

## RESULTS FACTSHEET

### ENV01: EXPOSURE OF POPULATION TO TRAFFIC NOISE

#### DEFINITION- OBJECTIVE

Noise generated by means of transport constitutes the most common and directly perceptible impact of transportation on the environment. In the case of Egnatia Motorway, Road Traffic Noise (RTN) is one of the most important environmental issues that need to be systematically monitored and effectively addressed.

Noise levels at inhabited areas in close proximity to the Egnatia Motorway are checked, in order to detect the areas where an excess of statutory limits is observed and calculate the population exposed to noise, due to the operation of the motorway.

#### Introductory Note

To accurately monitor Road Traffic Noise, EGNATIA ODOS AE performs regular noise counts in inhabited areas at both sides of the motorway and, in addition, conducts a special study entitled as: “Noise Count and Mapping at Inhabited Areas in close proximity to the Egnatia Motorway”, on the basis of the requirements laid by Directive 2002/49/EU, which was incorporated into the Greek institutional framework by Joint Ministerial Decision 13586/724/2006 (Government Gazette 384B/28.3.2006) “Specification of measures, terms and methods for the assessment and management of noise in the environment, in compliance with the provisions of Directive 2002/49/EU relating to the assessment and management of environmental noise, of the European Parliament and of the Council of 25<sup>th</sup> June 2002”.

The indicator observes noise levels in areas in close proximity to the Egnatia Motorway, the values exceeding the allowed noise limits, the number of persons affected in a specific area or the number of residencies exposed to specific noise indicator values. When necessary, appropriate protection measures are taken to achieve compliance with the terms and restrictions that apply to the zone around the road axis.

Noise counts are regularly performed since 2007, and noise mapping results shall be available by the end of 2009.

## RESULTS- ESTIMATES

In 2008, an abundance of noise counts was performed by the company Environment Unit, Maintenance Department, Operations and Maintenance Division, at the inhabited areas located within a 200m-wide zone at both sides of the road, where the monitoring, recording and assessment of Road Traffic Noise is required with respect to the Environmental Terms regarding the operation of the motorway.

The tables below present all the noise counts, and the bar charts present the indicators' results in all areas compared with the statutory limits.

It is obvious that the operation of the biggest part of the motorway led to the bypass of many settlements; consequently, the situation is now much more favourable as far the population exposed to noise is concerned.

The results of noise counts prove that for the greatest part of the settlements located at both sides of the Egnatia Motorway, noise levels are below the statutory limits L10 (70 dBA) and Leq (67 dBA). Consequently, the population exposed to a noise level exceeding the statutory limits is fairly restricted. The necessary special acoustic studies for the total of these special cases are under preparation, to enable the implementation of the appropriate necessary noise protection measures. Currently, a special acoustic study is being conducted for the traditional settlement of Vrasna, which will be followed by the installation of special noise barriers.

Finally, the counts carried out in close proximity to Egnatia Odos fencing have proved that the noise levels reach 78,0 dB(A) for indicator Leq and 80,2 dB(A) for indicator L10, a fact which, in comparison with the counts carried out at build-up areas proves that:

- The closer we get to the source the more disturbances are increased.
- The tendency to extend the limits of settlements towards the motorway should be seriously reexamined when conducting physical planning studies, in order to control and eliminate it.

**LOCATIONS & RESPECTIVE NOISE COUNT RESULTS AT BOTH SIDES OF THE EGNATIA MOTORWAY**

S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR $L_{eq}$ (dB A)	TRAFFIC NOISE INDICATOR $L_{10}$ (dB A)
1	Igoumenitsa	IC 01 - IC 01A	1	63,7	64,9
			2	61,3	61,8
			3	59,8	62,3
			4	62,1	62,5
			5	61,5	62,2
2	Graikochori	IC 01 - IC 01A	1	48,5	51,6
			2	53,2	55,8
3	Gkani	IC 01 - IC 01A	1	58,8	62,4
			2	51,5	54,2
			3	60,6	63,0
4	Ladochori	IC 01 - IC 01A	1	59,4	62,4
			2	57,3	59,0
			3	60,6	63,0
5	Myloi	IC 01 - IC 01A	1	49,2	52,1
6	Vasiliko	IC 01 - IC 01A	1	53,8	57,5
			2	48,0	50,8
			3	56,4	58,0
			4	53,3	54,5
7	Psakia	IC 01A - IC 02	1	49,9	48,8
			2	47,9	50,7
8	Gkrika	IC 01A - IC 02	1	57,5	58,9
			2	55,4	56,2
			3	57,2	58,1
			4	53,0	54,4
			5	59,0	61,7
9	Eleftherochori	IC 02A - IC 03	1	52,4	54,3
			2	48,8	49,9
10	Dramesioi	IC 03 - IC 04	1	56,9	57,9
			2	49,0	51,5
			3	56,0	57,2
11	Dodonoupoli	IC 03 - IC 04	1	50,0	44,1

S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR $L_{eq}$ (dB A)	TRAFFIC NOISE INDICATOR $L_{10}$ (dB A)
			2	45,4	48,7
			3	46,3	47,1
			4	49,3	46,3
12	Fteri	IC 04- IC 05	1	57,6	58,1
			2	43,2	46,0
			3	49,1	51,7
			4	55,0	57,9
13	Pedini	IC 04 - IC 05	1	51,4	53,8
			2	52,3	55,4
			3	50,3	49,8
			4	55,8	55,7
			5	55,4	57,9
14	Bafra	IC 05 - IC 05A	1	53,5	57,1
			2	52,1	54,2
			3	66,6	68,0
			4	57,0	59,1
			5	55,4	57,9
15	Iliokali	IC 05A - IC 06	1	59,9	59,9
			2	64,1	65,6
16	Koutseli	IC 05A - IC 06	1	64,4	63,0
			2	55,8	59,5
17	Myrsina	IC 09 - IC 09A	1	66,6	70,3
			2	57,8	62,2
			3	47,6	50,2
			4	59,3	62,5
18	Taxiarchis	IC 09 - IC 09A	1	50,1	51,1
19	Kalamia	IC 11 - IC 12	1	54,8	56,4
			2	56,1	58,6
			3	58,0	57,2
20	Koila / Kardia	IC 11 - IC 12	1	48,8	49,7
			2	51,0	48,8
			3	54,8	55,6
21	Ag. Charalambos	IC 12 - IC 13	1	55,6	58,1
			2	56,4	58,9

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22	Ag. Theodoroi	IC 12 - IC 13	1	56,0	57,1
			2	56,7	59,7
23	Polymylos	IC 13 - IC 14	1	55,1	55,3
			2	58,5	62,7
			3	57,6	61,3
			4	53,2	55,7
24	Lefkopetra	IC 13 - IC 14	1	58,5	62,3
			2	57,3	60,9
			3	61,1	64,3
			4	65,5	34,0
25	Asomata	IC 13 - IC 14	1	57,0	59,3
			2	62,7	66,0
			3	64,3	68,1
			4	50,7	53,4
			5	63,4	66,0
26	Mesi	IC 14 - IC 15	1	56,1	56,2
			2	57,3	53,6
			3	50,6	53,3
			4	55,2	57,2
27	Kouloura	IC 15 - IC 16	1	59,6	62,3
			2	61,0	62,5
			3	65,5	66,1
			4	62,0	62,1
			5	36,6	61,7
28	Rapsomaniki	IC 15 - IC 16	1	58,0	58,1
			2	53,4	54,3
			3	52,9	55,6
			4	56,4	57,3
29	Kefalochori	IC 15 - IC 16	1	47,9	48,6
			2	62,0	60,6
			3	47,0	48,8
			4	49,7	50,6
			5	43,0	44,5
			6	57,6	56,9
30	Niselli	IC 15 - IC 16	1	53,1	54,6

S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR L <sub>eq</sub> (dB A)	TRAFFIC NOISE INDICATOR L <sub>10</sub> (dB A)
			2	52,1	53,6
			3	55,5	56,2
31	Niselloudi	IC 16 - IC 17	1	44,6	46,9
			2	58,4	56,8
			3	60,5	58,3
32	Prasinada	IC 16 - IC 17	1	54,4	49,3
			2	55,5	58,7
			3	55,8	58,5
			4	63,7	66,5
			5	61,7	63,7
33	Platanos	IC 16 - IC 17	1	52,3	49,5
			2	61,5	52,4
34	Kleidi	IC 16 - IC 17	1	54,5	56,7
			2	56,0	58,7
			3	60,6	62,3
			4	64,5	65,2
35	Magnisia	IC 21 - IC 22	1	70,8	72,7
			2	70,0	72,2
			3	73,3	75,6
36	Efkarpia	IC K4 - IC K5	1	63,6	65,2
			2	66,7	68,8
37	Girokomeio	IC 23 - IC 23A	1	77,1	79,2
			2	66,9	68,7
			3	68,8	70,3
38	Derveni A Archaeological Site	IC 23A - IC 24	1	72,0	74,2
39	Akrochori	IC 24 - IC 25	1	57,6	58,6
40	Underpass to Liti	IC 24 - IC 25	1	64,5	67,7
			2	66,4	69,1
			3	69,8	72,4
			4	68,1	69,6
41	Evangelismos	IC 24 - IC 25	1	52,0	54,9
			2	56,3	59,0
			3	58,0	61,3
			4	54,6	57,3
			5	53,3	54,8

S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR $L_{eq}$ (dB A)	TRAFFIC NOISE INDICATOR $L_{10}$ (dB A)
			6	57,7	61,6
42	Profitis	IC 25 - IC 25A	1	61,8	64,4
			2	61,9	64,3
			3	49,8	52,0
			4	56,2	53,4
			5	66,6	70,2
			6	56,0	57,2
			7	62,4	65,0
43	Nymfopetra	IC 25 - IC 25A	1	51,8	53,7
			2	52,5	54,1
			3	46,4	48,4
			4	48,2	49,6
			5	49,0	50,9
			6	52,4	52,9
44	Megali Volvi	IC 25A - IC 26	1	53,1	55,0
45	Mikri Volvi	IC 25A - IC 26	1	49,6	52,0
			2	51,2	53,0
46	Asprovalta	IC 27 - IC 28	1	62,4	66,0
			2	67,5	71,1
			3	51,7	54,5
			4	50,4	53,1
			5	61,2	63,7
			6	52,1	54,9
			7	62,1	64,2
			8	69,2	66,0
47	N. Kerdylia	IC 27 - IC 28	1	46,1	49,5
			2	56,8	54,3
			3	46,6	48,5
			4	45,0	46,4
48	Kavala	IC 29 - IC 31	1	47,4	50,9
			2	41,8	43,9
			3	45,8	46,9
			4	49,0	52,0
			5	66,2	69,1
	Palio Junction	IC 29 - IC 31	1	60,1	63,3

S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR L <sub>eq</sub> (dB A)	TRAFFIC NOISE INDICATOR L <sub>10</sub> (dB A)
49			2	48,8	51,0
			3	62,9	65,1
			4	52,1	56,0
50	Nea Karvali	IC 32 - IC 32A	1	48,2	50,2
			2	47,6	50,3
			3	51,7	53,1
51	Nea Komi	IC 32 - IC 32A	1	52,4	55,7
			2	46,3	47,8
52	Ano Pontolivado	IC 32 - IC 32A	1	52,9	54,6
			2	57,3	58,9
			3	60,9	64,8
			4	64,0	66,3
53	Petropigi	IC 32 - IC 32A	1	59,7	53,5
			2	52,9	53,3
			3	45,5	47,3
			4	62,8	64,4
54	Perni	IC 32A - IC 33	1	67,0	69,3
			2	66,6	69,6
			3	57,0	60,4
			4	65,3	65,3
55	Gravouna	IC 32A - IC 33	1	59,1	58,9
			2	55,1	56,3
			3	55,2	54,0
			4	57,4	58,6
56	Xerias	IC 33 - IC 34	1	55,5	58,7
			2	51,4	54,0
57	Amaksades	IC 35 - IC 36	1	59,8	61,0
			2	56,8	59,5
			3	58,9	58,8
			4	55,2	57,7
			5	57,1	57,4
58	Koptero	IC 35 - IC 36	1	51,0	52,7
			2	66,6	66,9
			3	54,4	56,9
			4	62,5	63,2



S/N	NOISE COUNT AREA	EGNATIA MOTORWAY SECTION	NOISE COUNT LOCATION	TRAFFIC NOISE INDICATOR $L_{eq}$ (dB A)	TRAFFIC NOISE INDICATOR $L_{10}$ (dB A)
59	Galini	IC 36 - IC 37	1	51,5	54,3
			2	52,1	53,5
			3	55,4	52,9
			4	55,1	56,8
60	Kosmio	IC 37 - IC 38	1	55,5	58,4
			2	56,9	55,9
			3	54,2	51,2
			4	55,3	58,5
			5	55,9	57,6
61	Fylakas	IC 38 - IC 39	1	49,8	52,2
			2	52,6	55,7
			3	51,4	53,0
			4	54,2	56,9
62	Mesti	IC 39 - IC 40	1	56,1	50,5
			2	51,8	54,7
63	Makri	IC 39 - IC 40	1	49,5	49,5
			2	51,9	52,4
			3	51,5	52,0
64	Nipsa	IC 42 - IC 43	1	53,0	56,6
			2	51,0	53,0
			3	50,5	53,3
			4	54,0	57,2
			5	56,8	59,7

## METADATA

### Sources

The noise counts and result analysis were carried out within the year 2008 by the Environment Unit of the Maintenance Department of Operations & Maintenance Division of EOAE, within the framework of the Programme for the monitoring and assessment of the Road Traffic Noise.

### Law

According to the Greek law concerning noise, Ministerial Decision 17252/2002 (Government Gazette 395B/19.6.1992) for the “determination of indicators and maximum noise limits resulting from traffic caused by road and transport works”, determines the most characteristic traffic noise quality and quantity indicators, the maximum limit values of the aforementioned, as well as the geographical limits on both sides of the road and transport works, for which the aforementioned should apply.

The Ministerial Decision concerns all new motorways and amended alignments of the existing sections, as well as expressways and roadside installations, only for those sections located within a distance less or equal to 200 m from the closest limit of the approved town plan.

On the basis of Ministerial Decision 17252/2002, the following indicators are considered as traffic noise indicators:

(a)  $L_{eq}$  indicator (Equivalent Continuous Sound Level) expressing an unchanged continuous sound level that during a specific time period has the same energy content with the actual noise, unchanged or altering, during the same time period. For the purposes of this particular MD, a French 12-hour indicator has been set, from 08.00 to 20.00. Consequently, the indicator is set to be  $L_{eq} (8 - 20)$ .

(b)  $L_{10}$  indicator (18h) of the British 18-hour indicator, which is the average value of 18 different  $L_{10}$  values per hour (from 06.00 to 24.00), meaning the level which is surpassed by 10% of the respective count time period.

The following are specified as maximum traffic noise limits allowed:

- ◆ For indicator  $L_{eq} (8 - 20)$ , 67 dB(A).
- ◆ For indicator  $L_{10} (18 h)$ , 70 dB(A).

At the same time, a Joint Ministerial Decision 13586/724 (Government Gazette B'384 28.3.2006) is in force concerning the “Specification of measures, terms and methods for the assessment and management of noise in the environment”, which incorporates the provisions of directive 2002/49/EU into the Greek Law. These determine the necessary measures, terms

and procedures and at the same time rate certain actions and priorities, in order to avoid, prevent or limit the adverse impacts caused by exposure to environmental noise.

The traffic noise indicators monitored on the basis of Directive 2002/49 are:

- ◆ Lday (day noise indicator): the noise indicator characterizing the disturbance during the day hours from 07.00 - 19.00
- ◆ Levening (evening noise indicator): the noise indicator characterizing the disturbance during the evening hours, from 19.00 - 23.00
- ◆ Lnight (night noise indicator): the noise indicator characterizing the disturbance of sleep from 23.00-07.00
- ◆ Lden (day-evening-night indicator): the noise indicator characterizing the total disturbance

### Methodology

Within the framework of the programme for the Road Traffic Noise monitoring of the Egnatia Motorway during 2008, noise counts were performed in 55 settlements, at 233 locations at both sides of the Egnatia Motorway, to give an objective picture of the quality of the audio environment. During the course of the counts, sheets were being completed (according to the Operating Procedure of the Egnatia Motorway AE, OP-EOAE-OM-750), which, inter alia, include information about the count positions (coordinates of the count point), the count's date and duration, the noise meter type (calibration, manufacturer's certification etc), meteorological information, such as the wind speed, temperature and humidity, the soil characteristics and type of vegetation, the main noise source and other general comments.

The noise meter has been placed at a position so as not to be affected by natural or artificial factors, such as trees, sheds and others that would affect the count. The noise meter had to be calibrated prior to and after the count with the use of a special acoustic calibrator, meeting the requirements of I.E.C 942, Class 1.

The following noise counts have been carried out:

- ◆ 24hour counts with the use of a special moving station of environmental acoustic counts, appropriately adjusted, so as to meet the requirements of the European Directive concerning noise 2002-49-EU, applied measurement height of 4,0 meters- equipped with a statistic noise analyser and all weather SOLO type microphone arrangement (on a special pole), of 01 dB.
- ◆ 15 and 30 minute, as well as hourly counts with the use of CIRRUS (CR) sound meter 811B type 1 and applied measurement height of 2,5 - 3 meters.

The noise counts have been carried out at each location at 2 meters distance from the façade of the closest building to the road, as well as at positions in close proximity to the Egnatia Motorway fencing, to determine the disturbance at the source and its limitation (reduction), depending on the distance increase.