



2- Noise Pollution

Introduction:

Noise is defined as unwanted sound. It is considered one of the most widespread environmental issues all over the world. For Egypt, the noise issue, as environmental pollution, ranks second among environmental pollution issues according to the complaint survey (received by EEAA) for 2006. It is considered a serious issue because of its harmful impacts on citizens and public health. The impact of noise may cause permanent hearing loss due to the exposure to noise levels exceeding 90 dB (where dB is the noise measurement unit). Noise adversely impacts development as a result of its direct and indirect effects on life activities (education, production, economic processes, and social aspects, etc). Exposure to high noise levels is among the key causes of human mistakes leading to increased accident rate. Egypt road acci-

dents survey shows that human error accounts for 73% of accidents. Disturbing environmental noise produced by car horns, loudspeakers, and the high sound of TV sets and cassette players, which the citizens are exposed to, affects man's psychological and nervous health leading to annoyance and restlessness. This is considered a violation to the human right to rest and quietness. In addition to the abovementioned impacts, noise disturbs pregnant women putting them in an unstable state, accordingly impacting the fetus health.

In the last years, it has been noticed that noise levels in Egyptian streets are disturbingly increasing. These levels have reached unacceptable limits locally and internationally. Measurements indicate that noise levels in major squares and streets may reach approx. 75–85 dB, violating permissible limits stipulated upon in Law 4/1994 on the Environment and its executive regulations

not to exceed 60 dB by day, 55 dB in the evening, and 50 dB by night. High noise levels in major cities and governorate capitals are due to population growth and associated activities as well as the lack of sound urban planning.

Thus, development of a national plan for combating noise was a mandatory, with the participation of all concerned ministries, according to Cabinet directives. The plan included identifying roles and responsibilities of each ministry in light of the MSEA's strategy to mobilize efforts to face one of the most hazardous pollutants and identifying scientific solutions to combat it.

Noise Sources in Egypt

Egypt has recently witnessed increasing development of new projects in all activities, particularly in major cities, without prior planning. This is one of the outcomes of increased population, requiring more commercial and industrial activities in the residential areas, in addition to high traffic density resulting from increased number of vehicles. All these factors combined together lead to increased noise level. Major noise sources in Egypt include:

1.Noise from Transportation Means and Traffic Roads

Noise produced by means of transportation and traffic roads is considered to be the prime cause of environmental noise in Egypt. This type of noise contributes around 60% to noise causes. All areas at the level of major cities are exposed to this type of pollution. Citizens, in their workplaces, homes, roads, etc. are exposed to such type of noise. Noise from transportation means and traffic roads include the following sources:

A. Vehicles Noise

Noise from vehicles is produced by:

- Vehicle engines
- Exhaust pipes
- Horns
- Sounds of cooling fans, gearboxes, and brakes
- Tire-road friction

B. Railway Noise

Train noise affects the inhabitants adjacent to the railway lines within a distance of approx 150 m.

C. Aircraft Noise

The increase in air traffic in airports impacts urban and housing areas which have marched around airports through high levels of noise, especially for areas near runways.

2. Noise from Power Stations

3. Noise from Industrial Facilities

There are some industries which are considered major sources of noise such as textile, metallurgical, and wooden industries, as well as some equipment such as compressors, boiler chambers, and power generators.

4. Noise from Commercial and Human Activities

Commercial activities under residential blocks are considered one of uncontrollable noise sources. Therefore markets and commercial activities should be transferred away from residential areas and new licenses should not be issued inside these areas.

5- Construction and Demolition Noise

Noise from construction and demolition is produced by equipment used for these purposes. This, however, is a temporary source of noise in certain areas which ends by the termination of construction works.

6- Noise from Central Cooling Systems and Air Conditions

This is due to the absence of Building Noise Code as well as acoustic abatement design for places of AC installation and central air conditioning systems.

Demonstration Monitoring of Environmental Noise Levels for 2006

1. Noise Levels in South Cairo

Completing the studies made during 2005 which clarified noise levels in South Cairo region, noise levels were monitored 24 hours in Nile Corniche road through a mobile noise monitoring station installed in the building of Environment and Water Police General Department. This was the trial stage of permanent noise monitoring process as an arrangement to start operating environmental noise monitoring network. Monitoring aims at the following:

- Assessment of noise levels resulting from traffic, to which the Egyptian citizen is exposed.
- Preparation of an exhaustive report about noise sources levels and the proposed solutions to improve the current status which will be submitted to decision makers.

These measurements are executed on three stages:

- Monitoring and analysis of noise data.
- Preparation of environmental noise maps of such area according to measurement results.
- Development of necessary recommendation.

a. Noise Measurements

As shown in next figs ((2-1),(2-2), (2-3)) and table (2-1).

Monitoring Results Analysis

1. Results show that L(A)eq levels exceed permissible limits stipulated in the Executive Regulations of the Law of Environment during the three periods of the day: 60 dB during day, 55 dB during evening, and 50 dB during night, throughout the monitoring period (October, November, and December). Noise levels were higher by approx. 16 dB during day, by approx. 20 dB during evening, and by approx. 25 dB during night.
2. Analysis of measured sound frequencies show that the frequency of the highest measured sound level ranges between approx. 400–4000 Hz during the three periods of the day throughout the monitoring period. Noise sources of this frequency range could be identified as a group of sounds produced from horn and car engine sounds.
3. Analysis of monitoring results show that the main source of sound which increases noise rates in this region is increased traffic volume in addition to

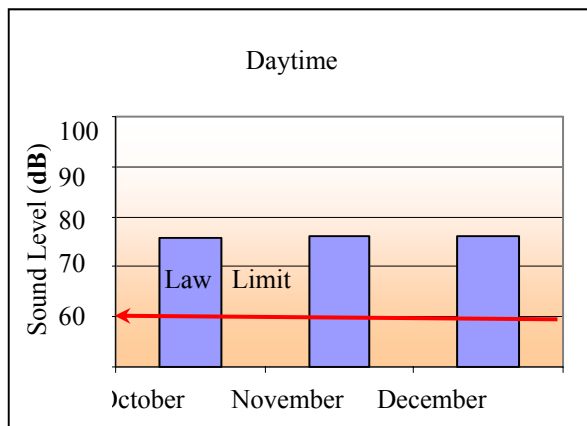


Figure (2.1) $L_{(A)}$ eq during day

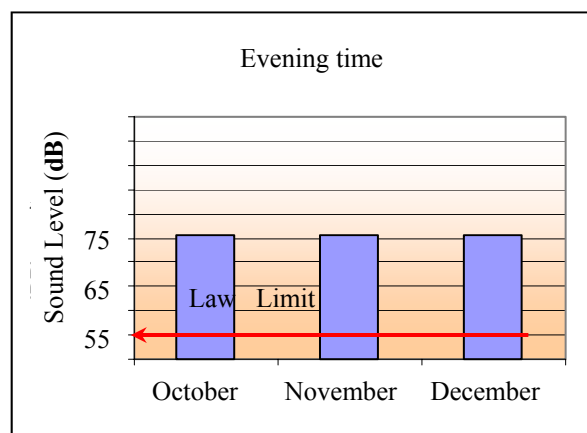


Figure (2.2) $L_{(A)}$ eq during evening

Table (2.1) $L_{(A)}$ eq during different periods of the day for three months at Nile Corniche road (Maadi–Helwan)

Month	Day $L_{(A)}$ eq		Evening $L_{(A)}$ eq		Night $L_{(A)}$ eq	
	Measurement	Permissible limit	Measurements	Permissible limit	Measurements	Permissible limit
October 2006	75.9	60	75.73	55	74.61	50
November 2006	76.27	60	75.77	55	74.63	50
December 2006	75.98	60	75.43	55	74.45	50

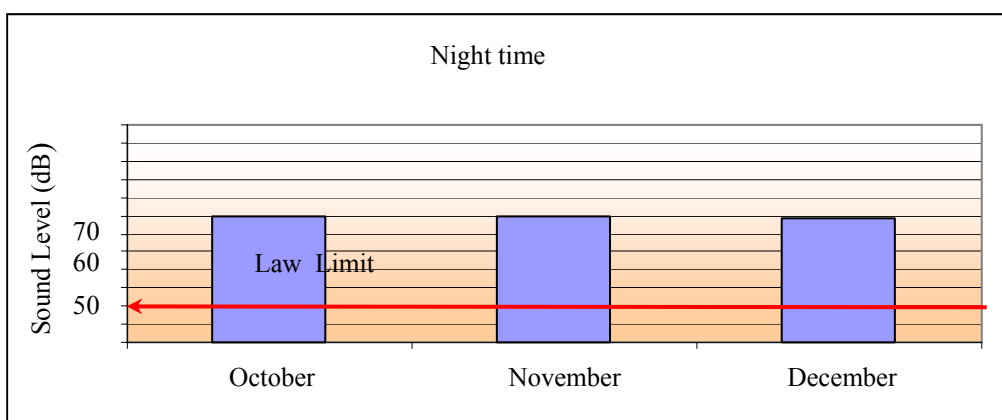


Figure (2-3) $L_{(A)}$ eq during night

the high sound of horns which are extensively used. This could be due to the absence of a pedestrian area, accordingly pedestrians pass randomly.

3. Noise levels exceeding permissible limits during night could be the result of increased heavy truck traffic and use of horns in vehicles and wedding processions at night time.
4. Comparing noise levels during days of the week, it was found that they are close although it was expected that noise levels would decrease during Fridays and Saturdays as the weekends.

This shows that traffic volume increases during weekends.

b. Environmental Noise Contour Maps in Nile Corniche (Maadi–Helwan) Road

These maps have been drawn using noise monitoring measurements and noise prediction program

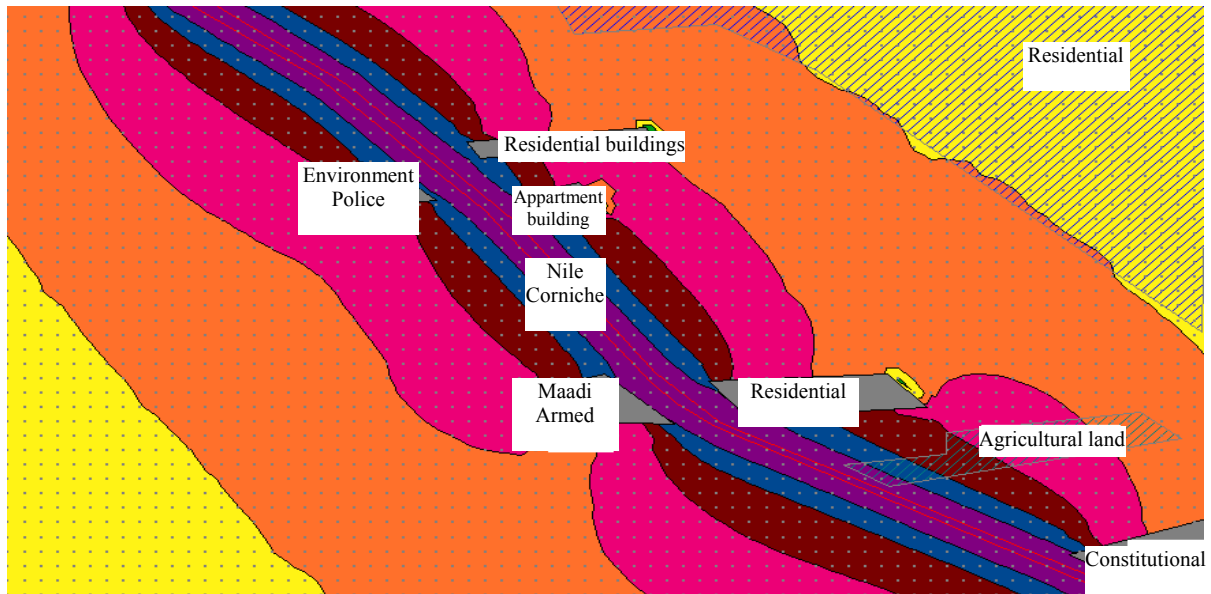


Figure (2.4) Environmental Noise Map in Nile Corniche (Maadi–Helwan) Road during Day

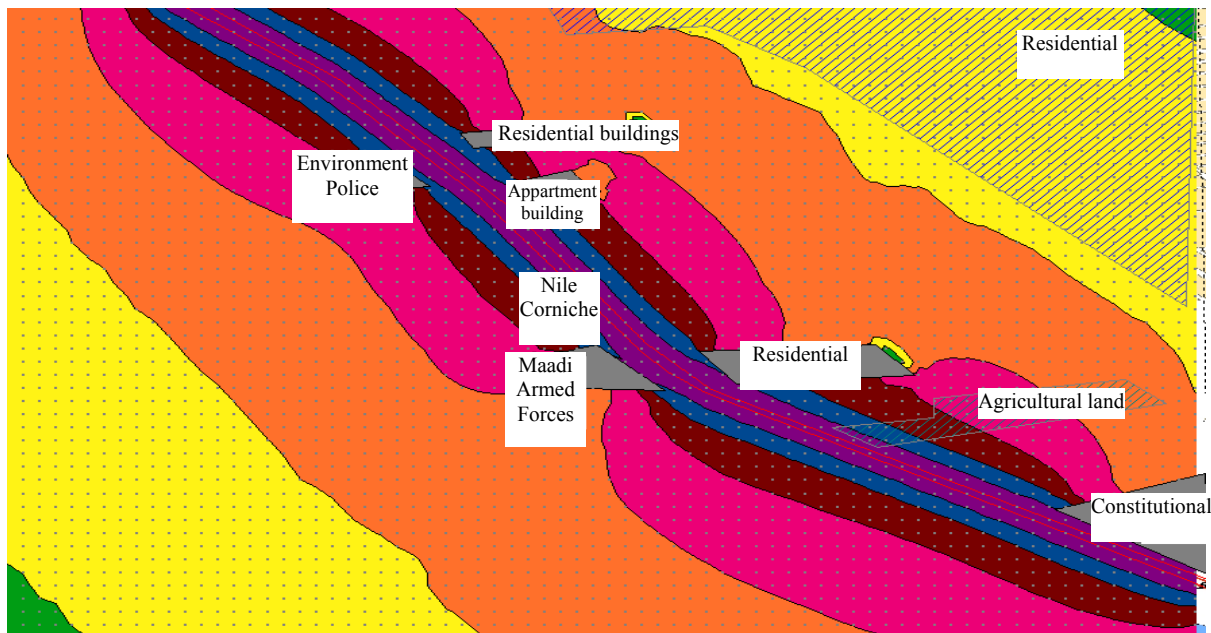


Figure (2.5) Environmental Noise Map in Nile Corniche (Maadi–Helwan) Road during Evening

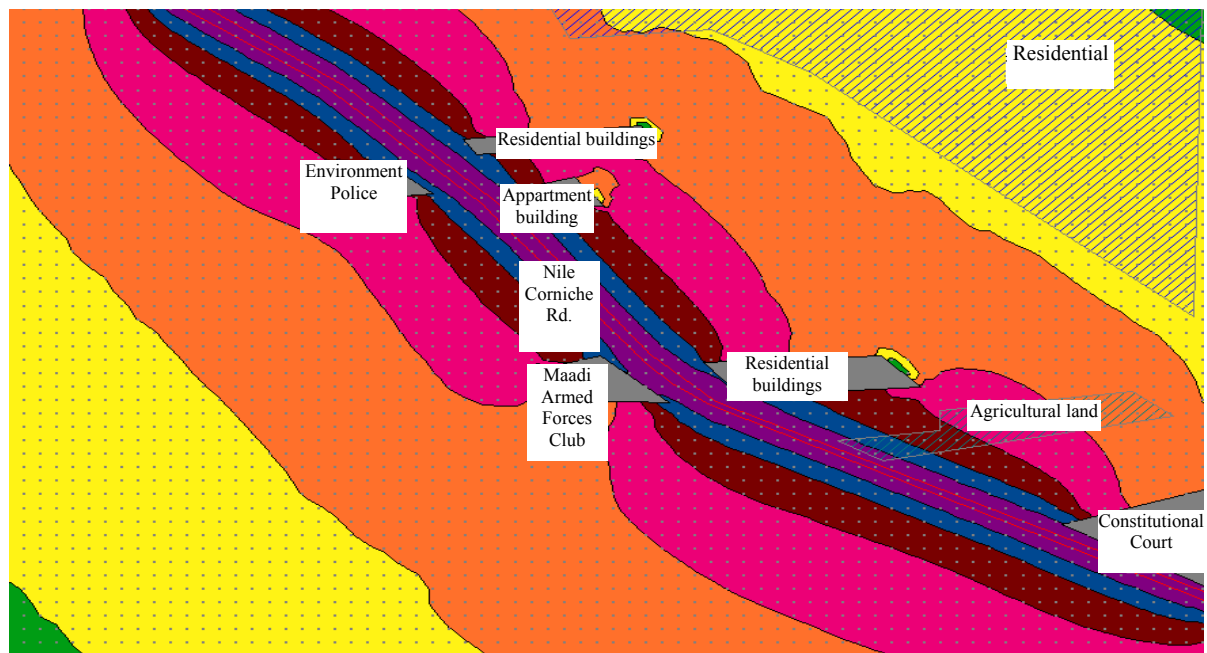


Figure (2.6) Environmental Noise Map in Nile Corniche (Maadi–Helwan) Road during Night

nr	From	To	fill style	fill color
1	45.0	55.0	█	Green
2	55.0	60.0	█	Yellow
3	60.0	65.0	█	Orange
4	65.0	70.0	█	Pink
5	70.0	75.0	█	Red
6	75.0	80.0	█	Blue
7	80.0	95.0	█	Purple

Contour Map Legend of Noise Levels around the Road

Colors indicate noise levels in dB

2- Noise Levels in Giza Square

Within the framework of re-planning and developing Giza Square, which suffers from high noise due to increased traffic volume and variety of overlapping activities, measurements have been carried out in the Square to determine the current noise levels, make use of results in proper planning of the square, and avoid increase

of noise levels after development ends. These measurements aim at the following:

- Evaluation of noise levels to which the Egyptian citizen is currently exposed and the extent of noise level compliance with limits stipulated in Law of Environment 4/1994.
- Making use of measures in reducing noise levels during the re-planning and development of the Square to meet limits stipulated in Law of Environment 4/1994 after development.

Noise monitoring measurements were carried out for two hours per day period as stated in the Executive Regulations of the Law of Environment. Results were compared with parameters provided in Table (2), Annex (7) of the Executive Regulations, Law of Environment 4/1994. Giza Square was considered a commercial, administrative area and as downtown.

Measurement Locations in Giza Square:

- 1) In front of Istiqama Mosque
- 2) In front of Omar Effendi (Giza)
- 3) In front of Misr Insurance Building
- 4) In front of Bank Du Caire

a. Measurements Results and Noise Data Analysis



Figure (2.7) comparison between $L_{(A)eq}$ results at measurement locations during evening

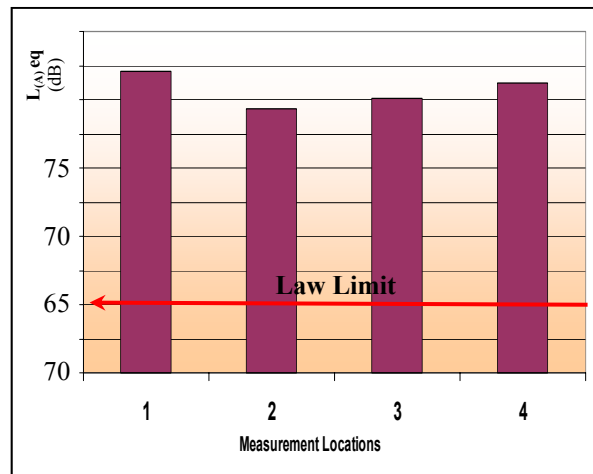


Figure (2.8) comparison between $L_{(A)eq}$ results at measurement locations during day

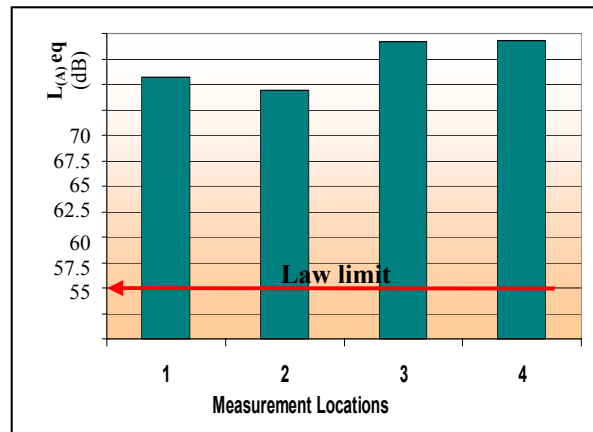


Fig. (2.9) Comparison between $L_{(A)eq}$ at measurement locations during night

Table (2.2) $L_{(A)eq}$ during Day Periods at Measurement Locations in Giza Square

Period	permissible limits of $L_{(A)eq}$ (dB)	Noise Level at Location 1 $L_{(A)eq}$ (dB)	Noise Level at Location 2 $L_{(A)eq}$ (dB)	Noise Level at Location 3 $L_{(A)eq}$ (dB)	Noise Level at Location 4 $L_{(A)eq}$ (dB)
Day	65	82.1	79.37	80.14	81.19
Evening	60	76.97	77.95	79.9	79.64
Night	55	75.73	74.4	79.2	79.29

Analysis of monitoring results:

- 1) Results showed a rise in $L_{(A)eq}$ than permissible limits set by the executive regulation of environmental law, during day periods for all monitoring locations. Noise levels increased during day time by a range of 15 to 17 dB, during evening by a range of 16 to 20 dB, and at night to more than 20 dB.
- 2) Relevance in results of noise level measurements at several locations around Al Giza square, El Gamaa and Morad streets, and El Ahram Street. They all ranged from 75 to 79 dB, this rise in noise levels at all locations is due to increase in the volume of traffic congestion, scattered microbus parking areas all around the square, and presence of street vendors causing obstruction of traffic flow and excess use of horns.
- 3) Although noise level measurements have been performed for location 4 (in front of Cairo Bank) on Friday (official vacation) where noise levels were expected to decrease, it was noticed that they have increased to be the same as all the week rates. This is due to excess traffic volume at the square as well as crowdedness of citizens especially during day time after El Gomaa prayer.
- 4) Measured sound frequencies analysis proves that the highest measured sound frequency ranges from 400 to 4000 Hz during day periods for all monitoring locations. Sources of noise for these frequencies can be identified as a group of sounds such as car horns, diesel-operated engine sounds (microbuses and buses), street vendors, and pedestrians sounds.

Note:

- $L_{(A)eq}$: The equivalent continuous A – weighted noise pressure level identified in the Environment Law 4/1994.
- Decibel is the unit of measuring sound level (**dB**)
- Hertz is the unit of measuring frequency (**Hz**)

b- Environmental noise Contour maps in Al Giza Square

These maps were drawn upon monitoring results and using noise prediction program

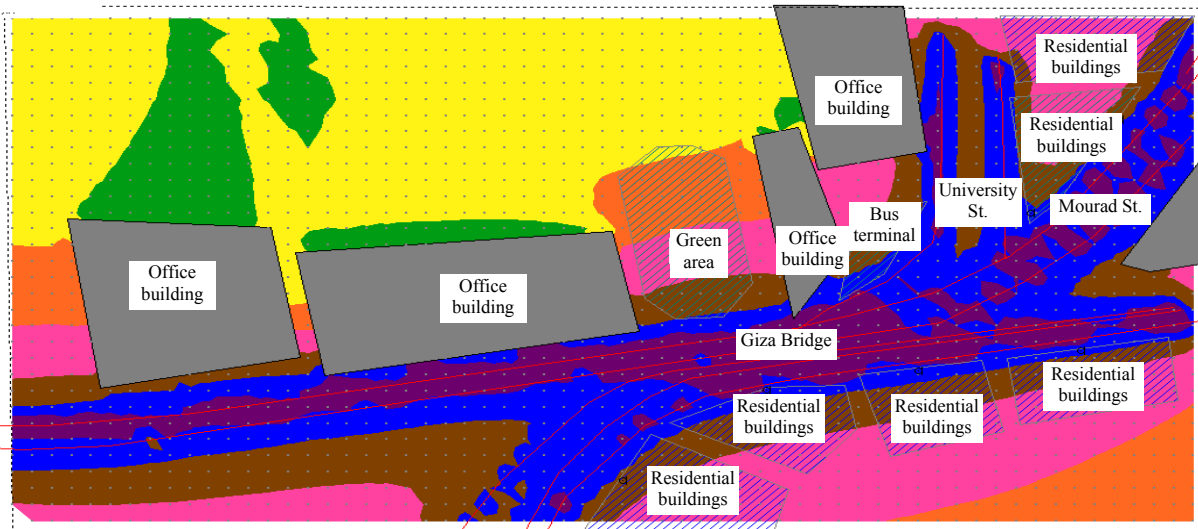


Fig (2-10) shows the environmental noise map for Al Giza Sq area at day time

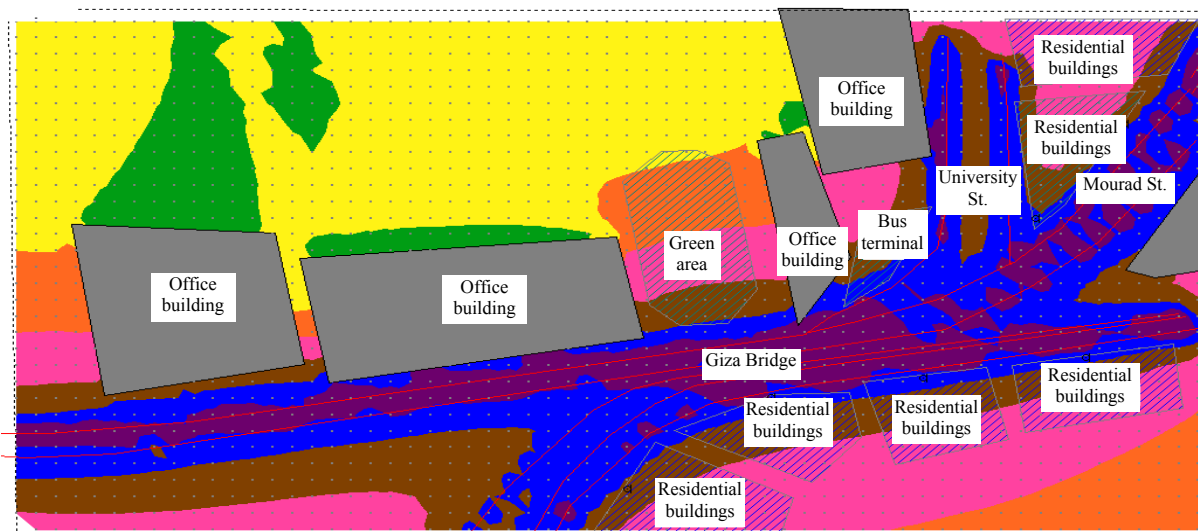


Fig (2-11) shows the environmental noise map for Al Giza Sq area in the evening

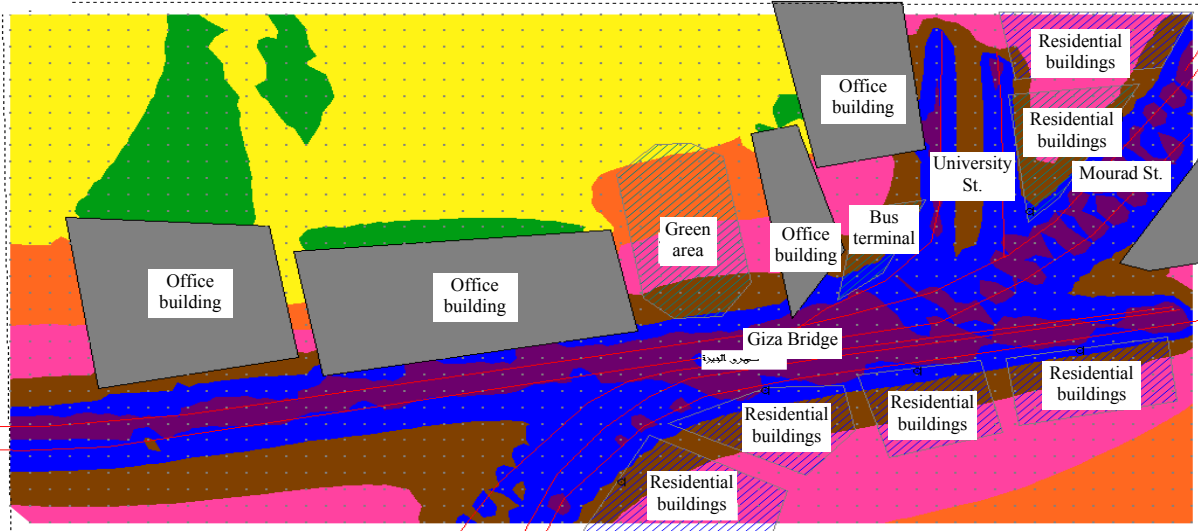


Fig (2-12) shows the environmental noise map for Al Giza Sq area at night

nr	From	To	fill style	fill color
1	30.0	50.0	Black	Green
2	50.0	60.0	Black	Yellow
3	60.0	65.0	Black	Orange
4	65.0	70.0	Black	Pink
5	70.0	75.0	Black	Brown
6	75.0	80.0	Black	Blue
7	80.0	90.0	Black	Purple

Contour map legend of Giza Sq;
Colors indicate the level of noise in dB

Noise levels of different activities all over the governorates of the republic during 2006

EEAA is activating the environmental law (EL) no. 4 of 1994 concerning article 44 of the executive regulation for permissible limits of noise levels through periodic inspection process over enterprises and investigation of citizens' complaints. A database was established for noise levels measured within industrial, commercial, and touristic enterprises all over the republic during inspecting these enterprises through the Environmental Inspection Department of EEAA and its RBOs. The database is published on the internet on the website of EEAA, and all the RBOs recorded their measurement results in the database.

The report denotes that the total enterprises inspected (concerning noise emission) at EEAA RBOs in different governorates during 2006 were 704. The ratios of violating enterprises were 32, 25% (recorded more than permissible limits of EL no. 4 of

1994). Necessary legal procedures have been taken towards these enterprises, while the ratio of non-violating enterprises was 66, 75%.

Table (2-3) No. of different facilities inspected concerning noise all over EEAA RBOs

(RBO)	No. of Violating Facilities	No. of non-Violating Facilities	Total
Cairo	57	66	123
Alexandria	18	149	167
Tanta	44	96	140
Al Masura	40	77	117
Al Suez	12	20	32
Asyut	52	60	112
Hurghada	11	2	13

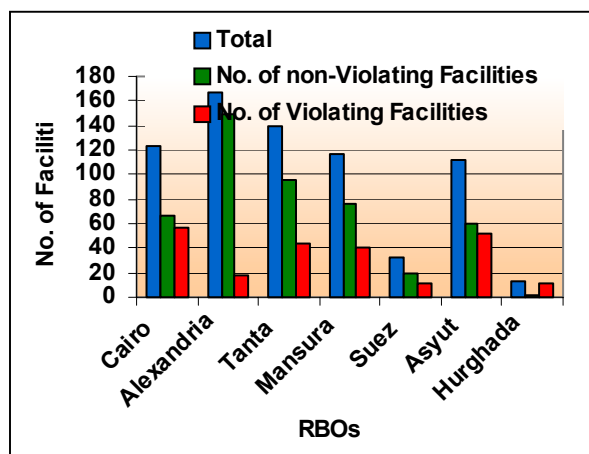


Fig (2-13) graph showing no. of different enterprises inspected during 2006 all over (RBOs) of EEAA

Efforts of the Ministry of State for Environmental Affairs (MSEA) to combat noise in 2006

In the framework of the National Plan (NP) to combat noise developed by EEAA in coordination with the concerned ministries, MSEA activated their role by preparing the necessary arrangements for establishing the National Noise Monitoring Network (NNMN) to monitor environmental noise levels. The Network will start operation on March 2007 with Cairo governorate as a first phase. NNMN consists of 20 Stationary monitoring stations and 2 Mobile trial monitoring stations. Locations where stations will be installed were chosen and identified; 5 stations location were identified to be installed permanently in five of the main squares (El Tahrir, El Ataba, Ramsis, Roxi, and El Opera), and 15 stations south of Cairo at locations of different activities according to international standards. They include various activities; (industrial, commercial, touristic, roads, railways, and residential). These stations will be transferred to north, east, and west of Cairo until noise monitoring is completed all over Cairo governorate, then they will be moved to Al Giza and Qalyubia during the second and third phases.