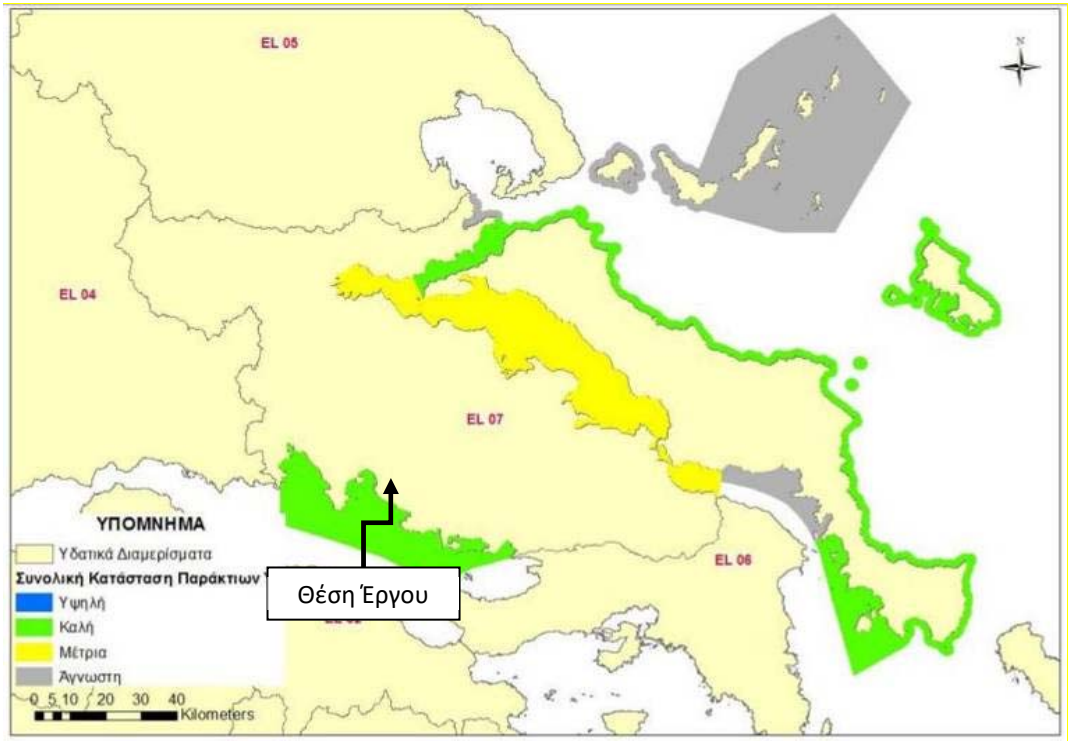


Figure 8.30: Classification of the overall status of coastal water systems of Eastern Central Greece (EL07).

The supply of the system is made by the direct injection of meteoric water, which moves in depth through the karstic network.

Discharges of the system are made in places laterally in quatogenic materials, but its most important discharge, which characterizes the system, takes place in the coastal zone towards the sea. The sea level forms a base level of the karst aquifer with which it is in direct hydraulic communication. Coastal brackish sources of high supply are gushing across the coastline.

The average annual supply of the system is 200×106m^3/year, while total receipts are estimated at 9.51×106m^3/year. The quantitative status of the "Antikyra - Kithairon" (EL0700230), as shown in the extract of the map below, is characterized as good.

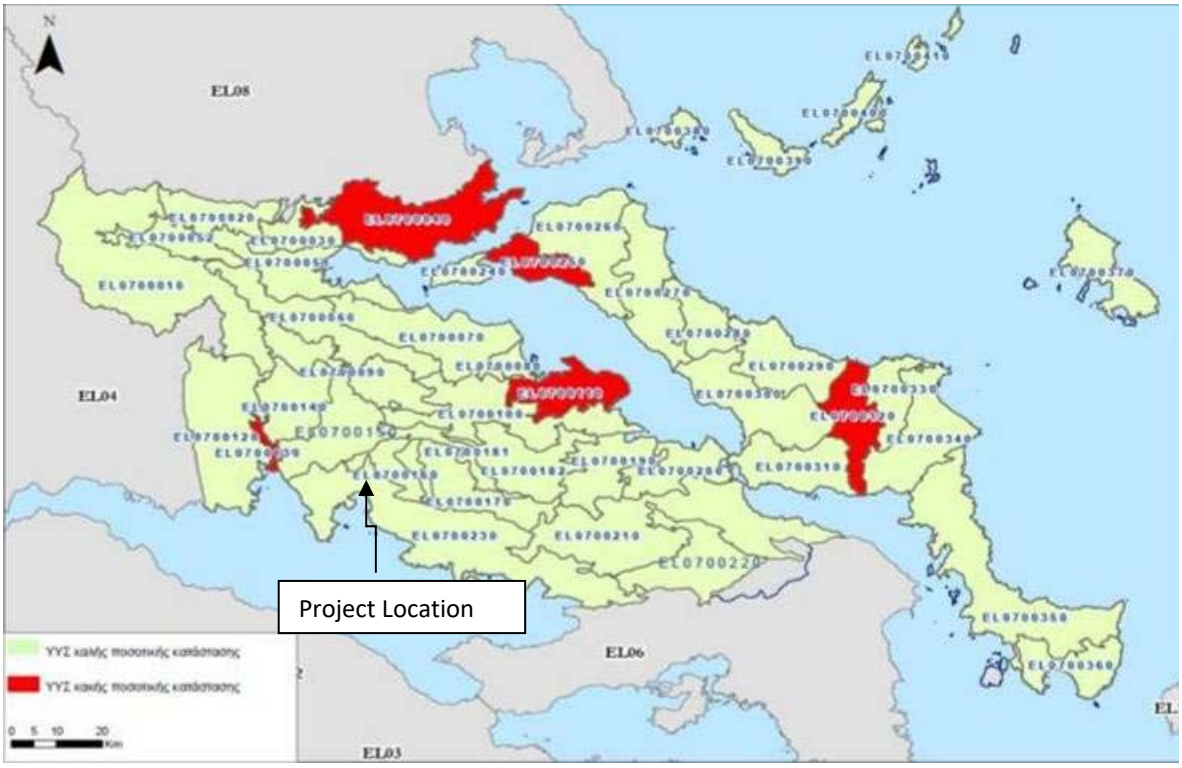


Figure 8.31: Quantitative status of Groundwater Systems (HSS) in HR EL07.

Similarly, the chemical status of "Antikyra - Kithairon" (EL0700230), as shown in the extract of the map below, is characterized as good.

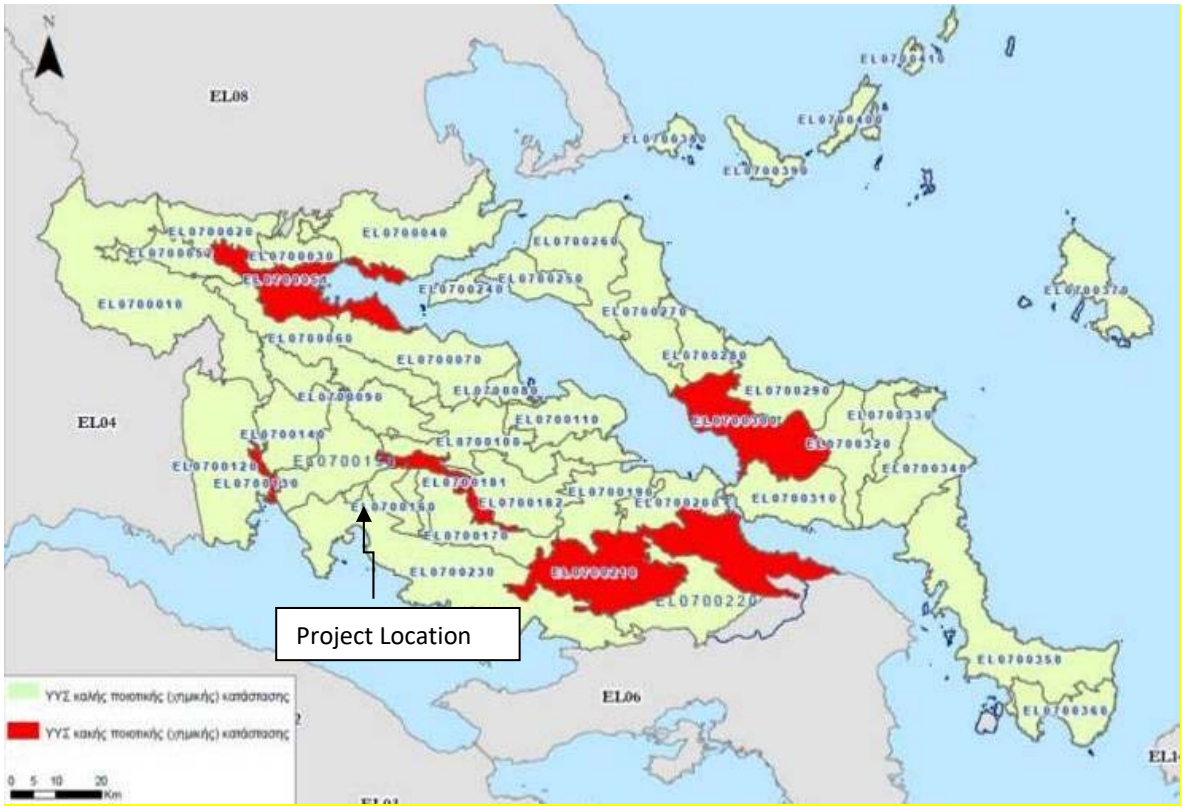


Figure 8.32: Chemical status of Underground Water Systems (HSS) in HR EL07.

In the study area there is no underground body of water falling within an area intended for the abstraction of water for human consumption and has been included in the Register of Protected Areas.

8.14 RISKS TO HUMAN HEALTH, CULTURAL HERITAGE AND / OR THE ENVIRONMENT, MAINLY DUE TO ACCIDENTS OR DISASTERS

This section presents the risks to human health, cultural heritage and/or the environment due to natural disasters or technological accidents/disasters that may occur in the study area and cause adverse effects on the environment.

The assessment of vulnerability in the study area to major accidents and natural disasters is carried out following changes in EU legislation. The revised Directive 2014/52/EU entered into force on 16 May 2017 as incorporated into The Greek Legislation by 1915 (Government Gazette 304/B/2018) and declares the need to assess the "expected significant negative impact" of the project on the environment resulting from the vulnerability of the project to risks of major accidents and/or natural disasters related to the project.

Natural disaster is the probability of a potentially catastrophic event within a time period and in a specific geographical area. The United Nations (UN) defined natural disasters in 1992 as serious disturbances in the functioning of society, causing widespread human, material or environmental losses that go beyond society's ability to deal with them with their own resources.

The literature lists various ways of separating and classifying natural disasters, depending on the etiology and gravity. The World Health Organization classifies natural disasters into the following categories:

- Hydrological, such as floods.
- Geophysical: earthquakes, volcanic eruptions and landslides belong to this category.
- Meteorological, such as storms and storms.
- Climatic, such as extreme very high or very low temperatures, natural fires.
- Biological, caused by exposure of living organisms to pathogenic microorganisms.

With regard to the time scale of occurrence of natural phenomena, the size-frequency relationship reflects the intensity of the disasters that can be caused by a particular catastrophic event, as a result of its magnitude on the frequency of its occurrence. In general, large-scale events do not take place so often that they are considered to be the most important, while the most frequently occurring phenomena are usually of lesser intensity. The average consequences are therefore calculated by multiplying the size of the event by the frequency of their occurrence.

In Greece, the most common natural disasters are due to earthquakes, heavy rains and floods, fires that can lead to de-flooding of areas that, when they have high slopes, favour the creation of landslides and in burnings.

In addition to natural disasters, however, there are also technological disasters, which are basically regarded as man-made.

Technological disasters are usually due to technological risks, which are not in principle adequately addressed, or to technological events (accidents) caused by human errors, equipment failures, organisational or administrative malfunctions, etc. and are beyond control. But they can also be the result of other natural disasters (earthquakes, lightning, heavy rainfall, etc.) or deliberate human actions. In general, technological disasters are considered not to occur with a high frequency (M.U. they have very little chance of occurring) but have potentially very serious consequences.

Technological disasters, depending on their intensity and intensity, can cause loss of life or injuries (both to workers at the site of the accident and to those who are, permanent or passing 'close' - see the relevant directives on the concept of 'close'- at the site of the accident population), destruction of property, disruption of social and economic life and degradation of the environment.

The usual classification of technological accidents is as follows:

- Chemical accidents in industrial installations: they take place in industrial installations (production, treatment or storage) resulting in serious environmental pollution from the release of heavy metals and toxic chemicals.
- Accidents involving the transport of dangerous goods: occur during the transport of hazardous materials by various means of transport (road, rail, sea, air).
- Transport accidents: road, rail, sea, air. It is conventional transport accidents, which usually cause loss of life and injuries, but do not have a major impact on the environment.
- Dam collapse: they occur rarely and have great effects, both on loss of life and on the environment.
- Nuclear Accidents: they are usually associated with the release of radioactive elements into the environment and have long-term effects on both human health and the environment.

Although environmental disasters are generally not a daily occurrence and are therefore not often responsible for deaths or material disasters, their potential for potential unexpected catastrophic losses makes them of great importance and determines their character. Environmental disasters have some common characteristics:

- The source of the catastrophic event is clear and creates characteristic effects (e.g. flooding causes drowning deaths).
- The warning time is usually short.
- The greatest number of losses caused, either in human lives or in assets, occur immediately after the phenomenon has taken place.
- The risk of exposure is largely unintentional, usually due to finding populations in dangerous areas.
- The disaster has such intensity and scale that it requires an immediate response.

The following sub-sections detail both natural and technological disasters related to the study area.

- **Risks of flooding**

In the recently approved River Basin Flood Risk Management Plan of the Water District of Eastern Central Greece (EL07) [41375/328/2018 (Government Gazette 2682/B/06.07.2018)] the following were assessed and reflected:

- **Flood vulnerability**, which is defined as a set of conditions and procedures that determine the extent to which an area is vulnerable to the effects of flooding. These conditions and procedures relate to natural, and anthropogenic factors (social, economic, environmental, etc.) that can increase or mitigate the degree of vulnerability.
- **Flood hazard**, which is defined as the possibility of a flood of a certain intensity, is expected to occur over a specific period of time and in a certain spatial area. Flood risk is often assessed based on the depth and flow rate of the flood in a certain flood area.
- **Flood risk** is defined as a combination of the likelihood of flooding and the potential negative consequences for human health, the environment, cultural heritage and economic activities associated with this flood (Article 2, Directive 2007/60/EC). The flood risk in practice is determined on the basis of the following equation::

  Flood Risk = Flood Risk × Flood Vulnerability

In the context of Greece's adaptation with the Community Directive 2007/60/EC on flood risk assessment and management, in 2012 the Preliminary Flood Risk Assessment was carried out by the Special Secretariat for Water in accordance with Articles 4 and 5. In particular, the Preliminary Flood Risk Assessment included the following stages:

- The recording of historic floods with their main characteristics and the identification of significant historical floods based on their consequences.
- Identify areas where flooding is likely to occur and assess the potential negative effects of future flooding, taking into account historical flood data and changes in flood conditions since then.
- Determining Potentially High Flood Risk Zones.

In the context of Greece's adaptation with the Community Directive 2007/60/EC on flood risk assessment and management, in 2012 the Preliminary Flood Risk Assessment was carried out by the Special Secretariat for Water in accordance with Articles 4 and 5. In particular, the Preliminary Flood Risk Assessment included the following stages:

- The recording of historic floods with their main characteristics and the identification of significant historical floods based on their consequences.
- Identify areas where flooding is likely to occur and assess the potential negative effects of future flooding, taking into account historical flood data and changes in flood conditions since then.
- Determining Potentially High Flood Risk Zones.

More specifically, areas where flooding is likely to be defined are those that meet at least one of the following two restrictions:

- are located in alluvial deposits.
- are located on soil with a slope of less than 2%.

Similarly, areas with potential negative effects on future floods were defined as those containing:

- cities and settlements.
- industrial and commercial zones.
- agricultural land with significant economic value.
- production units that may cause pollution.
- protected areas.
- cultural heritage sites.
- infrastructure (road, rail network, ports, airports, hospitals, major dams).

According to the Approved River Basin Management Plan of the Water District of Eastern Central Greece (EL07) [41375/328/2018 (Government Gazette 2682/B/06.07.2018)], as shown in the following figure the area of the project under study does not fall under potentially high flood risk zone.

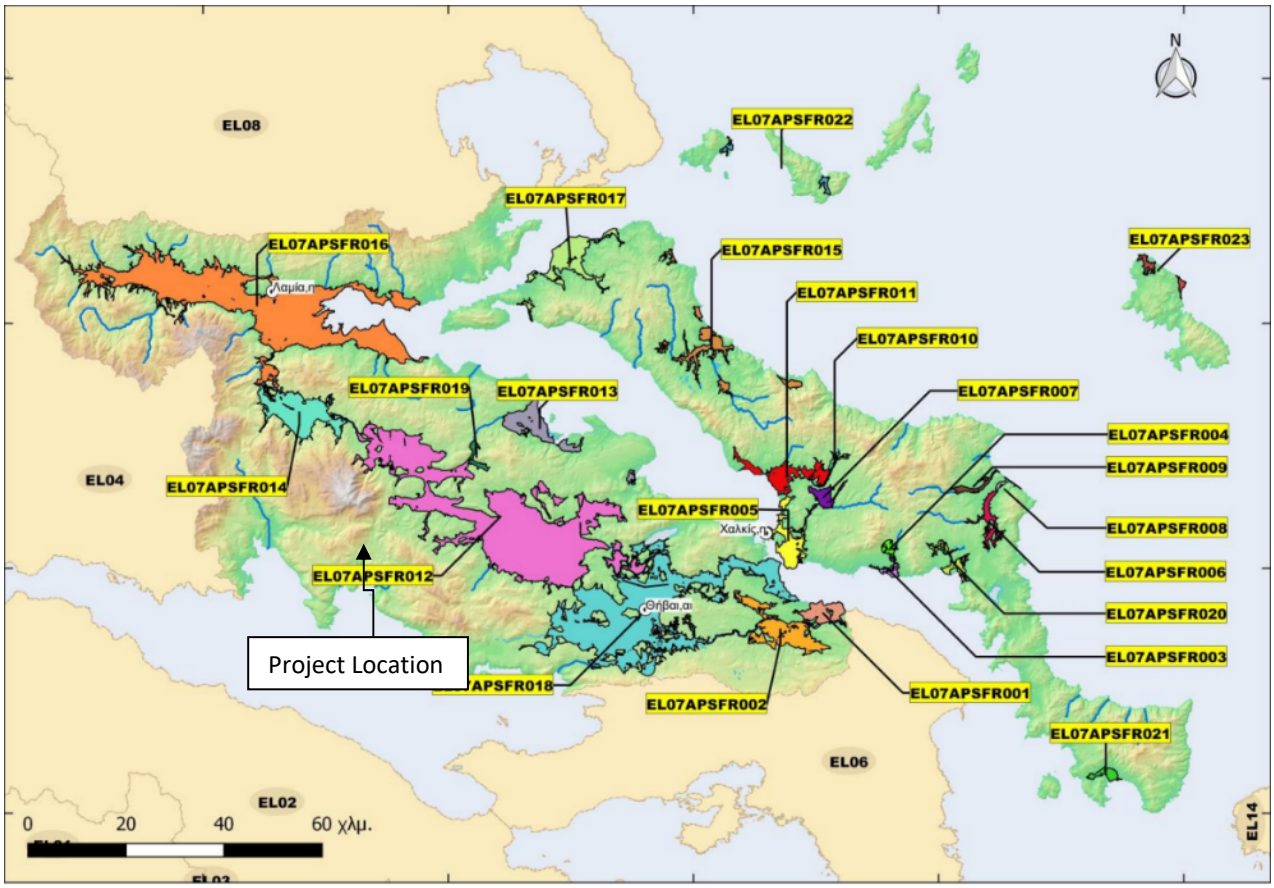


Figure 8.33: Excerpt from the Map of Potentially high flood risk zones, based on the 1st Review of the CIP.

As detailed in section 5.2.3.2, the project under study does not fall into a flood zone for any period of restoration (T=50, T=100 and T=1000).

- **Risks from earthquakes**

The Greek area is located at the boundary of contact and convergence of the African lithospheric plate and the Euro-Asian plate. This is why active tectonics in the field is intense, with Greece showing the greatest seismicity in Europe, as half of the energy coming out of earthquakes across Europe (ESPON) is released, 2006.

The earthquake is a phenomenon that occurs without clear warning, cannot be prevented and, despite its short duration, can cause great material damage to human infrastructure, resulting in serious injuries and loss of life.

Greece ranks first in Europe in terms of seismicity and sixth in the world. Its geographical location coincides with an area of our planet where large geotectonic phenomena take place, such as the convergence of the African with the Euro-Asian lithospheric plate, resulting in the great seismicity observed in this region.

The country's seismological bodies have proposed the separation of Greece into three Categories of Seismic Risk Zones. According to the Greek Earthquake Regulation (EAC 2000), as amended by the ministry decisions D17a/67/1/FN275/03 (Government Gazette 781/B/16-6-03) and D17a/115/9/FN275/03 (Government Gazette 1154/B/12-8-03), the area is included in seismic hazard zone II (average seismic hazard) with a maximum expected seismic ground acceleration A= 0.24g, where g = gravity acceleration.

Figure 8.34: Map of Seismic Hazard Zones of Greece.

According to the digital database on the active faults of Greece (NOAfaults), the following active faults are identified in the immediate area of the project under study:

- Kalogerikos Fault.
- Aspra Spitia Rift.
- Antikyrafracture.
- Kirfis fault.

The Kalogerikos fault runs through the existing power transmission line. It has an address NW – TO with a length of 3,68km, a 124th line and a 60th slope to the SW. The Kalogerikos fault runs through the part of the existing electricity transmission line that is to be abolished. It has a DIRECTION NE – SW with a length of 4,62km, a 30th line and a 60th slope to the SOUTH. The Antikyra fault is located about 2,5km NW of the new proposed route of the electricity transmission line. It has a DIRECTION NE – SW with a length of 6,63km, a 31st line and a 70th slope to the SOUTH. The Kirfis fault is located about 1.6km NW of the new proposed route of the electricity transmission line. It has an address NE - SW with a length of 4,79km, a 29th line and a 60th slope to the SOUTH.

Figure 8.35: Satellite imagery extract from the digital database on the active faults of Greece (NOAfaults), showing the location of the project under study, as well as the active faults of the wider region.

Based on the available data of the Geodynamic Institute of the National Observatory of Athens, the following figure shows the seismic events with magnitude Ms ≥ 3,0 Richter, which occurred in the wider region, within a 30km radius of the project under study, during the period 1964 - March 2019. Based on the available data, the largest earthquake of 5,4 Richter intensity occurred on 08.04.1970 at a distance of about 10,3km from the area of the factory under study, with a focal depth of 10km in the maritime area of the Corinthian Gulf.

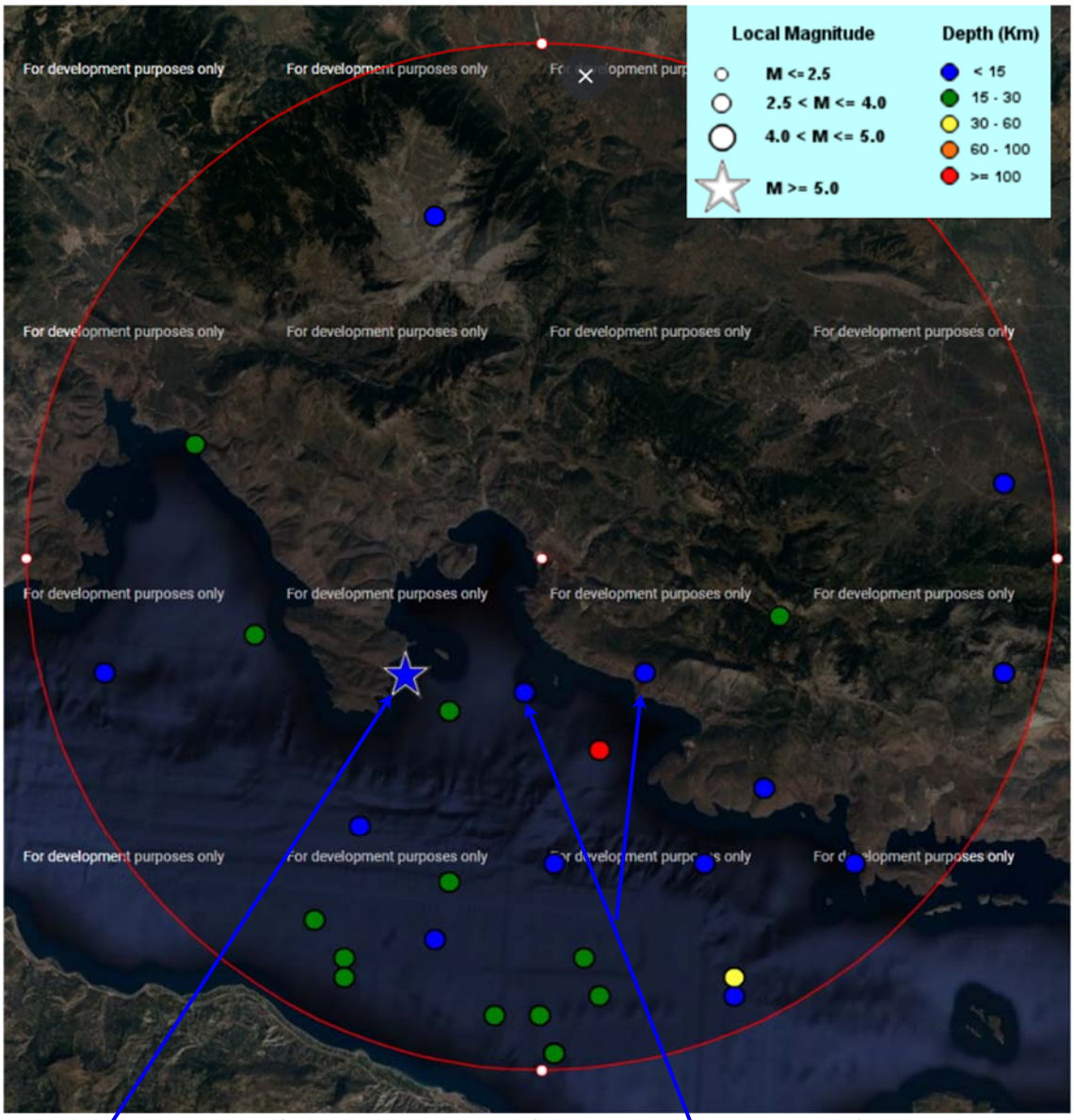


Figure 8.36: Seismic activity of the wider study area for the years 1964-2019 and for earthquakes over 4.0 Richter.

Stronger

Χρόνος Γένεσης: 1970/04/08 13:50:28 (GMT)
Μέγεθος: 5.4 ML
Γεωγρ.Πλάτος: 38.30°B
Γεωγρ.Μήκος: 22.60°A
Βάθος: 10.0 χμ
Επίκεντρο: 28.2 χμ ΔΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 10.3 χμ

closer

Χρόνος Γένεσης: 1989/05/07 10:46:47 (GMT)
Μέγεθος: 4.1 ML
Γεωγρ.Πλάτος: 38.29°B
Γεωγρ.Μήκος: 22.68°A
Βάθος: 1.0 χμ
Επίκεντρο: 23.4 χμ ΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 8.1 χμ

Χρόνος Γένεσης: 1999/06/25 07:42:14 (GMT)
Μέγεθος: 4.3 ML
Γεωγρ.Πλάτος: 38.30°B
Γεωγρ.Μήκος: 22.76°A
Βάθος: 11.0 χμ
Επίκεντρο: 18.0 χμ ΝΝΔ της Λειβαδιάς
Απόσταση από το κέντρο: 9.4 χμ

In any case, all the construction structures of the project under study will be constructed under the current seismic regulation and all seismic protection measures will be applied.

- **Risks from fires**

Regardless of the causes of forest fires, some natural, geomorphological and meteorological factors have a significant impact on their action. In particular, the radiation of the sun, the temperature of the air and the surface of the ground may facilitate the process of setting fires. Further, the altitude of the area affects the temperature and humidity of the area, factors important for the spread of fire. At the same time, the intensity of the fire increases as it moves upward in the prane, as the hot gases warm up the impending vegetation. Finally, vegetation itself plays a decisive role in the risk of starting the fire, bearing in mind that vegetation species exhibit a different degree of susceptibility.

Forest fires in Greece occur mainly in the "Mediterranean zone", in areas with an altitude of less than 600m. , particularly in years where favourable conditions prevail for their manifestation. The land of the installation under study is of an industrial nature and the area surrounding the plant is of no particular ecological interest. In the surrounding areas of the premises of the activity and within the boundaries of its land there are point sparse toast and bushy areas with sclerophyllous vegetation.

According to the results of the analysis of the forest fires of Greece for a relatively long period (1983-2008 or 1983-2006 as appropriate) by (K. TSANGARIS, G. KARETSOS & N. PROUTSOS, 2011):

- The largest numbers of incidents and burned areas are reported in the Peloponnese with 19% and 27% of the respective totals of the country. The fires of the Regional Units of Kefalonia, Ilia and Ioannina account for 17% of the total. The burned areas of the Regional Units of Ilia, Attica, Larissi and Evia amount to 25% of the total of the country, with the Regional Unit of Ilia having suffered the greatest disasters (1,275,000 st. for the period 1983-2008 or 49,039 str. per year).
- The most severe fires occur in the Aegean, Thessaly and the Peloponnese (with average intensities greater than 500 acres of burnt area per incident) and at the level of Regional Units in REGION OF. Arcadia, Dodecanese and Larissa (1.079,80 and 783 acres of burnt area per incident). Less serious are the fires in the Regional Units of Evritania, Xanthi and Imathia (average intensities of 45,99 and 105 acres of burnt area per incident).

The particularly dangerous areas of the country for the outbreak of forest fires and woodlands are mentioned in PD 575/1980, adopted pursuant to Art. 25 of Law 998/1979 and shown in the following map, showing that the entire study area is not part of the areas of forests and woodlands susceptible to fires.

Figure 8.37: Areas of forests and woodlands susceptible to fires declared dangerous by P.D. 575/1980.

Detailed fire data for Viotia exist only for the period 1983-1997, with 375 records, while the period 1998-2005 is covered by aggregated annual data of incident numbers and burned areas. In particular:

- The total number of burned areas of this region amounts to 265.160 acres, as a result of 571 incidents that have occurred over time in the region throughout the 23 years.
- On average, about 26 incidents occur in this region each year and 12.053 acres agricultural and forest vegetation. The average fire intensity reaches 464 str. area per incident.

Average fire intensity (burned area per incident)	464
Average annual loss of land (st.)	12.053
Average annual number of incidents	26
Average intervention time (min)	32
Average extinguishing time (min)	843

- The total analytical record shows that 88% of the burnt areas (174.898 acres) were forested, while the remaining 12% were agricultural, with cereals predominantly affected and a corresponding 6.9%.

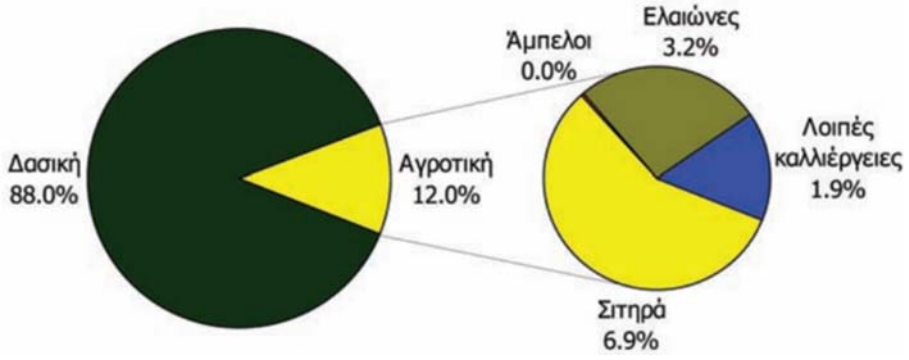


Figure 8.38: Burnt areas by type of vegetation in Boeotia.

- From the available data, this region appears fifth in the ranking based on the total number of recorded incidents in the geographical department of Central Greece, since the total number of incidents corresponds to 9,8% of the apartment. From the ranking based on the burned areas, Viotia also occupies the fifth place, with 9,7% of the burned areas of the apartment, while from the rating with the average fire intensity comes third after Fthiotida and Attica.
- Of the total occurrences, 10 have caused burned areas of more than 5.000 acres. and no more than 10.000 acres.
- Over time, the largest fire caused 9.507 acres of damage (of which 8.807 acres were forested) and was presented on 11/9/1993 at 17:50, possibly by malicious arson, but without identifying the perpetrator.

Prevailing meteorological conditions were relatively favourable for the onset and development of the fire, as the relative humidity was low (40%), the temperature high (30°C), while very strong Eastern winds prevailed (7.1-9.0 BF).

- However, the worst fire for forest vegetation occurred on 29/8/1995 at 12:30 p.m., from an unknown cause and burned 9.500 acres, of which 9.000 st. it was woodland. The meteorological conditions at the time were quite favourable for the spread of the incident, since the relative humidity ranged from 40%, the temperature to 31°C and moderate northerly winds of 1.1-4.0 BF. The territorial gradients in the area of occurrence of the incident were slightly increased (20-40%).

- **Risk due to pollution, as may result from an accident**

According to the data of the 1st Review of the River Basin Management Plan of eastern Central Greece, point and diffuse sources of pollution are identified in the project area. In particular, the point sources of pollution of the Eastern Central Greece concern Wastewater Treatment Facilities, estuary of sewerage networks to a natural recipient, large hotel units, livestock units, aquaculture /fish farming and spills from uncontrolled waste disposal site and landfills.

The diffuse sources of pollution of eastern Central Greece concern agricultural activities, transport, urban waste water that does not result in wastewater treatment facilities, livestock farming (pastoral and stable) and water contamination from other sources.

The following figure shows the point sources of pollution in the East Solid SD, which in the study area mainly concern industrial activities.

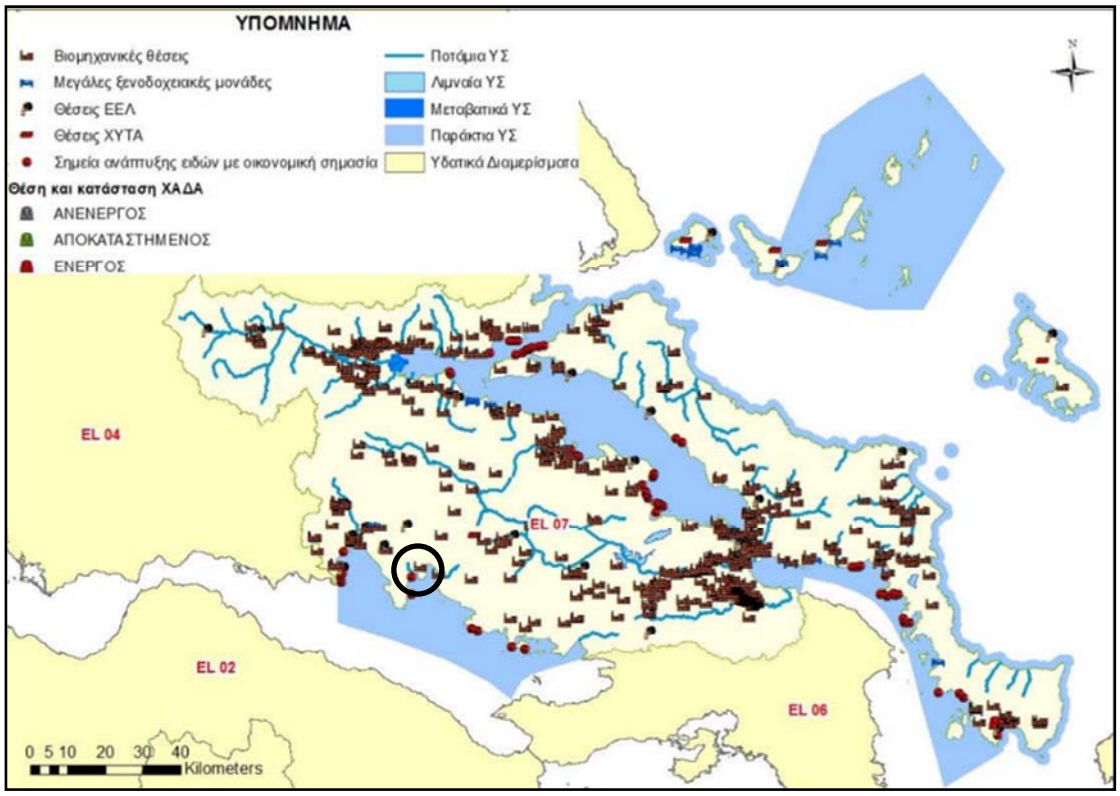


Figure 8.39: Point sources of pollution in the Ministry of Eastern Central Greece. The black circle encloses the wider study area.

Risks to the environment and/or human health may arise in the event of an accident at one of the existing plants operating in the wider area, as mentioned above, which may be related to an episode of pollution due to the diffusion of substances into the environment, such as waste from production processes. An accident may occur either in one of the existing plants or during the transport of waste, for final disposal. In the event of an accident, the operator of the respective installation shall be responsible for informing the authorities and taking immediate measures to reduce pollution (use of adsorbent materials, etc.).

- **Risks due to serious technological/industrial accidents**

A major accident (large-scale technological accident, or a large-scale industrial accident, 172058 GG 354/B/17-2-2016 – Seveso III) is defined as a major leakage, fire or explosion resulting from uncontrolled situations during the operation of any installation and which poses major risks to human health and/or the environment and which is related to one or more hazardous substances..

The project under study **does not fall within the scope of the 172058/2016 JMD and does not involve risks that could cause a "Large-Scale Industrial Accident".**

8.15 ENVIRONMENTAL DEVELOPMENT TRENDS

On the basis of the data presented in the above paragraphs, the following conclusions are drawn:

- With regard to the anthropogenic environment, the settlements found in the study area are small and the population in the Municipal Units where the project under study is located in the decade 2001 - 2011 is as follows: in the M.U. Kyriaki there is an increase in the population of 6,34% , while in M.U. Distomo there is a decrease of 11,53%.
- Within the study area there are no environmental infrastructure systems such as Landfills or Wastewater Treatment Plants, other than the Alumina and Aluminium Production Plant's wastewater treatment facilities
- In the wider region there is a developed provincial and road network, but it does not have high traffic loads that could be related to the deterioration of one or more quality parameters of the atmospheric environment of the study area.
- For surface water found in the study area, both the ecological and chemical conditions show no signs of deterioration.
- The underground bodies of water of the region, show good quantitative and qualitative condition.

In conclusion, environmental trends in the study area without the project under study are estimated to be stable.

9 ENVIRONMENTAL IMPACT ASSESSMENT AND EVALUATION

9.1 METHODOLOGICAL REQUIREMENTS

Environmental impact is defined as a change in environmental conditions or an equivalent change in the environmental parameters prevailing in an area. The change in environmental conditions may be positive or negative (to enhance or degrade the quality of the environmental parameter in question), reversible or irreversible and direct or indirect. A prerequisite for the acceptance of a project is not to result in permanent negative effects on the environment, while the resulting intermediate changes are made at such a rate as to prevent the environment from absorbing them.

Thus, in order to make an assessment of the environmental impact of a project, the environmental parameters, which suffer the effects, must first be defined, then the changes in their quality must be assessed and, finally, the minimisation and remedial actions must be described.

The parameters of the environment which, in accordance with the requirements of No. 170225 Decision of the Ministry of Environment (Government Gazette 135/B/27-01-2014) it is proposed that they be examined concerning climatic and bioclimatic characteristics, morphological and landscape characteristics, geological, tectonic and soil characteristics, the natural environment and the man-made environment. In addition, the socio-economic effects, the effects on technical infrastructure, air quality, noise effects, water and electromagnetic field impacts are examined.

This environmental impact assessment shall be submitted in accordance with Article 4 of L. 4014/2011 due to an amendment to the project under study. The amendments proposed in this study concern the following:

- the abolition of part of the 400kV Electricity Transmission Line, for a length of 3.833m in its connection with the existing High Voltage T.L
- 400kV HVC Acheloos – HVC Distomos, with the removal of twelve (12) High Voltage pylons.
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5.198m for its direct connection to the Distomo HVC , with the construction of seventeen (17) new High Voltage pylons.
- execution of work – addition of equipment, within the HVC of Agios Nikolaos and HVC Distomos.
- opening of a forest road, with a total length of about 4.174m, to serve the construction and operation needs of the new section of the electricity transmission line and.

- reunification of the HVC Acheloos - HVC Distomos circuit.

9.2 IMPACT RELATED TO CLIMATE AND BIOCLIMATIC CHARACTERISTICS

- ***Construction phase***

The project under study is not expected to have a negative impact on the climatic and bioclimatic characteristics of the study area during the construction phase. The construction of the projects under study is not related to large-scale deforestation of forest vegetation or dry areas covered by surface water or concrete of large surfaces, which could result in changes in the microclimate of the area.

The deforestation work that will take place during the construction phase of the new section of the transmission line and the new forest road construction concerns:

- deforestation of **400m^2** (20mx20m) per pillar, which entails total deforestation of about **6.800m^2** (17 new pillars x 400m^2).
- deforestation of **32.769m^2** for the opening of the new forest road, in order to allow access to the new pillars.

In conclusion, the construction of the proposed projects is not related to deforestation of a single area of significant area covered by natural vegetation or emissions of significant quantities of gaseous or particulate pollutants, which may affect the microclimate and bioclimatic characteristics of the study area.

The effects on the climatic and bioclimatic characteristics of the region, during the construction phase of the requested modifications, are classified as **neutral**.

- ***Operating phase***

The operation of the project under study is not related to increased production of gaseous pollutants or an increase in ambient temperature. On the contrary, it indirectly contributes to the penetration of cleaner forms of electricity generation, as it is an accompanying project of a Natural Gas Power Plant, indirectly contributing to the fight against climate change. The effects on the climatic and bioclimatic characteristics of the region, from the operation of the project under study, are characterized as **neutral**.

9.3 IMPACT ON MORPHOLOGICAL AND TOPOLOGICAL CHARACTERISTICS

9.3.1 Changes in the image of the wider area

- ***Construction phase***

During the construction phase of the proposed modifications no significant negative effects on the landscape of the study area are expected from the presence of the construction machinery and the required equipment. Also, no area of high aesthetic value will be affected or impact on vegetation outside the project area..

With regard to electricity transmission lines, it should be noted that the impact on the landscape and aesthetic environment of the project's road area is mainly related to the following:

- the construction work of the project.
- vegetation on the platforms of the pillars and access roads.
- the presence of metal conductors and pillars.

The opening of the new forest road, which concerns a total length of 4.174m, includes the construction work and the corresponding vegetation drainages, but they are considered to be non-significant, as their opening will take place with the minimum possible interventions in the environment and in the aesthetics of the landscape.

In any case, the construction of both the transmission lines and the new road construction will take place over a limited period, in which case the effects caused on the aesthetic environment during construction are considered local level. Work to remove part of the electricity transmission line, for a length of about 3.833m, includes dismantling the existing pylons and corresponding bases and removing the cables. Dismantling operations are not considered capable of causing significant effects on the environment and the aesthetics of the landscape.

During the construction phase of all the proposed projects, interventions will be carried out in the morphology of the soil, since excavation and configuration work will be required. In addition, the equipment and activities of the construction site, by the very nature of their object, entail the appearance of phenomena of visual nuisance and burden of the aesthetics of the environment.

By taking measures of good practice and planning of work, the immediate coverage and wetting of excavation materials and the strict restriction of excavations at the site of the projects, the impact on the local and morphological characteristics of the area, from the construction work will be of a low intensity and temporary nature, as well as fully treatable and reversible after the construction of the modifications.

Therefore, the effects on the image of the wider area during the construction phase of the modifications under study are considered to be **negative** in terms of their type, **small** in terms of their size, in terms of their **short-term** duration, and in terms of their treatment **fully treatable.**

- ***Operating phase***

During the operation of the project, small-scale impacts on the morphological and local characteristics of the area are expected, due to the nature of the proposed modifications. The new electricity transmission line, approximately 5.198m long, with the new seventeen (17) pillars, as well as the access roads to be opened to the squares of the new pillars, may change on a small scale the geomorphology of the landscape and the terrain of the area, but without altering the aesthetics of the landscape.

In particular, these effects are due to the presence of pylons installed on straight or damaged roads and to the development of overhead cables, suspended from pillar to pillar. In general, however, it is considered that the electrical lines have been integrated, due to their long-term presence, into the landscape of the Greek countryside, but also into the landscape of each developed country. Their image is interwoven with meeting electricity needs, the economy of an area and the modernization of the way of life. In the optimal aesthetic result, the well-designed engraving of the road contributes, :

- Appropriate treatment of soil morphology and physical barriers to ensure minimal visual contact.
- Avoid parallel development of lines with roads of considerable traffic.
- Integration of the appropriate design parameters into the individual elements of the structure that will minimize visual nuisance.
- Avoid crossing overhead lines in or near settlements.

This point states that the 3,833m of the existing and environmentally licensed 400kV electricity T.L is being abolished, in its connection to the existing 400kV dual-circuit High Voltage Transmission Line (HVC Acheloos – HVC Distomo), as well as twelve (12) pillars (P1, P2, P3,.....,P12) and a new T.L of approximately 5,198m and seventeen (17) new High Voltage pylons (P1N) is being constructed. , P2N, P3N, P4N,..., P12N, P12AN, P12BN, P12GN, P12DN and P12EN).

It should also be noted that the impact on morphological and topological characteristics will focus on the locations of the towers and will be particularly limited to the rest of the area along the new transmission line and new access roads.

In any case, there are no substantial changes in the morphological and local characteristics of the area from the proposed modifications, in relation to the originally environmentally licensed project.

The impact on the image of the wider area during the operational phase of the project under study is considered to be **negative** in terms of their type, in terms of their size, in terms of their **long-term duration**, and in terms of their treatment that is **untreatable.**

9.3.2 Evaluation of landscape changes

The picture that will emerge from the operation of the project under study is that of the modern technological infrastructure, whose presence has prevailed for many years in several parts of the countryside of our country, but also of all the developed countries of the world and is interwoven with the transfer of electricity and the modern way of life.

9.3.3 Chances of breaking the horizon line and the natural shapes and colors of the landscape

The project under study is not expected to cause disruption of the horizon line and the natural shapes and colors of the landscape. The transmission line does not create a visual barrier, taking into account the sequential distance between the towers and their technical characteristics (metal structures not consisting of solid sections), ensuring that they are integrated into the landscape of the wider area. Neutral colors and careful design of the pillars of T.L. help not to cause a breakdown of the colors of the landscape in the area of location of the proposed projects.

9.3.4 Compatibility of imminent changes in relation to the European Landscape Convention, which was ratified by Law 3827/2010

As already mentioned above, the projects under study are not expected to have a significant negative impact on the landscape of the study area or the wider area, so there is no question of the incompatibility of the changes that will be caused to the landscape by the implementation of the proposed projects in relation to the European Landscape Convention, which was ratified by Law 3827/2010 (A' 30).

9.4 IMPACT RELATED TO GEOLOGICAL, TECTONICAND SOIL CHARACTERISTICS

9.4.1 Alteration, division of the outer surface of the rocks

- ***Construction phase***

The potential changes related to the alteration/ partitioning of the external surface of the rocks found in the site area of the project under study, relate to the following:

- the operation of the construction sites, transport, assembly and installation machinery of the pillars, as well as the other individual structures of the project.
- work on cleaning and shaping the squares where the pillars will be installed.
- installation and operation of the pillars.
- the work of opening the forest road and.
- decommissioning of existing and environmentally licensed pillars.

For the **installation of the foundations of the pillars**, it is necessary to create a flat surface area of about 400m^2 (20m×20m) per pillar, M.U. the total area will amount to **6.800m^2** (17 new pillars × 400m^2). The construction of the foundations will be carried out by modern technical methods using reinforced concrete piles or other conventional foundation methods.

The **new forest road** construction to be opened for access to the locations of the new pillars will have a total length of 4.174m. The deck width of the new roads will be 5.0m. The total area of occupation of these roads will be 32.769m^2. These areas are mostly bushy vegetation. The proposed access zones are linked to existing routes offering the desired accessibility to the proposed projects from the wider area.

Effects on the morphological and soil characteristics of the intervention area are expected during the construction phase of the **aerial section of T.L.,** due to the development of construction activities and the operation of the transport, assembly and installation machinery of the pillars, as well as due to the other structures accompanying the construction work. Of course, these changes are expected to be locally limited (per square position) and short-term, given the nature of the work required to build a electricity T.L., and will only take place during the construction phase.

The **dismantling of the existing pillars** includes work to remove the foundation of the base of the pillars, break the existing bases and remove them.

The installation of the new pillars requires the configuration of the existing soil in order to facilitate the work of foundation, assembly and deposition of construction materials. The dimensions of the squares will be about 20m×20m. The configuration of the square spaces took into account the existing altitudes of the area, while the table below shows the earthworks required for the configuration of the installation squares of the new pillars.

Table 9.1: Table of earthy to form squares.

PLATES	EXPENDITURE (m^3)	BUSINESS (m^3)	MORE (m^3)
Π1N	0	0	0
Π2N	20,63	16,22	4,41
Π3N	16,62	17,23	-0,61
Π4N	80,81	335,98	-255,17
Π5N	305,54	160,03	145,51
Π6N	481,43	0	481,43
Π7N	354,4	224,52	129,88
Π8N	178,09	152,73	25,36
Π9N	150,97	90,4	60,57
Π10N	51,11	57,21	-6,1
Π11N	501	16,37	484,63
Π12N	328,74	14,27	314,47
Π12Α N	0	1063,49	-1063,49
Π12Β N	389,03	403,38	-14,35
Π12Γ N	321,2	50,02	271,18
Π12Δ N	476,83	71,42	405,41
Π12Ε N	484,25	21,85	462,4
total	**4.140,65**	**2.695,12**	**1.445,53**

According to the above table, excavations amounting to 4.140,65m^3 are required for the configuration of the installation squares of the new pillars, while the required excavations amount to 2.695,12m^3. Therefore, the excess of excavation materials from the configuration of the installation squares of the new pillars amounts to 1.445,53m^3.

Excavations and foundations required for the installation of the new pillars will not exceed 1.5m in depth. Earthworks for the installation of high-voltage pylons require excavations, for foundation work. For each pillar about 15m^3 bazaars are created for each foot of the pillar and a total of 60m3 for each pillar. Of the

60m^3 or so 52m^3 will be used to re-build the foundations of the pillar. About 8m3 reinforced concrete is needed to establish a pillar. Since seventeen (17) new pillars will be installed, the excess amount of excavation work amounts to: 8m^3 × 17 = 136m^3.

The opening work of the new road construction provides for earthworks, M.U. excavations and earthworks, which are detailed in the table below.

Table 9.2: Table of earthy of the roads under opening.

ROAD	EXPENDITURE (m^3)	BUSINESS (m^3)	MORE (m^3)
Π1- ROAD 1	7.879,42	6.899,73	979,69
Π1- ROAD 2	10.840,04	401,44	10.438,60
Π2- ROAD 1	432,56	93,10	339,46
Π2- ROAD 2	838,24	145,90	692,34
Π3- ROAD 1	4.458,81	1.058,35	3.400,46
Π3- ROAD 2	1.242,06	149,86	1.092,20
Π3 ROAD - 3	5.527,67	201,34	5.326,33
Π3 ROAD - 4	87,14	31,53	55,61
total	**31.305,94**	**8.981,25**	**22.324,69**

According to the above table, the excavations resulting from the road construction work amount to 31.305,94m^3, of which 8.981,25m^3 will be used for construction. Therefore, the excess of the excavation products to be managed amounts to 22.324,69m^3.

The drying of existing and environmentally licensed pylons will result in earthmoving, estimated at 5,000m3.

The total amount of excess excavations since the implementation of the proposed amendments amounts to:

1.445,53m^3 + 136m^3 + 22.324,69m^3 +5.000m^3 = ***28.906,22m^3***

Surplus materials resulting from the construction phase, which cannot be used in re-operation operations, will be deposited in an environmentally licensed repository or in landfills or in areas where other projects are carried out, which have approved environmental conditions and in which such materials can be used either in inactive quarries or through alternative management systems..

In any case, account must be taken of the legislation in force, namely 36259/1757/E103/2010 JMD "Measures, conditions and programmes for the alternative management of waste from excavations, constructions and demolitions " (Government Gazette 1312 B' 2010), as amended and in force.

The effects on the outer surface of the rocks during the construction phase of the modifications under study are considered **negative** in terms of their type, in terms of their size, in terms of their duration in the **short term**, and in terms of their treatment **fully treatable.**

- ***Operating phase***

The operation of the proposed project, due to its nature, may not cause changes in the outer surface of the rocks. The negative effects on the morphology of the area of location of the overhead section of the lines, due to the required de-cleaning of the existing vegetation at the locations where the pillars of the T.L. and access roads are planned, relate to the construction phase of the project and have already been presented above.

Therefore, the effects on the outer surface of the rocks during the operational phase of the projects are considered to be **neutral**.

9.4.2 Possible destruction of special geological features

The proposed projects, due to their nature, are not expected to cause the destruction of special geological features, since the proposed interventions concern surface projects that should be established and not underground projects.

Therefore, the effects associated with the destruction of specific geological characteristics during the construction phase of the project are considered to be **neutral**.

9.4.3 Possible occurrence of geological phenomena of special importance

- ***Construction phase***

The construction of the proposed projects is not related to the construction of pits or land of significant size, which may cause unstable situations in the territory of the site of the projects.

Therefore, the effects associated with the occurrence of geological phenomena of special importance during the construction phase of the project are considered **neutral**.

- ***Operating phase***

The operation of the proposed projects is not related to the application of significant loads in the territory of the project location area, which may cause unstable situations. No negative effects are expected as a result.

Therefore, the effects associated with the occurrence of geological phenomena of special importance during the operational phase of the project are considered **neutral**.

9.4.4 Effects on the qualitative characteristics of the soils of the study area

9.4.4.1 Possibility of soil pollution

- ***Construction phase***

In the construction phase of the projects under study, it is envisaged to produce the usual liquid waste produced in construction projects, taking into account that the pillars consist of pre-fabricated parts, which are not manufactured in the project area.

Chemical toilets will be installed for the collection of urban wastewater, which will be produced by the staff working on the construction of the projects. Considering a construction site of 10 persons, a sewage supply equal to: 50 l/ person/ day x 10 persons = 500 l/ day or 0.5 m3/day.

The wastewater collected will be made available by means of specialized tankers at the nearest, in-service Wastewater Treatment Facility. Used Waste Oils resulting from construction machinery and equipment will be collected and stored in a temporary wastewater storage area until they are delivery to approved ALE collectors. In the construction area there is no provision for washing or maintenance of the construction machinery, as it will be done either in specialized workshops.

For the disposal of liquid waste, No. E1b/221/1965 (B' 138) Health Provision on the disposal of wastewater and industrial waste, as amended by No. C1/17831/07.12.1971 (B' 986), C4/1305/02.08.1974 (EC B' 801) and D.YG2/G.P.133551/30.09.2008. Law 4042/2012 "Criminal protection of the environment - Harmonisation with Directive 2008/99/EC - Framework for waste production and management -

Harmonisation with Directive 2008/98/EC - Regulation of issues of the Ministry of environment, energy and climate change" also applies.

The collection and rational management of the site's wastewater ensures that the possibility of pollution of the soils of the study area is minimized. Measures will be taken to prevent soil pollution in the event of a leakage of fuel and mineral machinery. Both during construction and after work, waste materials will be removed and care will be taken to avoid soil pollution from machine leaks, etc..

The effects related to soil pollution during the construction phase of the modifications under study are considered to be **negative** in terms of their type, in terms of their size, in terms of their **short-term duration**, and in terms of their treatment **fully treatable**.

- ***Operating phase***

During the operational phase of the project, the soil characteristics of the area are not expected to be affected to any extent, either due to lubricant leaks (insulators operate without oils), or due to dust emissions from the operation of the machinery used for the maintenance of the pillars and the transmission line. During and after maintenance work, care shall be taken to prevent soil pollution from possible leaks of machinery.

The effects related to soil pollution during the operational phase of the project are considered to be **neutral**.

9.4.4.2 Soil quality degradation

No negative effects are expected in the projected projects due to long-term deposition of materials in the form of piles.

The effects associated with the degradation of soil quality during the construction and operation phase of the project are considered to be **neutral**.

9.4.4.3 Soil erosion

- ***Construction phase***

During the construction phase of the proposed modifications, it is estimated that the projects under study will have a weak negative impact related to soil erosion, compression and sealing, taking into account the limited extent of occupation of the projects and their dispersion in the area, as due to the nature of the

project (linear work) it is envisaged to disperse the intervention areas (squares and access roads) along the lines.

The effects of soil erosion during the construction phase of the proposed modifications are considered to be **negative** in terms of their type, in terms of their size, in terms of their **short-term duration**, and in terms of their treatment **partially treatable.**

- ***Operating phase***

Due to the nature of the project under study, no effects from soil erosion are expected during the operational phase and are therefore considered **neutral**.

9.5 IMPACT ON THE NATURAL ENVIRONMENT

9.5.1 Impact on flora, fauna and ecosystems

- ***Construction phase***

The main effects expected on ecosystems, vegetation and flora species are mainly due to the occupation of the proposed projects and relate to the following tasks:

- the operation of the construction sites, transport, assembly and installation machinery of the pillars, as well as the other individual structures of the project.
- work on cleaning and shaping the squares where the pillars will be installed.
- installation and operation of the pillars.
- the work on the integration of the T.Ls, the work of opening the forest road and.
- decommissioning of existing and environmentally licensed pillars.

In particular, the irreversible effects on the natural environment from the construction of the proposed amendments are limited to the area of occupation of the projects. In particular, the proposed interventions concern the following:

- construction of seventeen (17) new towers (pillars), occupying area 20m×20m=400m2, for each pillar and for all new pillars: $400m^2 \times 17 = 6.800m^2$. opening of a new forest road - to serve the construction needs of the new transmission line - with a total length of about 4.174m.

- The area of occupation of the new roads, as documented in the following table, amounts to approximately 32.769m^2.

Table 9.3: Area of occupation of each road section to be opened.

street	Length (m)	Width (m)	CONSTRUCTION (m^2)
Π1- ROAD 1	1.285	5,0	11.994
Π1-ROAD 2	735	5,0	6.000
Π2-ROAD 1	200	5,0	1.120
Π2- ROAD 2	120	5,0	818
Π3- ROAD 1	980	5,0	6.996
Π3- ROAD 2	166	5,0	1.168
Π3- ROAD 3	650	5,0	4.443
Π3- ROAD 4	38	5,0	230
total	**4.174**	**-**	**32.769**

On the basis of the above, the proposed amendments will occupy an area of **39.569m^2.**

The area occupied by the environmentally licensed project, under the current GNP, amounts to 15.300m^2 relating to the area occupied by the squares of the pillars, to 44.747,09m^2 from the opening of the roads, 5.275m^2 concerning the installation site of the PC and 2.804m^2 concerning the area of three pillars in place of the T.L HVC Acheloos – HVC Distomos, for the connection of the line to the new position of the left circuit of the existing 400kV Transmission Line (HVC Acheloos – HVC Distomo). The total area occupied by the environmentally licensed project amounts to 68.126,09m^2.

On the basis of the proposed amendments, it is proposed to remove twelve (12) pillars occupying an area of 4.800m^2 and to propose projects occupying an area of **39.569m^2**. Therefore, the increase in the area of occupation, on the basis of the proposed amendments, amounts to **34.769m^2** (since twelve pillars are removed).

In addition, it is stated that the implementation of the displacement and connection projects of the transmission line will require a slavery zone of 50m (25m on either side of the route of the line at the intervention points), which in total amounts to an area of 259.922m^2. This zone also includes the new pillars of intervention.

The effects which may be caused to fauna species during the construction phase of the proposed amendments are separated from those resulting from the occupation of habitats and those causing nuisance to fauna living in the immediate area of the project under study.

At local level during the construction phase it is possible for some of the existing fauna species in the area to be temporarily removed from the project area due to their noise and human presence, without further repercussions.

Temporary nuisance for most species of fauna during the construction phase is estimated to be fully reversible and transient in nature. In addition, it is worth noting that the projects will be implemented in part so that any nuisance is detected in different locations during the work, thereby further reducing its importance.

At the end of the construction phase it will be possible to physically re-separate almost the entire area that has been disturbed and is not occupied by technical works. Furthermore, taking into account the wide spread area of most species in relation to the limited extent to be taken over by the projects to be built, it can be safely concluded that the relevant effects will not be significant for most species of fauna.

The effects on the flora and fauna of the region, as a result of the construction of the proposed amendments, are considered to be **negative** in terms of their species, in terms of their size, in terms of their **short-term duration**, and in terms of their **treatment partially treatable.**

- ***Operating phase***

During the operational phase of the proposed projects, due to their nature, there will be no impact on the vegetation and flora species of the area. During the operation of the project, no effects on the natural environment of the area are expected, either due to lubricant leaks or due to dust emissions from the operation of the machinery used for the maintenance of the pillars and the transmission line. Both during and after maintenance work, care will be taken to avoid soil pollution and, by extension, vegetation of the area from possible leaks of mechanical equipment.

Regarding the fauna of the area, it is noted that there is insufficient literature from the Greek area on the risk of impacts and electric shocks of birdlife species on high voltage power transmission lines. However, foreign literature is available which reports on the possible impact of impact or electric shock on important

bird of prey in high-voltage power line development areas (Marcus 1972, Ferrer et al. 1991, Bayle 1999, Van Rooyen 2000, Barabashen 2005, Mastina 2005, Cartron et al. 2006, Harnerss 1998, 2000, 2008, Rollan et al. 2010 , Rubolini et al. 2001, Shobrak 2012).

According to the Hellenic Ornithological Society, where the main migration corridors of Greece have been depicted, the immediate area of intervention is adjacent but does not fall within a migration corridor (as shown in the Figure below).

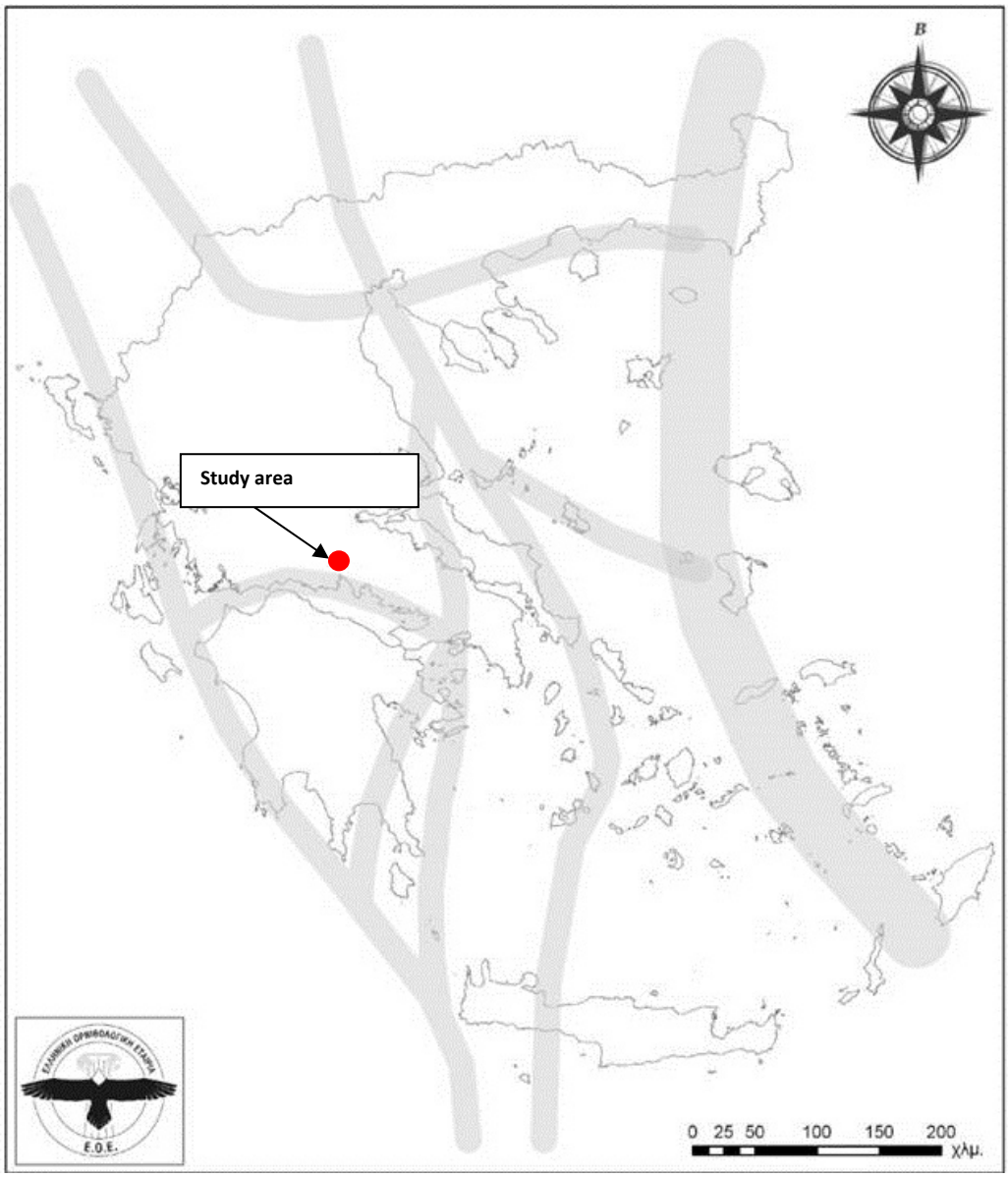


Figure 9.1: Excerpt from a map of the Hellenic Ornithological Society, showing the main migration corridors of Greece and indicating the study area.

In any case, the effects on birdlife in the area are not considered significant for the project under study, the following shall be taken into account:

- The overhead cables of the transmission line are at a great distance from each other, so the risk of electric shock is minimised even for large birds.
- The diameter of the overhead cables is quite large and therefore the cables are visible from a long distance.
- The area is not characterized by a high frequency of fog phenomena.
- The area is not a protected area and in particular a Special Protection Zone for birdlife, so it is estimated that the movement of birds in the area is not particularly increased.
- The area does not fall within one of Greece's main migration corridors.

The effects on the flora and fauna of the region are characterized in terms of their species as **negative**, in terms of their size, in terms of their **long duration**, and in terms of their **treatment treatable.**

9.5.2 Impact on the areas of the national protected areas system

As mentioned above, the project under study does not fall within the protected areas.

9.5.3 Impacts on forests and forest areas

For the study area there are no ratified or posted forest maps.

In any case, in accordance with Chapter 6 of L. 998/1979 "Allowable interventions in forests, forest areas and public areas referred to in points (a) and (b) of paragraph 5 of Article 3 of this Law', in particular in accordance with paragraph 5 of Article 53 'Infrastructure projects', **the installation of power plants by conventional fuel and accompanying works** only on public land referred to in points (a) and (b) of Article 3(5) of Law 998/1979 and in the absence thereof in forested areas and forests.

In any case, as mentioned in section 9.5.1, the main effects expected on the vegetation and flora of the area and, by extension, on any forest areas, are mainly due to the occupation of the proposed projects and relate to the following:

- the operation of the construction sites, transport, assembly and installation machinery of the pillars, as well as the other individual structures of the project.
- work on cleaning and shaping the squares where the pillars will be installed.
- installation and operation of the pillars.

- the work on the integration of the T.Ls,
- the work of opening the forest road and. decommissioning of existing and environmentally licensed pillars.

The effects on the forests and woodlands of the area are characterized in terms of their species as **negative**, in terms of their size, in terms of their **long-term duration**, and in terms of their treatment **partially treatable**.

9.6 IMPACT ON THE HUMAN ENVIRONMENT

9.6.1 Spatial Planning - Land Uses

The project under study belongs administratively to the Region of Central Greece, to the Regional Unit (of Viotia, to the Municipalities of Levadia and Distomos - Arachova - Antikyra (as formed pursuant to Law 3852/2010) and in particular, to the Municipal Units M.U. of Kyriaki and Distomos, respectively.

According to Decision 3124/128532 (Government Gazette 432/A.A.P./31.12.2012) "Approval of the General Urban Plan of the Municipal Unit (M.U.)of Distomo, Municipality of Distomos - Arachova - Antikyra", the proposed amendments pass through the Areas of Control and Restriction of Construction PEPD 1 "Zone for the protection of agricultural land and the rural landscape and the development of agricultural activities (falls the smallest part of the T.L concerned)' and PEPD 2 'Zone of grassland and development of RES facilities and bauxite mines (the majority of the T.L concerned)'. In both the PEPD1 and the PEPD2 zone, technical infrastructure installations and networks are permitted.

According to Decision 3529/149006 (Government Gazette 273/A.A.P./12.12.2016) "Approval of the General Urban Plan of the Community of Kyriaki, Municipality of Levadia", part of the project under study falls under the Areas of Control and Restriction of Construction PEPD 1 "Agricultural Development Area" and PEPD 2 "Coastal Area".

Facilities and technical infrastructure networks are permitted in both the agricultural development area and the coastal area.

The impact on spatial planning and land uses in the area, from the operation of the proposed project, is characterised as **neutral**.

9.6.2 Structure and functions of the anthropogenic environment

- ***Construction phase***

The construction of the proposed projects is not expected to cause the unity of the urban fabric to be broken up in the urban and extra-urban area. In the construction phase of the projects, all necessary measures will be taken to limit the emission of noise and gaseous or particulate pollutants, which may adversely affect the environment of the settlements found in the study area.

In conclusion, the effects of the construction of the proposed projects on the structure and functions of the man-made environment are **weak negative** and **short-term** and **partially manageable** by taking appropriate measures.

- ***Operating phase***

The continued operation of the project under study, including the requested amendments, is not expected to have an impact on the structure and main environmental characteristics of the nearest settlements..

Also, no changes are expected to occur in the installation, dispersion, density or rate of growth of the permanent population of the project area.

The impact on the structure and functioning of the anthropogenic environment of the region, from the operation of the proposed project including the proposed amendments, is characterized as **neutral**.

9.6.3 Cultural heritage

No impact on the cultural environment of the region is expected from the operation of the project under consideration, including the proposed amendments.

9.7 SOCIAL - ECONOMIC IMPLICATIONS

- ***Construction phase***

Positive effects on the social and economic environment of the region are expected during the construction of the proposed projects. On the one hand, supplies of construction materials will be secured as much as possible by companies in the region and, on the other hand, the jobs created will be filled as much as possible by the potential of the study area. The socio-economic impact of the region, during the construction phase of the proposed amendments, is characterised as **positive**.

- ***Operating phase***

The expected benefits of the operation of the project under study in the social- economic environment of the region are:

- ✓ Covering the country's electricity needs and ensuring the use of different sources.
- ✓ To promote the country's environmentally friendly policy on the use of cleaner primary energy sources, limiting greenhouse gas emissions.
- ✓ Economic development at both local and national level.
- ✓ Strengthening local employment and developing the local economy.

The socio-economic impact of the region, therefore, during the operational phase of the proposed project, is characterised as **positive**.

9.8 IMPACT ON TECHNICAL INFRASTRUCTURE

- ***Construction phase***

New access roads will be opened for the construction of the proposed amendments to meet construction needs, with a total length of about 4.174m and a width of 5,0m. These roads will link the locations of the proposed pillar squares with the existing rural road network.

It should be noted that the existing road network has low traffic and all necessary safety measures (construction markings, etc.) will be taken to ensure traffic safety on the existing road network and at the locations associated with it by the proposed roads.

During the construction of the new section of land a transmission line will be observed all the security measures provided for in the relevant regulations and specifications in direct communication and consultation with Independent Power Transmission Operator. It should be noted that for these interconnection projects the definitive terms of association, which are attached to a corresponding Annex at the end of the issue, have been approved by the Independent Power Transmission Operator.

Therefore, the impact of the construction of the proposed projects on technical infrastructures is considered to be **negative** in terms of their type, in terms of their **moderate size**, in terms of their duration in the **short to long term**, and in terms of dealing with them **manageable** by taking appropriate measures..

- ***Operating phase***

During the operational phase of the proposed project, including the proposed amendments, no impact on the technical infrastructure of the region is expected..

The impact on the technical infrastructure of the region, from the operation of the project under consideration, is characterised as **neutral**.

9.9 RELATIONSHIP WITH HUMANITARIAN PRESSURES IN THE ENVIRONMENT

9.9.1 Consideration of the possibility of excessive reinforcement of one or more of the anthropogenic pressures on the environment

The operation of the licensed activity under consideration is not related to the production of gaseous, liquid and solid waste, but also to the exploitation of natural resources and the water potential of the study area.

Therefore, no strengthening of the already recorded anthropogenic pressures is expected.

9.9.2 Possibility of creating new pressures on the environment

No increase in already recorded anthropogenic pressures is expected.

9.10 IMPACTS ON AIR QUALITY

- ***Construction phase***

During the construction phase of the proposed amendments, low-intensity effects on the atmospheric environment of the region, related to:

1. dust emissions from vehicles to be used for the construction of the proposed modifications.
2. exhaust emissions from these vehicles.

The impact of the construction of the project includes the creation of dust from the excavations, landings and deposits of construction materials. In particular, as far as dust is concerned, this is mainly due to the alienation and pulverisation of the surface of the materials in the excavation site. It may also be due to disturbances in soil materials characterized by low consistency, during excavations and other earthworks, as well as the transport and distribution of soil and other easily crushed materials. More generally, the amount of dust to be produced depends mainly on the extent of the area where the excavations are to be

carried out - which due to the nature of the project is limited - on the volume and type of materials that will result from them, the way of excavation and finally, on the climatic conditions that will prevail in the area during the construction period of the project.

In addition, it is possible to create on the spot some unpleasant odors from the combustion of motor oil and from the operation of construction machinery.

The above effects are not considered capable of degrading the quality of the atmosphere in the project area, as they will be temporary and reversible. The burden on the atmospheric environment of the area during the construction of the project is expected to be negligible and temporary (only during construction).

Therefore, the effects on the atmospheric environment during the construction phase of the modifications under study are considered to be **negative** in terms of their type, in terms of their size, in terms of their **short-term duration**, and in terms of their treatment of **partially treatable**.

- ***Operating phase***

No negative effects on air quality (neutral effects) are expected during the operational phase of the project, as the project will not contribute to the production of gaseous emissions. It will also not contribute to the release of dust particles or odours. Finally, any effects of vehicle movements to perform maintenance or repair work are considered negligible.

9.11 EFFECTS FROM NOISE AND Vibration

- ***Construction phase***

During the construction phase of the requested modifications, a temporary, local charge is expected to be placed on the acoustic environment of the immediate study area, as noise from point sources, construction equipment, is to be emitted. A small percentage of the contribution to the burden on the acoustic environment will be due to the movement of trucks producing construction materials and the operation of machinery for the work carried out, but it will not be a particular problem, due to the small number of vehicles.

It is also noted that the expected increase in noise will not place a significant burden on the anthropogenic environment, as the residential units of the area, the dwellings and the activities of the inhabitants develop

at a relatively large distance from them in relation to the activity under study (nearest settlement 800m). The effect also applies to any wildlife species, in particular those that are sensitive to noise levels. For this reason, although high noise intensities exceeding statutory limits are not expected, measures should be taken at the construction stage, in particular by rational planning of construction work, as detailed in Chapter 10.

Therefore, the effects of noise during the construction phase of the modifications under study are considered **negative** in terms of their type, in terms of their size, in terms of their **short-term duration**, and in terms of their treatment **fully treatable.**

- ***Operating phase***

Noise during the operational phase of the project is limited to the appearance of the Corona effect on the surface of the transmission lines when the intensity of the electric field on the surface of the conductor exceeds the dielectric strength of the air.

It takes the form of intermittent or continuous evacuations. However, since the proposed amendments (with regard to the main project) concern the displacement of an existing and environmentally licensed high-voltage transmission line, with an increase in this length of only about 1.365m, no increase in the intensity of the Corona phenomenon is expected during the operational phase of the proposed amendments.

The average value of noise from the CORONA effect under the Lines and in wet weather can reach a minimum of up to 50db, as much as about the operating noise of an electric refrigerator. Since the T.L. under study is not in direct proximity to settlements, no effects from the CORONA phenomenon are expected.

The effects on the acoustic environment of the area, from the operation of the project, are characterized as **neutral**.

9.12 IMPACT ON ELECTROMAGNETIC FIELDS

- ***Construction phase***

No electrical and magnetic fields are expected during the construction phase of the project under study and therefore no effects of any kind are expected.

- ***Operating phase***

Electrical and magnetic fields are not only created around the transmission (high voltage) and distribution lines (medium and low voltage) of electricity, but their existence in the surrounding area is interwoven with the very use of electricity. Around any electrical element develops electric and magnetic field, the sizes of which depend for a given position only on voltage and current intensity, respectively.

As the intensity of these fields weakens as the distance from the source that creates them increases, in many cases the use of household electrical appliances results in exposure to magnetic field (magnetic induction) values higher than those that could come from adjacent electrical lines, since in all possible places of residence people have significant safety distances.

The electrical and magnetic fields generated by the power transmission line function are low frequency (50 Hz). The intensity of these fields rapidly weakens as the distance from the source that creates them increases and therefore any visual contact with electrical lines does not automatically result in an electrical or magnetic field charge..

In April 2018, measurements were made of the levels of the low-frequency electrical and magnetic field in the environment of the power plants in Agios Nikolaos, the exposure of which is attached to a corresponding Annex to this study. The measurements were carried out by a team of the Office of Non-Ionized Radiation of the EUAE with a view to recording the levels of low-frequency electrical and magnetic fields for verification of compliance or not with Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016).

In line with the conclusions of the EEAE measurement report, it can be reported that low and high action (AL) values for magnetic induction and electric field intensity have not been exceeded, as defined by Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016) "Harmonisation with Directive 2013/35/EU "on minimum health and safety requirements with regard to the exposure of workers to risks

arising from natural factors (electromagnetic fields) and repealing Directive 2004/40/EC' which harmonised national law with Directive 2013/35/EU of the European Parliament and of the Council of 26 June 2013.

In any case within a radius of 100m from the boundaries of the transmission lines there are no sensitive recipients (e.g. institutionalized settlements), nor sensitive uses (e.g. schools, hospitals, nursing homes, etc.).

The health effects of magnetic and electrical fields during the operational phase of the project are classified as **neutral**.

9.13 IMPACT ON WATER

- ***Construction phase***

The construction phase of the amendments requested by this agreement may not:

- affect in any way issues that have been set as priorities or objectives of the measures of the approved Eastern Central Greece Basin Management Plan.
- have a negative impact, in relation to those provided for in the approved River Basin Flood Risk Management Plan of the Water District of Eastern Central Greece.
- affect the groundwater in the study area.

The potential impact on the aquatic environment from the construction phase of the requested modifications concerns the quality status of surface water and is mainly related to accidents, for which the design includes preventive measures and the maintenance/implementation of good construction practices.

In conclusion, in the aquatic environment the effects during the construction phase of the modifications to the existing project are classified as **neutral**.

- ***Operating phase***

During the operational phase of the project under consideration, including the requested modifications, no impact is expected on the quantity and quality of surface and groundwater.

Therefore, the impact on the waters of the region from the operation of the proposed project is characterised as **neutral**.

9.14 ASSESSMENT OF THE IMPACT ON RISKS OF SERIOUS ACCIDENTS OR DISASTERS RELATED TO THE PROJECT

The project under study is **not subject to the provisions of 172058/2016 MD (Government Gazette 354/B/2016)** on "Determination of measures and conditions to address risks from large-scale accidents in installations or units; in view of the existence of dangerous substances, in compliance with the provisions of Directive 2003/105/EC "amending Council Directive 96/82/EC on the treatment of the risks of major accidents related to dangerous substances" of the European Parliament and of the Council of 16 December 2003".

It is considered that the work under study cannot result in large-scale accidents and that there are no significant risks to human health, cultural heritage and the environment from its operation. However, the following sections shall assess any impact of the project's vulnerability to natural disasters.

Destruction can be defined as "the degree of loss of a good or many goods resulting from the action of a natural phenomenon given size" and measured on a scale from 0 (no loss) to 1 (maximum loss). When the danger becomes visible and imminent then a clear distinction is made between the threat. Thus, the sequence of situations relating to a disaster is as follows: a catastrophic event -> threat -> threat ->consequences

In general, disasters are defined as "threats to people and to what is valuable" and risks as the "quantitative and occasional possibilities that make the consequences of disasters harmful".

The concept of risk can be attributed on the basis of the following three components:

1) risk-exposed elements, population, property, economic activities, public goods, etc., elements threatened with destruction in a particular area.
2) the specific risk, which is the degree of losses likely to be caused by the action of a specific natural phenomenon. It can be expressed as the product of natural disaster on vulnerability.
3) the total risk, which reflects the number of lives likely to be lost, the number of injured, the damage to property and the cost of stopping the various activities caused by the action of a specific natural phenomenon.

As mentioned in Section 8.14, in the study area the potential risks of serious disasters that the project may face are:

- Floods
- Earthquakes
- Forest Fires
- Pollution from an accident

The impact of the project's vulnerability on each of the above risks is presented in detail below.

Floods

The most dangerous and abrupt type of flooding is that caused by heavy rainfall in a short period of time, usually less than 6 hours and usually characterized by violent torrents flooding urban roads or mountain valleys, sweeping everything in front of them. Sudden flooding is very dangerous because it can happen within seconds with little warning.

Their main feature is their extremely sudden appearance. The factors contributing to this type of flooding are the intensity of rainfall, their duration, surface conditions, soil morphology and the slope of the reception basin.

Sudden floods occur in mountainous or hilly areas due to the steep morphology of their soil. However, they can also occur in lowland areas, where the slope is too small to allow direct water runoff, but it accumulates in lower areas such as underpasses or basements. Sudden flood forecasts are one of the most difficult problems meteorologists face at the moment.

The effects of floods can be direct, caused by the flood itself or indirect, caused by the breakdown or malfunction of related services and systems

As mentioned above, the study area does not fall into a flood zone for any recovery period (T=50, T=100 and T=1000) and therefore the probability of such phenomena is very low.

Earthquakes

The genesis of earthquakes is particularly associated with pronounced phageogenic tectonics. The largest seismic event in the wider region, based on available data from the Geodynamic Institute of the National

Observatory of Athens, is the earthquake of 5.4ML on the Richter scale that occurred on 08.04.1970 at a distance of about 10.3km SW of the project under study and 28.2km SW of Livadia, at a focal depth of 10km.

The closest seismic tremors of more than 4.0 Richter magnitude to the project under study are:

- A seismic vibration of 4.1 ML on the Richter scale, occurring on 07.05.1989, at a distance of about 8.5km SW of the project under study and 23.4km SW of Livadia with a focal depth of 1.0km.
- Seismic vibration of 4.3 ML on the Richter scale, occurring on 25.06.1999, at a distance of about 9.5km SOUTH of the project under study and 18.0km SW of Livadia with a focal depth of 11.0km.

The study area, according to the R&D.A."s Seismic Hazard Zones Map, is part of seismic hazard zone II (medium seismic hazard) with a maximum expected seismic ground acceleration A= 0.24g, where g = gravity acceleration.

The direct impact of a potential earthquake on the environment and, by extension, on the project depends on two main factors: the intensity of the earthquake and the vulnerability of the natural environment. Only the most powerful earthquakes (M>7.0, Intensity > XI) cause significant changes in the landscape of a large area and have a significant impact on it.

It is stated here that the earthquakes that took place in the past, focusing on the area under study, did not cause any damage or other problems to the construction of the project. All the construction structures of the project have been constructed with the applicable seismic regulation and all seismic protection measures have been taken into account.

Forest fires

Fires are an intense natural phenomenon which can be particularly destructive. It is considered one of the large-scale natural phenomena that man is not yet able to control. The threat is even more acute for regions with Mediterranean ecosystems, such as Greece, with immeasurable ecological, economic and social consequences.

The onset of fires is caused by natural and man-made causes. The main causes of the fires are:

- the various agricultural activities and especially the burning of dry grasses.
- Discarding lit cigarettes or lighting a fire in the woods.

- Dumping garbage in the woods.
- Uncontrolled burning of waste.
- Malicious actions (arson).
- Various activities in holiday homes.
- Accidents (traffic accidents, damage to agricultural machinery, engine sparks, etc.).

Human activities result in fires occurring so often that the strength of ecosystems is depleted. Moreover, the regeneration and preservation of the ecological values of ecosystems is made even more difficult by the disruption caused by infrastructure - especially roads and settlements.

The rate of spread of a fire increases exponentially by increasing wind speed. With a wind speed of 10km/h a fire in a sandy area moves at a speed of 0.5km/h, while at 20km/h wind speed the fire spread speed becomes 0.75km/h and at 40km/h the spread speed reaches 1.75km/h.

The environmental impact resulting from the outbreak of a forest fire is:

- Destruction of the ecosystems of the wider region.
- Burden of air quality with substances dangerous to humans and the environment.
- Damage to surrounding land uses.

9.15 IMPACT SUMMARY

The following table summarises the environmental impact on the natural and man-made environment of the study area, the construction of the proposed modifications, but also the operation of the project. In particular, color encoding is used in which the positive edge of the variance range of each property is shown in green, with white the neutral state and with yellow the negative edge.

Table 9.4: Summary environmental impact table of the project.

Impact Category		**Impact characterization during the construction phase of the proposed amendments**	**Impact rating during the project operation phase**
Climate and bioclimatic characteristics		Neutral	Neutral
Morphological and Topological characteristics			
•	Assessment of local changes	Negative, weak, short-term, fully treatable	Negative, weak, long-term, un treatable

•	Assessment of local changes	Neutral	Neutral
•	Probability of disruption of the horizon line and the natural shapes and colors of the landscape	Neutral	Neutral
•	Compatibility of upcoming changes in relation to the European Landscape Convention, ratified by L. 3827/2010	Neutral	Neutral
Geological, Tectonic and Soil Characteristics			
•	Alteration, partitioning of the outer surface of the rocks	Negative, weak, short-term, fully treatable	Neutral
•	Possible destruction of special geological characteristics	Neutral	Neutral
•	Possible occurrence of geological phenomena of special importance	Neutral	Neutral
•	Probability of soil pollution	Negative, weak, short-term, fully treatable	Neutral
•	Soil quality degradation	Neutral	Neutral
•	Soil erosion	Negative, weak, short-term, partially treatable	Neutral
Natural Environment			
•	Effects on flora, fauna and ecosystems	Negative, weak, short-term, partially treatable Negative, weak, short-term, partially treatable	Negative, weak, long-term, treatable
•	Impact on areas of the national system of protected areas	Neutral	Neutral
•	Effects on forests and woodlands	Negative, weak, long-term, partially treatable	Negative, weak, long-term, partially treatable
Anthropogenic Environment			
•	Spatial Planning - Land Uses	Neutral	Neutral
•	Structure and Functions of the Anthropogenic Environment	Negative, weak, short-term, partially treatable	Neutral
•	Cultural heritage	Neutral	Neutral
Socio-economic Impact		Positive	Positive

Impact on Technical Infrastructure	Negative, moderate, short-term, treatable	Neutral
Association with anthropogenic pressures in the environment	Neutral	Neutral
Effects on air quality	Negative, weak, short-term, partially treatable	Neutral
Effects of noise or vibration	Negative, weak, short-term, fully treatable	Neutral
Effects related to electromagnetic fields	Neutral	Neutral
Effects on water	Neutral	Neutral

10 ENVIRONMENTAL IMPACT MANAGEMENT

In accordance with the specific contents of Chapter 10, Annex 2 to No. 170225 Decision of the Ministry of Environment (Government Gazette 135/B/27-01-2014), this chapter should contain a detailed description of the additional measures proposed to address its significant adverse effects on the environment, in addition to those incorporated into its design.

This Chapter will therefore follow the thematic structure also followed in Chapter 9 and will develop only the corresponding environmental instruments that may be affected on the basis of the prior documentation of the impact of the proposed amendments.

10.1 GENERAL TREATMENT MEASURES - GOOD PRACTICE TECHNIQUES

This paragraph analyses general guidelines for good practice in the construction of the proposed projects. In order to prevent, and optimally address, potential environmental impacts during the construction phase of the proposed extension projects, the following basic principles will be followed:

i. Implementation of an organised timetable for the individual work to be required, with the main aim of carrying out parallel construction work on the individual projects.

ii. Issuance of all the Environmental Terms Approvals and approvals provided for by the applicable legislation of the competent Services before the start of work.

iii. Use of modern mechanical equipment with international specifications and regular maintenance based on the manufacturer's instructions.

iv. Implement all necessary measures to limit the potential impact of waste generated (solid, liquid), air pollutant emissions and noise emissions. The various excavations should not remain uncovered for long periods of time.

v. The deposits of materials in piles shall be made from the minimum possible height and the piles shall not be more than 4 m high.

vi. regular cleaning of the site, sorting at source and management in accordance with the applicable legislation for each waste stream (e.g. P.D. 82/2004 for oils, JOINT MINISTERY DECISION 13588/725/2006 for hazardous waste, etc.)

vii. For hazardous waste that may arise during the construction phase, the contractor should ensure their separate collection. They should be managed in accordance with the provisions of JOINT MINISTERY DECISION 13588/725/2006 (FKE 383/B/2006).

viii. Any other waste that occurs and is subject to the provisions of the alternative management will be collected separately under the responsibility of the contractor and disposed of in approved systems as provided for in the relevant legislation

ix. Take appropriate measures to prevent fuel and lubricants from leaking from machinery failures. Availability of adsorbent materials (e.g. sand, shaving, etc.) on site for collection of liquids in case, despite control and proper operation measures, a leak occurs. Immediate remediation and restoration of soil, management of impregnated materials as referred to in the applicable hazardous waste legislation.

x. Explicit prohibition of all forms of combustion of materials (garbage, tires, oils, etc.) in the area of the project

xi. Use of a protective cover on all trucks carrying powdery materials to and from the construction site.

xii. Wetting of soil and materials during movements and depositions in order to reduce the dust emitted.

xiii. All machinery and equipment used in construction should be in good condition and regular maintenance should be carried out.

xiv. Reduction of emissions of air pollutants and noise from machinery, construction site vehicles, etc., using new technology machinery and which will be maintained preventively according to manufacturers' specifications.

xv. In order to deal with noise during the construction phase, the use of new technology construction machinery, which will be CE-marked and the guaranteed sound power level indicated

xvi. Establishment of maximum speed limits, for reasons of avoiding dusting but also for safety reasons.

10.2 MEASURES TO MANAGE THE IMPACT ON CLIMATE AND BIOCLIMATIC CHARACTERISTICS

No adverse effects on the climatic and bioclimatic characteristics of the area are expected from the construction and operation of the projects under consideration and therefore no response measures are required.

10.3 MEASURES FOR THE IMPACT ON THE MORPHOLOGICAL AND TOPOLOGICAL CHARACTERISTICS

The construction work of the modifications under study is estimated to have only a limited negative impact on the topographical and morphological data of the region. In order to reduce these effects, the following are proposed:

- The bandwidth of the project's occupation zone should be limited to what is strictly necessary for the construction of the project.
- For the entire project and before the construction phase, the areas of occupation should be demarcated, so that any excavations that will be carried out are limited to what is strictly necessary and to avoid unnecessary excavations, excavations and de-excavations.
- All kinds of waste materials will be collected and removed from the project site and disposed of in accordance with the applicable provisions.
- After the completion of the construction work, the removal of all materials and equipment that have been transferred to the intervention area for the needs of the project will take place.
- As regards urban waste, no special measures are required in the construction of the projects. The volume of waste produced by the workers during the construction of the projects will be quite small, so these can be collected in waste bins and removed, along with the other solid waste generated, in the waste collection areas of the area.
- At the end of the construction of the project, the affected areas will return to their previous form. As part of the restoration, the contractor is obliged to remove and remove from the construction sites any temporary installation that exists, waste, tools, scaffolding, machinery, surplus materials, useful or useless, temporary machinery installations, etc. and to repair or rebuild parts of areas damaged or morphological alterations from the execution of the project, in a reasonable time, however, less than the project's performance in.

10.4 MEASURES FOR THE IMPACT ON GEOLOGICAL, TECTONIC AND SOIL CHARACTERISTICS

The treatment of the effects on geological and soil characteristics concerns the proper management of excavations and excavation products and the possibility of reusing them. For the construction needs of the proposed projects and in particular from the configuration of the new platforms for the seat of the pillars, but also from the opening of the new forest road construction to serve the needs of the proposed modifications, excavations of the order of 40.582,59m^3 will be carried out, of which a quantity of

11.676,37m^3 will be used for the re-operation needs. The excess excavations, which will amount to 28.906,22m^3, will be managed in accordance with the current Legislation and in particular the 36259/1757/E103/2010 JMD (Government Gazette 1312/B/2010) where waste from excavations and demolitions can be taken for alternative management to authorized management centers.

Soil pollution can occur by accident or negligence in the operation of the construction machinery of the project. According to 82/2004 (Government Gazette 64 A/2.3.2004) "Replacement of 98012/2001/1996 JMD ''Determination of measures and conditions for the management of the mineral oils used (B 40)''. Measures, conditions and programme for the alternative management of lubricating oil waste', 13588/725/06 JMD (Government Gazette 383/B/28.3.06), 24944/1159/06 JMD (Government Gazette 383/B/28.3.06), 24944/1159/06 JMD (Government Gazette 383/B/28.3.06), 24944/1159/06 JMD (Government Gazette 383/B/28.3.06), 24944/1159/06 JMD (Government Gazette 383/B/28.3.06). GG 791/B/30.6.06) and 8668/2.3.07 JMD (Government Gazette 287/B/07), as applicable, prohibit the pollution of surface and groundwater from all types of oils; fuel, etc., as well as the discharge of second-hand oils into the soil. The mineral oils to be used shall be kept in closed containers in a covered area, while the mineral oils used or their leaks shall be collected and made available to legal collectors and recipients.

The construction site for the needs of the project should be kept in a clean and work-appropriate condition throughout their use. At the end of the work it should be restored to its previous state and any damages repaired.

Additional measures that will be taken to minimize the impact on the geological and soil characteristics of the intervention area are the following:

- The deposition of excavations that will be reused as soil material should be done in a way that does not allow phenomena of erosion and disposal of materials.
- The excavation materials must be transported by means of transport with appropriate covers, in order to prevent their dispersion or diffusion on the roads.
- Earthworks should be avoided during days of heavy rainfall.
- To make an effort to ensure that the routes of the cars serving the construction sites do not pass through the centers of the settlements and areas of residence.
- For all waste and waste resulting from construction activities during the construction of projects (solid and liquid) appropriate management should be applied to avoid pollution of the area (soil, subsoil, surface and groundwater) from their uncontrolled disposal or from any leaks.

- Prohibit all forms of burning of materials (garbage, tires, oils, etc.) in the area of the project.

10.5 MEASURES TO DEAL WITH THE IMPACT ON THE NATURAL ENVIRONMENT

The general measures to deal with the impact on plant communities and flora during the construction of the proposed project are summarised as follows:

- The bandwidth of the project's occupation zone should be limited to what is strictly necessary for the construction of the project.
- For all waste and waste resulting from construction activities during the construction of the projects (solid and liquid, hazardous or not, appropriate management should be applied in order to avoid pollution of the area (soil, subsoil, surface and groundwater) from their uncontrolled disposal or from any leaks
- Any excavations of foundations and technical works to be carried out should be limited to what is strictly necessary and that unnecessary excavations, excavations and de-excavations should be avoided.
- Interventions in forest areas should be carried out in accordance with the conditions, conditions and procedure laid down by the Forest Legislation. The use of these areas should relate exclusively to the project covered by this study. Any deforestation or general deterioration in natural vegetation shall be limited to the minimum extent possible and exclusively within the approved area of occupation of the project, M.U. within the limits of the premises for which an installation protocol has been issued in the case of a forest character, or the possibility of their lawful use in the case of a non-forest character (e.g. by purchase) has been ensured. , licensing by the owner, expropriation, creation of slavery, etc.). The logging, grubbing-up and more generally any deterioration of forest trees, as well as the disposal of logging products, should be carried out in accordance with the provisions of forestry legislation.
- During earthworks, a reduction in dust dispersion is required, with soil wetting, in case of adverse atmospheric weather conditions.
- At the end of the construction of the proposed projects, all types of construction facilities will be removed.

10.6 MEASURES TO DEAL WITH THE IMPACT ON THE HUMAN ENVIRONMENT

In order to minimise the potential impact on the social and economic environment of the wider region, measures should be taken aimed at the following:

- Ensuring smooth movement of vehicles in the area during the construction phase of the project…

- Compensation of owners for the expropriation of the areas of seat of the pillars and for the repair of any kind of damage caused during the construction stage of the project…
- Fulfillment of technical requirements for safe operation and easy construction and maintenance of the line.
- Compliance with the anti-seismic protection rules for the seat of the pillars…
- Coverage of the needs of the project to staff, by the residents of the settlements located near the part of T.L.

10.7 MEASURES TO DEAL WITH SOCIO-ECONOMIC IMPLICATION

As positive effects are expected on the social-economic environment, from the construction and operation of the project under study, no response measures are required.

10.8 MEASURES TO TACKLE THE IMPACT ON TECHNICAL INFRASTRUCTURE

In order to address any impact on existing technical infrastructure from the construction of the projects under study, the following measures are proposed:

- Any intervention in an existing infrastructure project should be carried out in accordance with a relevant study and in cooperation with the relevant Public Utilities Organizations, in order to ensure the smooth operation of the infrastructure project concerned.
- The smooth movement of vehicles in the project area during the construction phase of the project (placement of construction markings).
- Fulfillment of technical requirements for safe operation and easy construction and maintenance of the line.
- Compliance with the anti-seismic protection regulations for the seat of the pillars.

10.9 MEASURES TO RESPOND TO THE IMPACT ON HUMANITARIAN PRESSURE IN THE ENVIRONMENT

As no impact on anthropogenic pressures on the environment is expected from the construction and operation of the project under study, no response measures are required.

10.10 MEASURES TO DEAL WITH THE IMPACT ON AIR QUALITY

The main effects on the atmosphere of the project area concern the gaseous pollutants to be produced by the construction machinery, as combustion products of motor oil and the production of dust, as an excavation product.

By applying the fixed measures provided for by existing legislation and good construction practice, the effects of exhaust emissions from vehicles and machinery and from the release of dust emissions due to earthworks and the deposition of various materials can be fully addressed. In addition to what has been mentioned in paragraph 10.1, these measures are as follows:

- All vehicles – and in particular heavy vehicles – involved in construction work should have the required emission control certificate (the so-called 'exhaust card'), which should be renewed before its expiry, so that emissions of gaseous pollutants are within the limits permitted.
- Provision should be made for the implementation of a maintenance programme for all construction machinery on a regular basis by qualified personnel.
- As provided for in the current legislation, all transport of loose materials (soil, gravel, sand, cleaning materials, etc.) requires cover of all cargo, so as not to endanger those who move behind or around the truck. This measure contributes significantly to limiting dust emissions.
- Truck engines should be switched off when they are in a stop (e.g. when they are loaded). This measure is part of good construction practice as it contributes to fuel savings and reduces emissions of gaseous pollutants.
- During dry periods of the year, construction routes should be wet. This measure, which restricts dust emissions, is required both for reasons of environmental protection and good construction practice, in order to ensure satisfactory visibility on and around construction routes.

Other important measures to limit dust emissions are the following:

- The movement of trucks and other heavy machinery to and from the construction site will be done through existing paved roads where possible.
- Disposals or disposals of materials in/from piles should be minimised. The deposit of materials in piles should be done from the minimum possible height (depending on the machine used).
- The planning of the project so that the excavation products are driven within the shortest possible time to the site and their systematic wetting during dry periods of the year if they are stored for a long period of time (e.g. more than one month).
- The planning of the project so that the stored quantities of aggregates for the needs of the project are limited to the most necessary and their systematic wetting during dry periods of the year if they are stored for a long period of time (e.g. more than one month). This measure makes a significant contribution to limiting dust emissions

10.11 MEASURES TO TREAT THE EFFECTS OF NOISE AND VIBRATION

During the construction of the project an increase in noise is expected in the area of execution of the work, which will be mainly due to the operation of the machinery.

In order to better deal with nuisances, it is proposed to use state-of-the-art equipment that meets the noise emission specifications, to comply with the specifications for the proper operation of the machinery, to regularly maintain the mechanical equipment, to comply with the permitted sound power levels based on the JOINT MINISTERIAL DECISION 37393/2028/2003, as amended by D.A. 9272/471 (Government Gazette 286/B/2-3-2007) and to take measures to protect workers from exposure to noises that may in any way harm their health. Provision of protective equipment (e.g. earplugs) to any worker who, due to the nature of his work, is often exposed to high noise levels.

In order to reduce noise nuisances, care should be taken to ensure that all relevant provisions of Greek legislation are complied with and noise levels do not exceed the permitted limits. In the alternative, in order to reduce as much as possible the impact on the acoustic environment during the construction phase of the project, it is proposed to take into account the following measures:

- Selection of site location and planning of work in order to cause the least possible harassment.
- Work that causes significant noise (excavations, etc.) to stop quiet hours.
- Installation where necessary of temporary sound curtains in the areas of immediate proximity to dwellings.
- Avoid simultaneous operation of construction machinery.
- Intermittent machines should be closed during intermediate periods, which are not in operation. Priority selection of equipment of low sound emission or similar conversion (e.g. with silencers) equipped with an EC type-certificate.
- Regular maintenance of all machinery - vehicles of the construction site.

During the operational phase of the project under study, the average value of the noise from the CORONA effect under the Lines and in wet weather can reach up to 50db, as much as about the operating noise of an electric refrigerator. Since the T.L. study is not in direct proximity to settlements, no effects from the CORONA phenomenon are expected.

10.12 MEASURES FOR MANAGING THE IMPACT ON ELECTROMAGNETIC FIELDS

In line with the conclusions of the EEAE Measurement Report prepared in 2018, it can be reported that low and high action (AL) values for magnetic induction and electric field intensity have not been exceeded, as defined by Presidential Decree 120/2016 (Government Gazette 203/A/26.10.2016) "Harmonisation with Directive 2013/35/EU "on minimum health and safety requirements with regard to the exposure of workers to risks arising from natural factors (electromagnetic fields) and repealing Directive 2004/40/EC' which harmonised national law with Directive 2013/35/EU of the European Parliament and of the Council of 26 June 2013. Therefore, no measures are proposed to deal with any effects related to electromagnetic fields.

10.13 MEASURES TO DEAL WITH THE IMPACT ON WATER

During the construction and operation phase of the project under consideration, including the requested modifications, no impact is expected on the quantity and quality of surface and groundwater and therefore no specific response measures are proposed in addition to those mentioned, including the general guidelines for good practice in the construction work of the proposed projects referred to in section 10.1.

10.14 TREATMENT OF THE IMPACT ON THE RISK OF SERIOUS ACCIDENTS OR DISASTERS RELATED TO THE PROJECT

The project under study **is not subject to the provisions of 172058/2016** (Government Gazette 354/B/2016) on "Determination of measures and conditions to address risks from large-scale accidents in installations or units, in view of the existence of dangerous substances, in compliance with the provisions of Directive 2003/105/EC "amending Council Directive 96/82/EC on the treatment of the risks of major accidents related to dangerous substances" of the European Parliament and of the Council of 16 December 2003".

It is considered that the project under study cannot result in large-scale accidents and there are no significant risks to human health, cultural heritage and the environment from its operation and therefore no corresponding response measures are proposed.

THESSALONIKI, OCTOBER 2020

PROJECT OPERATOR	ENVIRONMENTAL STUDY ENGINEER

11 ENVIRONMENTAL MANAGEMENT & MONITORING

11.1 ENVIRONMENTAL MANAGEMENT

The successful implementation of the Environmental Management System consists mainly in meeting the relevant environmental legal requirements. The proposed Environmental Management System (EA) concerning the project under study and having the following main objectives is presented below:

- Control of the impact of construction and operation, in accordance with the provisions of this Environmental Impact Assessment.
- Reliable and with sufficient frequency monitoring of the sizes characterising the environmental impact of the project under study.
- Faithful observance of the project construction schedule.
- Implementation of the environmental conditions of the Environmental Terms Approval Decision of the project and all preventive and remedial measures proposed in this study.
- Continuous improvement in environmental performance.
- Implementation and observance of the monitoring program proposed in this study.
- Effective protection of the environment.

11.2 ENVIRONMENTAL MONITORING

In the context of the implementation of the environmental monitoring programme and in accordance with the applicable E.T.A. and in particular in accordance with paragraph A.d. the following are proposed:

- Measurements of the level of the electric and magnetic field should be carried out during the operation of the project at at least two points on the transmission line. The points to be selected should be located in or near residential tissues. Measurements will be made under the responsibility of the project operator every six months. Measuring instruments must be accompanied by calibration certificates. Measurements shall be carried out in accordance with ELOT IEC 61786:2003 or as applicable.

The amendments proposed in this study do not require an amendment to the environmental monitoring programme.

12 ENVIRONMENTAL MANAGEMENT & MONITORING

This chapter sets out proposals to amend the terms and limitations of No. 124363/16.04.2010 E.T.A., as amended and renewed by No. 32394/2177/13.11.2019 E.T.A.

At the end of paragraph 'A.a.) Type and size of activity', the following proposed projects are added:

- abolition of part of the 400kV Electricity Transmission Line, for a length of 3.833m in connection with the existing High Voltage T.L 400kV HVC Acheloos – HVC Distomos, with the removal of twelve (12) High Voltage pylons.
- construction of part of the 400kV Electricity Transmission Line, for a length of about 5.198m for its direct connection to the Distomos HVC , with the construction of seventeen (17) new High Voltage pylons.
- execution of work – addition of equipment, within the HVC of Agios Nikolaos and HVC Distomos.
- opening of a forest road, with a total length of about 4.174m, to serve the construction and operation needs of the new section of the electricity transmission line and
- reunification of the Acheloos HVC - Distomos HVC circuit.

The new electricity transmission line, under the requested amendment, will have a total length of about 11.825m and will consist of thirty-seven (37) pillars.

In paragraph **B. and in the General Data**, the following shall be added:

- the removal of twelve (12) existing high-voltage pillars and the construction of seventeen (17) new ones; for the displacement of the 400kV electricity transmission line, its connection to the existing High Voltage T.L 400kV HVC Acheloos – HVC Distomo and the construction of a new T.L about 5.198m long by connecting it directly to the Distomo HVC . The total required intervention area is estimated at 6.800m^2.
- In the opening of eight sections of forest road construction with a total length of 4.174m, to serve the construction needs of the new section of the electricity transmission line, with a total required intervention area of 32.769m^2.
- For the considered displacement of part of the 400kV electricity transmission line, an additional slavery zone 50m wide (25m either side of the track and a total area of 259.922m^2) will be required.

13 ADDITIONAL INFORMATION

13.1 SPECIALIZED STUDIES

The fact that the installation location of the project is outside the NATURA 2000 area did not require the preparation of a Special Ecological Assessment.

The final forest road study will be submitted to the competent forestry authority for approval, following the Environmental Terms Approval of the project. However, in order to provide the best possible description of the activity, the detailed description of the accompanying road works (paragraph 6.2.1) and their indicative drawings.

13.2 PROBLEMS DURING THE CONDUCTION OF THE STUDY AND WAYS RESOLVED

No specific problems or difficulties occurred in the preparation of this assessment. The existing specifications of Greek legislation and the European Union have been used for the drafting of this study. Data from various websites as well as the study team's experience from previous approaches to Environmental Impact Studies were also used.

In any case, an effort has been made for this study to meet both the formal requirements of the legislation and the essential requirements of the project and its impact on the environment.

14 PHOTOGRAPHIC DOCUMENTATION

Photo 1: General view of the HVC Distomos, in which the pillar P1N will be installed.

Photo 2: General view of the installation location of pillar P2N.

Photo 3: General view of the installation location of pillar P3N.

Photo 4: General view installation of pillar P10N.

Photo 5: General view installation of pillar P11N.

Photo 6: General view installation of pillar P12AN.

Photo 7: General view installation of pillar P12EN.

Photo 8: View of the pillar P12 to be dismantled from the installation site of pillar P12EN.

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