The Environment Matters

Annual Report 2007

Ministry for the Environment
Government of Gibraltar

Photo credits: Eric Shaw, Helping Hand Trust

Minister's Foreword

The Ministry for the Environment presents the annual report entitled "The Environment Matters" produced by the Ministry for the Environment and supported by data provided by the Environmental Agency.

We all face environmental issues, challenges and decisions on a daily basis arising from a wide variety of sources. Some may be policy driven subsequently leading onto local legislation, others through our membership of larger communities such as the European Union, and some as voluntary international obligations. Whatever the avenue, all efforts contribute to our collective vision for a sustainable future. Such a future incorporates a rich, diverse & healthy environment in our communities and indeed throughout the world.

The very often-unique characteristics of our local settings provide, in addition to extra challenges, opportunities to improvise and innovate in our approach to environmental management. We do this knowing our contribution, which starts at home will have some impact on a global level. Whilst we must acknowledge the limit to the level of impact we may be able to make as a small territory, we must always remain confident that whatever the contribution we make, it is a positive addition to the collective goal.

In order for this to happen, for us to meet our goal, a balance needs to be struck, a partnership developed, between the natural environment and development. Sustainable development therefore needs to focus on the long-term management of our living environment, striking the delicate balance between the natural and urban settings and their interdependencies. We all need to strive to ensure that economic development and better standards of living do not come at an unacceptable environmental cost.

I hope you will find the contents if this annual report informative and will allow you to see the extent of local environmental management.

Acknowledgements

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Introduction

Gibraltar has a population of approximately 29,000 residing in 6.4km^2. As population density increases, this will place increasing pressures on the environment through the provision of housing, water supplies, traffic management and waste disposal. These in turn will affect biodiversity, air quality and water resources and will need to be managed if development is to continue in a sustainable manner.

The promotion of sustainable development and sound environmental management continue to be the key principles underpinning the work of the Department of the Environment (DOE) and the Environmental Agency (EA). With increasing concerns over climate change and the overall state of the planet, the need to balance the health of our natural environment with our social and economic development has never been greater. This second annual Environment Report highlights how the Government of Gibraltar (GOG) has built upon the foundations set out in last year's report and gives indications for future developments in the field.

There are various aspects of the environment considered in this report, all of which are fundamental to the quality of life of Gibraltar's residents. Air quality, water quality, waste management and energy matters are just some of the chapters in this report, which seek to inform the public of the work currently being undertaken by the relevant departments in this respect as well as advising them of future developments.

The DOE and the EA will continue to work within the parameters of Government Policy to achieve our goals of:

- Cleaner and healthier air
- Improved and protected inland and coastal waters
- Restored, protected land with healthier soils
- A 'greener' and more sustainable business world
- The development of local renewable energy sources
- Reducing our greenhouse gas emissions and contributing to the global fight against climate change

"Let every individual and institution now think and act as a responsible trustee of Earth, seeking choices in ecology, economics and ethics that will provide a sustainable future, eliminate pollution, poverty and violence, awaken the wonder of life and foster peaceful progress in the human adventure."

— John McConnell, founder of International Earth Day

Chapter 1 Air Quality

1.1 INTRODUCTION

This chapter provides an overview of Gibraltar's air quality measurements for the calendar year of 2007. It includes data from the automatic and non-automatic monitoring networks.

The Gibraltar Air Monitoring Programme consists of two automatic monitoring stations measuring a variety of pollutants and a passive monitoring network measuring nitrogen dioxide and six species of Volatile Organic Compounds (VOC) by diffusive samplers. The equipment deployed on the existing network is set out in Table 1.1

Table 1.1 The Gibraltar Air Monitoring Programme

Location	Pollutants Measured	Equipment Types
Electricity Offices Rosia Road	Sulphur dioxide	API M100E (Ultraviolet fluorescence)
	Oxides of nitrogen	API M200E (Chemiluminescence)
	Carbon monoxide	API M300E (Infrared Absorption)
	PM_{10} Gravimetry	R&P Partisol 2025
	PM_{10} Metals / Indicative PAHs	R&P Partisol 2025
	$PM_{2.5}$ Gravimetry	R&P Partisol 2025
	Volatile Organic Compounds	Environment VOC71M Gas Chromatograph
	Wind speed & direction	Gill Windsonic
	Ambient temperature	Met One 592
Bleak House Near Europa Point	Oxides of nitrogen	API M200E (Chemiluminescence)
	Ozone	API M400E (Ultraviolet absorption)
	Metals and PAH in Deposition	Deposit Gauge
	Wind speed & direction	Gill Windsonic
	Ambient temperature	Met One 592
Passive Network Various locations	Nitrogen Dioxide	Diffusive Samplers - Palmes Tubes at 27 sites
	Volatile Organic Compounds	Diffusive Samplers – SorbentTubes at 15 sites

The instrumentation deployed was selected to ensure robust measurements at the necessary level of accuracy and time resolution to meet the data quality objectives within the European Air Quality Directives and national legislation.

The monitoring equipment itself forms only one aspect of the overall Gibraltar Air Monitoring Programme. Appropriate maintenance and support, coupled to a well designed and managed quality control regime, ensures that the raw monitoring data obtained are successfully processed, analysed and interpreted, in order to provide

information and ensure compliance requirements under the Air Quality Framework and Air Quality Daughter Directives.

Gibraltar air pollutant measurements are underpinned by a rigorous quality assurance and control programme, central to which are cross-checked calibration standards that are traceable to and compared with internationally recognised metrology standards.

The non-automatic network consists of a diffusion tube programme for Nitrogen Dioxide and Benzene, Toluene and Xylenes (BTX) as well as three partisol filter (Gravimetric) units which are used to monitor particulate matter (PM_{10} & $PM_{2.5}$), Lead, Arsenic, Cadmium, Nickel and Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene).

In addition to meeting the Gibraltar Governments monitoring obligations, the data itself is disseminated in near real-time on the **www.gibraltarairquality.gi** web site (Figure1.1). This web-based dissemination and reporting represents an important tool for delivery of air quality data and descriptive statistics to a broad range of end users.

This provides wide and unrestricted accessibility to air quality data. The archive has been designed to be user-friendly, interactive and responsive. Users may down-load unlimited portions of the database in spreadsheet format or graphs. The website has proved and continues to be popular; during 2007 it received 817,694 hits.

The primary objectives of the monitoring network are:

- To provide the public with rapid and reliable information on urban air quality.
- To monitor compliance with European Directives and local statutory instruments.
- To assist in developing new policies.

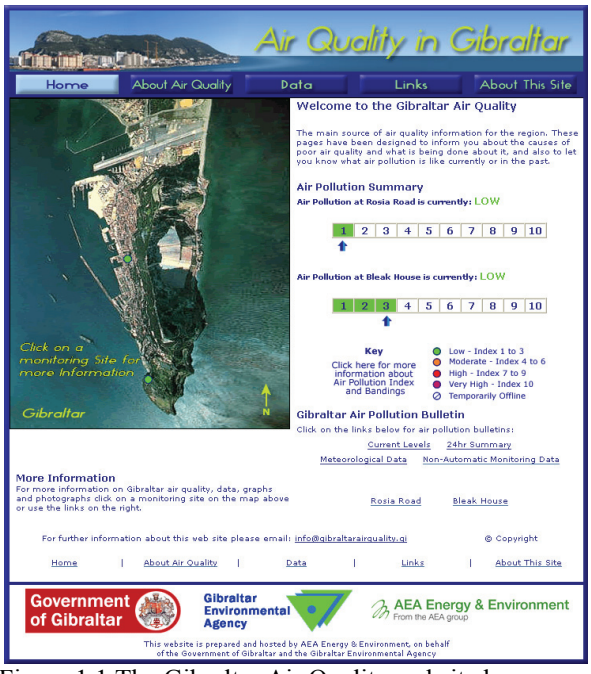


Figure 1.1 The Gibraltar Air Quality website homepage

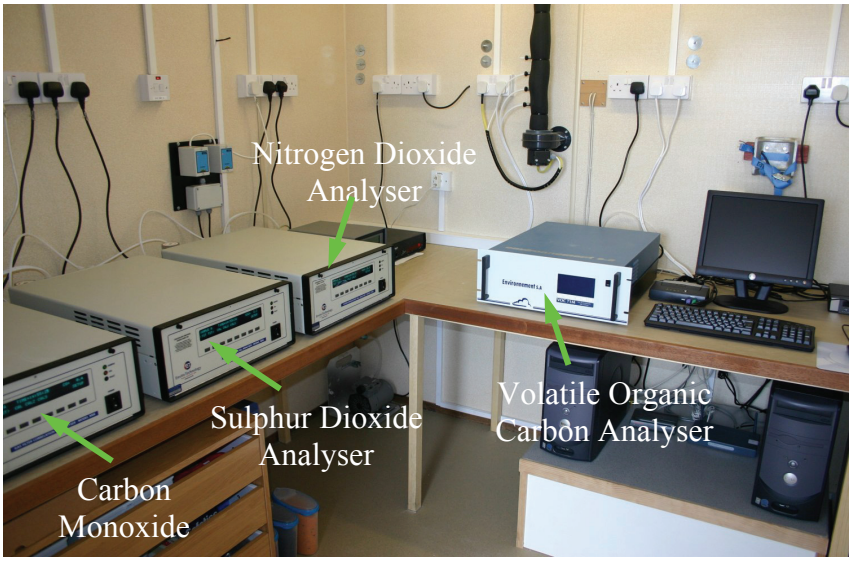


Figure 1.2 View inside the Rosia Road Station showing the analysers

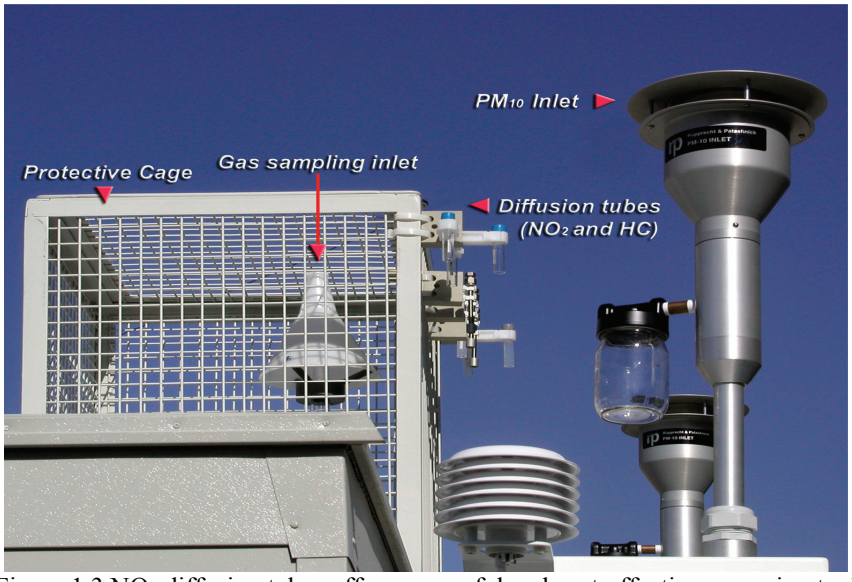


Figure 1.3 NO_2 diffusion tubes offer a powerful and cost-effective screening tool

1.2 GIBRALTAR AIR QUALITY STANDARDS

Standards and objectives are set for air pollutant concentrations in ambient air, over a given time period, that are considered to be acceptable in the light of what is known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The Gibraltar ambient air quality standards, in place for the purpose of Local Air Quality Management, are found in the Public Health (Air Quality Limit Values) Rules 2002 as amended by the Public Health (Air Quality Limit Values) (Amendment) Rules 2002 and the Public Health (Air Quality) (Ozone) Rules 2004. These Air Quality Rules have adopted into Gibraltar law the limit values required by EU Daughter Directives on Air Quality (European Council Directives 1996/62/EC, 1999/30/EC, 2000/69/EC and 2002/3/EC). Gibraltar is also complying with European Council Directive 2004/107/EC relating to Arsenic, Cadmium, Nickel and polycyclic aromatic hydrocarbons in ambient air which is in the process of being transposed.
A summary of the current Gibraltar Air Quality Objectives are provided in Table2.

TABLE 1.2 Summary of current Gibraltar Air Quality Objectives

Pollutant	Objective	Measured as	To be achieved by
Benzene	5 µg/m^3	Annual Mean	1 January 2010
Carbon monoxide	10.0 mg/m^3	Maximum daily running 8 Hour Mean	1 January 2005
Lead	0.5 µg/m^3	Annual Mean	1 January 2005
Nitrogen dioxide	200µg/m^3 Not to be exceeded more than 18 times per year	1 Hour Mean	1 January 2010
	40 µg/m^3	Annual Mean	1 January 2010
Nitrogen Oxides**	(V) 30 µg/m^3	Annual Mean	19 July 2001
Ozone	120 µg/m^3	Daily maximum running 8 hr mean not to be exceeded more than 25 times per calendar year averaged over 3 years	1 January 2010
Particles[a] (PM10) (gravimetric)	50µg/m^3 Not to be exceeded more than 35 times per year	24 Hour Mean	1 January 2005
	40 µg/m^3	Annual Mean	1 January 2005
Sulphur dioxide	350µg/m^3 Not to be exceeded more than 24 times per year	1 Hour Mean	1 January 2005
	125µg/m^3 Not to be exceeded more than 3 times per year	24 Hour Mean	1 January 2005
	(V) 20 µg/m^3	Annual Mean	19 July 2001
	(V) 20 µg/m^3	Winter Mean (01 October – 31 March)	19 July 2001
Arsenic	6 ng/m^3	Annual Mean	31 December 2012
Cadmium	5 ng/m^3	Annual Mean	31 December 2012
Nickel	20 ng/m^3	Annual Mean	31 December 2012
PAH (Benzo[a]pyrene*)**	1 ng/m^3	Annual Mean	31 December 2012

Notes:
a. Measured using the European gravimetric transfer sampler or equivalent.
µg/m^3 – micrograms per cubic metre
mg/m^3 – milligrams per cubic metre
ng/m^3 – nanograms per cubic metre
** Assuming Nox is taken as NO2
*** Benzo[a]pyrene is used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.
(V) These standards are adopted for the protection of vegetation and ecosystems. All of the remainder are for the protection of human health.

1.3 ANNUAL AUTOMATIC DATA SUMMARY REPORTS

ROSIA ROAD 01 January to 31 December 2007

TABLE 1.3 (These data have been fully ratified)

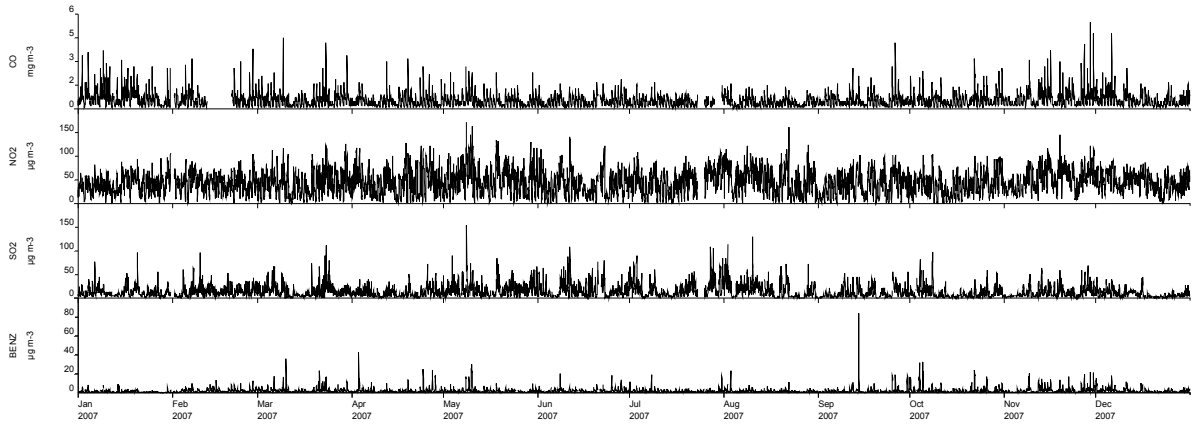
POLLUTANT	CO	NO_2	SO_2	BENZ
Number Very High	0	0	0	-
Number High	0	0	0	-
Number Moderate	0	0	0	-
Number Low	8329	8596	33765	-
Maximum 15-minute mean	7.2 mg m^{-3}	216 µg m^{-3}	197 µg m^{-3}	-
Maximum hourly mean	5.3 mg m^{-3}	172 µg m^{-3}	154 µg m^{-3}	86.58 µg m^{-3}
Maximum running 8-hour mean	2.2 mg m^{-3}	122 µg m^{-3}	75 µg m^{-3}	24.73 µg m^{-3}
Maximum running 24-hour mean	1.4 mg m^{-3}	99 µg m^{-3}	52 µg m^{-3}	11.93 µg m^{-3}
Maximum daily mean	1.3 mg m^{-3}	92 µg m^{-3}	41 µg m^{-3}	11.70 µg m^{-3}
Average	0.5 mg m^{-3}	44 µg m^{-3}	13 µg m^{-3}	2.280 µg m^{-3}
Data capture	95.2 %	98.1 %	98.0 %	98.2 %

All mass units are at 20'C and 1013mb

TABLE 1.4

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Carbon Monoxide	Running 8-hour mean > 10.0 mg m^{-3}	0	0
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0
Sulphur Dioxide	15-minute mean > 266 µg m^{-3}	0	0
Sulphur Dioxide	Hourly mean > 350 µg m^{-3}	0	0
Sulphur Dioxide	Daily mean > 125 µg m^{-3}	0	0
Benzene	Annual mean > 5 µg m^{-3}	0	-

GRAPH 1.1 (Hourly Mean Data for 01 January to 31 December 2007)



BLEAK HOUSE 01 January to 31 December 2007

TABLE 1.5 (These data have been fully ratified)

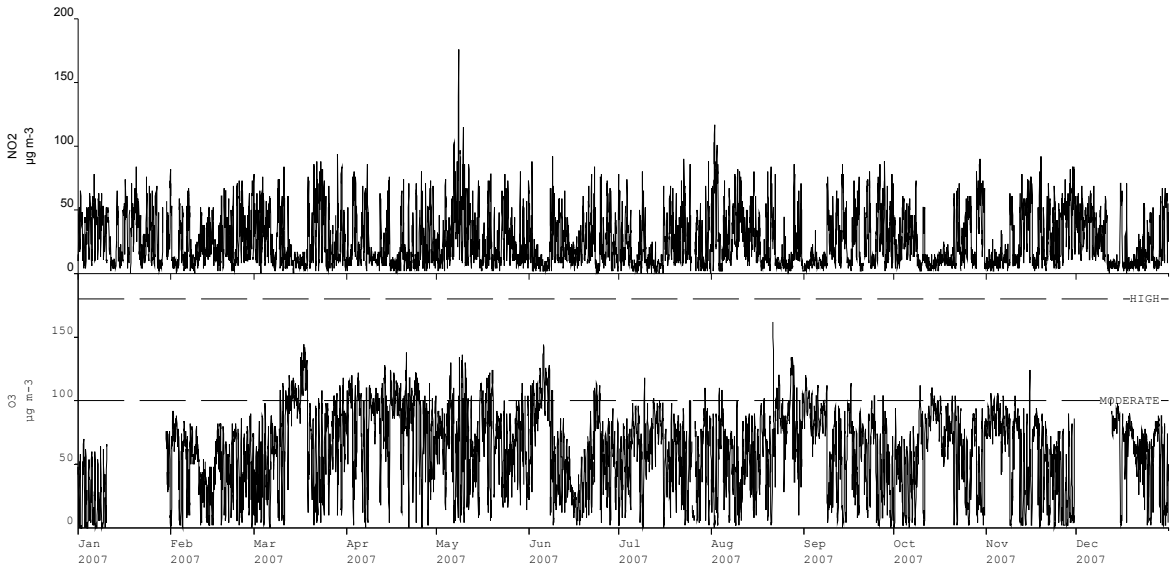
POLLUTANT	NO_2	O_3
Number Very High	0	0
Number High	0	0
Number Moderate	0	1000
Number Low	8626	6955
Maximum 15-minute mean	285 µg m^{-3}	160 µg m^{-3}
Maximum hourly mean	176 µg m^{-3}	144 µg m^{-3}
Maximum running 8-hour mean	97 µg m^{-3}	140 µg m^{-3}
Maximum running 24-hour mean	70 µg m^{-3}	130 µg m^{-3}
Maximum daily mean	65 µg m^{-3}	128 µg m^{-3}
Average	25 µg m^{-3}	62 µg m^{-3}
Data capture	98.5 %	90.4 %

All mass units are at 20'C and 1013mb

TABLE 1.6

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m^{-3}	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0
Ozone	Running 8-hour mean > 120 µg m^{-3}	70	12

GRAPH 1.2 (Hourly Mean Data for 01 January to 31 December 2007)



1.4 AN OVERVIEW OF GIBRALTAR'S AUTOMATIC AIR POLLUTION MEASUREMENTS

The Data capture figures reflects data capture over the whole year, 1st January to 31st December 2007.

Rosia Road Station:

CO	NO_2	SO_2	Benzene
95.2%	98.1%	98.0%	97.6%

Bleak House Station:

NO_2	O_3
98.5%	90.4%

Our target is to obtain at least 90% data capture in any one year. Any problems with the analysers have been promptly attended to, this has helped us to keep the data capture as high as we have achieved. The ozone analyser had three major faults which though promptly seen to caused the data capture figures to come very close to our minimum data capture target.

1.4.1 Carbon Monoxide

This pollutant is measured solely at the Rosia Road Station.

Carbon Monoxide (CO) is a colourless, odourless poisonous gas produced by incomplete, or inefficient, combustion of fuel. It is predominantly produced by the road transportation sector and in particular by petrol-engines.

This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.

The air quality objective for carbon monoxide is 10.0 mg/m^3 as the maximum daily running 8 Hour mean during a calendar year. The maximum running 8 Hour mean during 2007 was 2.2 mg/m^3; thus we are therefore well below the maximum permissible under the air quality rules (and EU Directives) (TABLES 3). The level recorded this year is below last year's, when a maximum running 8 Hour mean of 3.1 mg/m^3 was recorded. Carbon monoxide levels over the years 2005 -2007 show that we are well within the recommended level.

To summarise there were no exceedances of the carbon monoxide air quality objectives within our National rules or the European Limit Values.

1.4.2 Nitrogen Dioxide

This pollutant is measured at both the Rosia Road Station and Bleak House Station. Nitrogen oxides (NO_x) is a collective term used to refer to two species of oxides of nitrogen, nitric oxide (NO) and nitrogen dioxide (NO_2). Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. Nitric oxide (NO) is not considered to be harmful to

health. However, once released to the atmosphere, Nitric oxide (NO) is usually very rapidly oxidised to nitrogen dioxide (NO_2).

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure, to concentrations that are typically much higher than those normally found in the ambient air.

There are two air quality objectives, for the protection of human health, set for nitrogen dioxide. A long term, annual mean objective, set to protect against long term exposure to elevated nitrogen dioxide concentrations and a short term, 1 hour objective, set to protect against short term elevated nitrogen dioxide concentrations.

The annual mean air quality objective for nitrogen dioxide is 40µg/m^3 to be achieved by 2010. The EU Directive also sets a temporary 'margin of tolerance' (MOT) in relation to this limit value which decreases annually until 2010, the date for attainment of the Limit Value. The MOT is intended to help identify those areas where current air quality is worst and acts as a trigger to encourage action to be taken to ensure that the limit value will be met, while also ensuring that exceedances of the limit value which are expected to disappear without additional measures do not trigger the requirement to produce plans and programmes. The annual mean's margin of tolerance in 2007 is 6µg/m^3 this means that the Annual Mean + MOT in 2007 is 46µg/m^3. The annual mean was measured at 44µg/m^3 (Rosia Road Station) and 25µg/m^3 (Bleak House Station), both below the nitrogen dioxide Annual Mean + MOT. The 2010 annual mean of Limit Value of 40µg/m^3 has been exceeded at the Rosia Road Station.

The 1 hour air quality objective for nitrogen dioxide is 200µg/m^3 not to be exceeded more than 18 times per year to be achieved by 2010. The maximum one hour means during 2007 at the Rosia Road and Bleak House sites were recorded at 172µg/m^3 and 176µg/m^3 respectively (TABLES 1.3 & 1.5).

There were no exceedances of the current annual mean (plus tolerances) or the one hour mean of 200µg/m^3 at either of the automatic monitoring stations. The levels recorded this year are, as last year, in both stations below the European and Gibraltar objectives.

1.4.3 Sulphur Dioxide

This pollutant is measured solely at the Rosia Road Station.

Sulphur dioxide (SO_2) is produced when a material, or fuel, containing sulphur is burned. Globally, much of the sulphur dioxide in the atmosphere comes from natural sources, but in Gibraltar the predominant source is power stations and shipping burning fuel oils.

There are two air quality objectives, for the protection of human health, set for sulphur dioxide. A daily mean objective and a 1 hour objective. The 1 hour objective sets a Limit Value of 350µg/m^3, which is not to be exceeded more than 24 times per year. The Daily objective sets a Limit Value of 125µg/m^3 which is not to be exceeded more than 3 times per year.

The maximum one hour mean during 2007 at the Rosia Road site was recorded at 154µg/m^3 (TABLE 3).There were no exceedances of the one hour mean Limit Value of 350µg/m^3 at the automatic monitoring station.

The maximum daily mean during 2007 at the Rosia Road site was recorded at 41µg/m^3 (TABLE 3). There were no exceedances of the Daily mean Limit Value of 125µg/m^3 at the automatic monitoring station.

There were no exceedances of the one hour mean or the twenty-four hour mean at the Rosia Road Station.

1.4.4 Benzene

This pollutant is measured solely at the Rosia Road Station.

Benzene is a volatile organic compound which is a minor constituent of petrol (approximately 1% by volume). The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source.

The air quality objective for benzene is 5µg/m^3, measured as an annual mean. This objective is to be achieved by 2010. The EU Directive also sets a temporary 'margin of tolerance' (MOT) in relation to this limit value which decreases annually until 2010, the date for attainment of the Limit Value. The MOT is intended to help identify those areas where current air quality is worst and acts as a trigger to encourage action to be taken to ensure that the limit value will be met, while also ensuring that exceedances of the limit value which are expected to disappear without additional measures do not trigger the requirement to produce plans and programmes. The annual mean's margin of tolerance in 2007 is 3µg/m^3 this means that the Annual Mean + MOT in 2007 is 8µg/m^3. In 2007 the annual mean was measured at 2.28µg/m^3 which is below the Benzene Annual Mean + MOT and the Limit Value itself.

There was no exceedence of the Benzene annual mean objective at the Rosia Road Station.

1.4.5 Ozone

This pollutant is measured at Bleak House Station

Ozone (O_3) is not emitted directly from any man-made source in any significant quantities. In the lower atmosphere, O_3 is primarily formed by a complicated series of chemical reactions initiated by sunlight. These reactions can be summarised as the sunlight-initiated oxidation of volatile organic compounds (VOCs) in the presence of nitrogen oxides (NOx). The sources of VOCs are similar to those described for NOx above, but also include other activities such as solvent use, and petrol distribution and handling

The chemical reactions do not take place instantaneously, but can take hours or days, therefore ozone measured at a particular location may have arisen from VOC and

NOx emissions many hundreds or even thousands of miles away. Maximum concentrations, therefore, generally occur downwind of the source areas of the precursor pollutant emissions. Ozone irritates the airways of the lungs, increasing the symptoms of those suffering from asthma and lung diseases.

The air quality target value for ozone is expressed as a maximum daily 8 hour mean of 120µg/m^3.

This 2010 target value should not be exceeded more than 25 days per calendar year averaged over 3 years. This target value was exceeded on 12 days during 2007 (TABLE 6). The maximum hourly mean was recorded as 144µg/m^3, which is below the EU Information Threshold of 180µg/m^3 and the EU Alert Threshold of 240µg/m^3.

There were no exceedances of the Ozone objectives at the Bleak House Station.

1.5 AN OVERVIEW OF GIBRALTAR'S NON-AUTOMATIC AIR POLLUTION MEASUREMENTS

1.5.1 Lead

The majority of Lead (Pb) emissions arise from vehicles fuelled with leaded petrol. Industry, in particular secondary non-ferrous metal smelters, may contribute to emissions of lead in industrial areas, though none exist within Gibraltar. This source can become increasingly significant due to the reduction in the lead content of leaded petrol and the increasing use of unleaded petrol (leading to significant reductions in urban lead levels).

The air quality objective for Lead is 0.5µg/m^3 measured as an annual mean to have been achieved by 2005. The 2007 annual mean was measured at 0.013µg/m^3. There was no exceedance of the Lead annual mean objective at the Rosia Road station.

1.5.2 Particulate Matter PM_{10}

Fine particles are composed of a wide range of materials arising from a variety of sources including:

- combustion sources (mainly road traffic);
- secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere, and often transported from far across Europe;
- coarse particles, suspended soils and dusts (e.g. from the Sahara), sea salt, biological particles and particles from construction work.

Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focussed on PM_{10}, but the finer fractions such as $PM_{2.5}$ and PM_1 are becoming of increasing interest in terms of health effects.

There are two air quality objectives set for Particulate matter (measured as the PM_{10} size fraction) a daily mean objective and an annual mean objective.

The annual mean air quality objective for PM_{10} is 40µg/m^3, the Daily mean objective is set at 50 µg/m^3 which must not be exceeded on more than 35 days per year. These

objectives were to be met by 2005. The 2007 annual mean was measured as 45µg/m^3 and the Daily mean of 50 µg/m^3 was exceeded on 109 occasions.

Very high PM_{10} concentrations of 146ug/m-3 and 250ug/m-3 were measured on 20th December 2007 and 21st December 2007 respectively.

These may be due to a specific local source, it is worth noting that, even with these daily values excluded the annual mean remains > 40ug/m-3. We suspect that the AMCO operations at the ex Gun Wharf site was responsible for these high levels recorded. Dust clouds whipped up by the winds were visible in the vicinity of the Rosia Road station during this period. The site at Gun Wharf was occupied by AMCO sometime in 2006 and had been and is being used for the storage of aggregates and sands as well as being used for the small scale production of concrete.

PM_{10} data from the Partisols at Rosia Road over the past 3 years are shown in Table 1.7 below:

Table 1.7 PM_{10} Statistics for Rosia Road

	2005	2006	2007
Valid Days' Data	329	362	362
% Data Capture	90%	99%	99%
Annual Mean PM_{10} (40ug/m^{-3})*	35.9	39.7	45.0
Max. 24-hour mean PM_{10}	81.6	91.9	249.8
Days > 50ug m-3 (35days)*	18	60	109

* Limit values – annual mean and maximum number of days daily limit value can be exceeded

The number of days when PM_{10} daily mean concentrations > 50ug/m^{-3} shows a year on year increase, with more than the permitted 35 exceedences of the EC 24-hour limit value in both 2006 and 2007.

Figure 1.4 shows number of days > 50ug/m^{-3} for PM_{10}, per month throughout the 3 years of the study. This indicates that there may be a seasonal pattern – initial indications suggesting more exceedences occurring during summer months. It also shows the number of exceedences has increased in 2006 and 2007 compared with 2005.

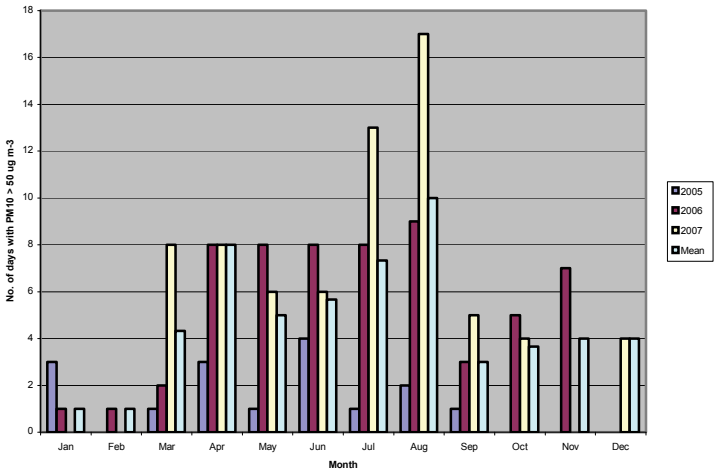


Figure 1.4 Number of days per month with PM_{10} > 50 ug/m^{-3}

Once again the daily PM_{10} limit value has been exceeded in 2007. There have been 109 days where the limit value has been exceeded, i.e. 74 days over and above the maximum of 35 days permitted.

The annual limit value of 40ug/m^{-3} has been exceeded for the first time since monitoring began in 2005. The recorded level for 2007 was 45ug/m^{-3}.
Natural transboundary events such as Saharan Dust Storms can give rise to PM_{10} events. The exceedances that are caused by such events can be deducted from the annual total. After obtaining Spanish data on their natural dust occurrences, African (Saharan) Dust intrusion events and studying our data, Environmental Agency's UK consultants, AEA Energy & Environment were able to identify that there had been 28 exceedances that were caused by natural events. This meant that the number of our reportable exceedances was down from 60 to just 32.

As yet we have not been able to get the Spanish data we require in order to offset the 2007 exceedances which are due to natural events African (Saharan) Dust.

Equally a number of exceedences during 2006 were caused by local sources. Given the sharp rise in exceedences from 2005 to 2006 and then to 2007, a number of these exceedences, when investigated, are likely to reveal a significant local source contribution. It is unlikely that even after the exceedances due to natural events are offset for 2007 that the exceedances will come to below 35, the number which must not be exceeded per year.

Gibraltar will this year have to report to the European Commission the exceedences of both the annual and daily PM_{10} limit values. This means that we will once again be required to produce further Plans and Programmes to abate PM_{10}.

1.5.3 Arsenic, Cadmium, Nickel and Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene)

Arsenic, Cadmium and Nickel are human genotoxic carcinogens. Impact on human health and the environment occurs via concentrations in ambient air and via deposition. The major sources of these metals in the Gibraltar region are likely to be Shipping and Power Generation. Target values are set with the aim of minimising harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne arsenic, cadmium and nickel.

Polycyclic Aromatic Hydrocarbons (PAH) are toxic organic micro pollutants (TOMPS) that cause a wide range of effects.

Target values are set with the aim of minimising harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne PAH. Benzo[a]pyrene is used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.

Monitoring in Gibraltar to support a Preliminary Assessment under DD4 began late 2005.

TABLE 1.8

Pollutants regulated by 4th Daughter Directive			
Pollutant	Parameter	**Target Value**	**Recorded Average**
Arsenic	Annual average	6ngm^{-3}	1.0ngm^{-3}
Cadmium	Annual average	5ngm^{-3}	0.3ngm^{-3}
Nickel	Annual average	20 ngm^{-3}	17.1ngm^{-3}
BAP	Annual average	1ngm^{-3}	0.15ngm^{-3}

The Preliminary Assessment Study revealed that mandatory fixed monitoring for nickel was required within Gibraltar. This monitoring must be conducted at a roadside location on a major road and close to key power generation and shipping sources. The annual averages recorded reveal that arsenic, cadmium and poly aromatic hydrocarbons are well below their corresponding target value. The annual average recorded for nickel shows that it is within the target value, the highest recorded monthly concentration was 31ngm^{-3} in period 14th August to 10th September 2007. Nickel needs to be monitored and though arsenic, cadmium and poly aromatic hydrocarbons are below their corresponding lower assessment levels these metals and poly aromatic hydrocarbons will continue to be monitored in light of the paucity of data available.

1.6 DIFFUSION TUBE NETWORKS

Diffusion tube samplers are used in order to obtain information of spatial variation of pollutant concentrations within Gibraltar, and further elucidate peak and background concentrations. Data from the diffusion samplers characterise the spatial distribution of pollutant levels throughout Gibraltar, and supplements the automatic monitoring network. **Diffusion Tube sampling is not a reference method of sampling, it is therefore only used for indicative purposes.**

Diffusion Tube samplers are used to measure NO_2 and hydrocarbons across Gibraltar. Monitoring sites were selected to include areas likely to be affected by specific emission sources (such as heavy traffic, power generation plants, petrol stations, or vents from fuel storage), as well as general background locations.

NO_2 and hydrocarbon (BTEX) diffusion tubes are exposed for 4-week periods and are bias adjusted using data from co-location studies carried out at Rosia Road and Bleak House. The precision of NO_2 and BTEX tubes was very good and the accuracy was within the expected range for an indicative method such as diffusive samplers (+/- 25%).

1.6.1 Hydrocarbon Diffusion Network

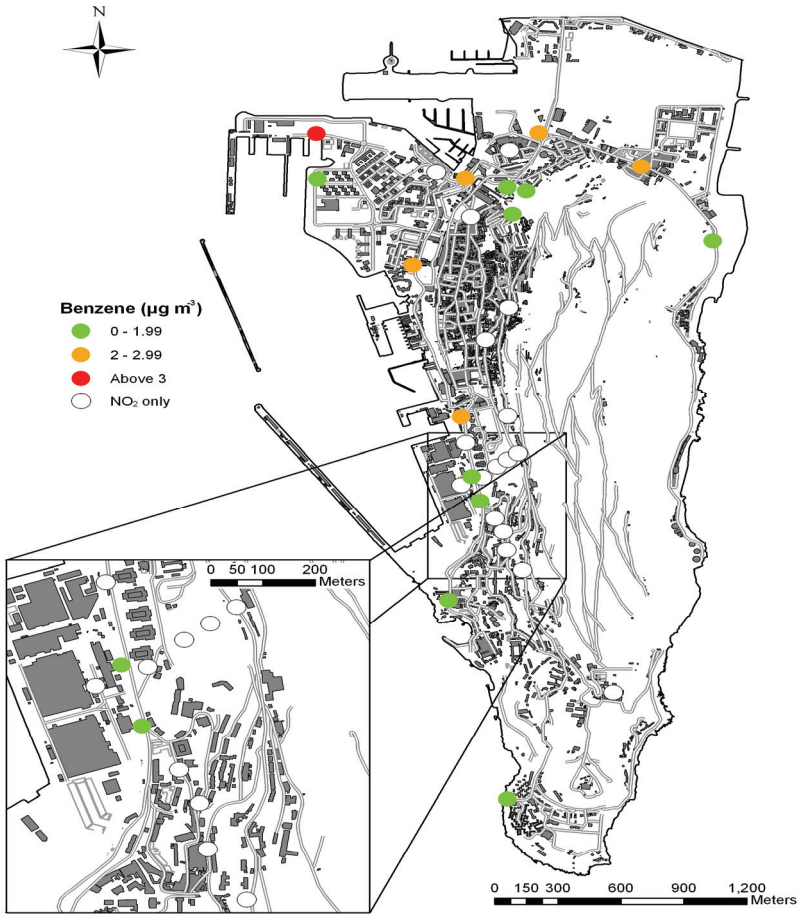


Figure 1.5 Diffusion Tube Network

- No sites had annual mean benzene concentrations greater than the EC Limit Value or Gibraltar Air Quality Objective of 5 µg m-3 in 2007.
- The highest levels of BTEX hydrocarbons were measured at North Mole and Queensway close to a busy road.
- The results obtained between 2005 and 2007 are very similar. Benzene levels in 2007 are, on average, slightly higher than 2005 but lower than 2006.

The highest annual mean benzene concentration as measured by this indicative method was 3.1µg m^{-3}. This was measured at North Mole. At all other sites the indicative annual mean benzene concentration was 3.0µg m^{-3} or less. All sites met the Gibraltar Air Quality Objective (and EC Limit Value) of 5µg m^{-3} for annual mean benzene concentration, which is to be achieved by 2010.

1.6.2 Nitrogen Dioxide Network

Annual mean NO_2 concentrations, as measured by this indicative method, for 2007 range from 35 µg m^{-3} to 56 µg m^{-3} at kerbside sites, 36 µg m^{-3} to 49 µg m^{-3} at roadside sites and 21 µg m^{-3} to 37 µg m^{-3} at background sites.

The highest indicative annual mean concentrations (56 µg m^{-3}) were measured at Withams Rd and Jumper's (on Rosia Road) followed by South Barracks Road at 54 µg m^{-3}. As can be seen below, other sites geographically close to these also exhibited elevated indicative concentrations of NO_2.

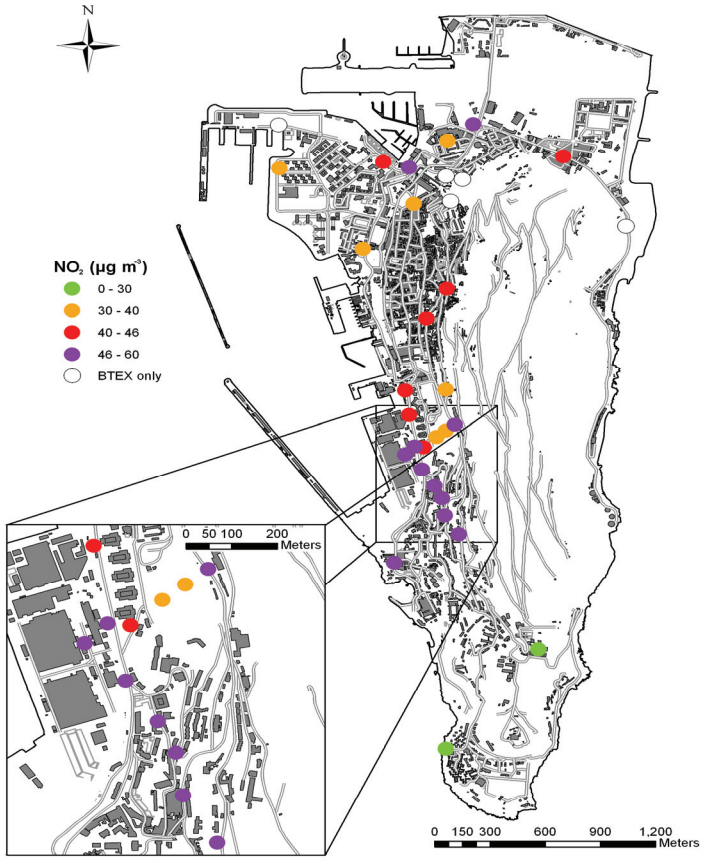


Figure 1.6 NO_2 Annual Average concentrations for 2007 (sites that do not measure NO_2 shown by white circles

Indicative background levels of around 35-37 µg m^{-3} (Harbour Views and Main St) were measured at background sites in the northern built-up area, while concentrations in the less built-up southern part of Gibraltar were considerably lower (21-25 µg m^{-3} at Lathbury Industrial Park and Bleak House). The indicative background levels near Rosia Road (Alameda Gardens) vary between 35-37µgm^{-3}.

The indicative annual mean NO_2 concentrations at twelve sites located in built-up areas were greater than, or equal to, the EC Directive Limit Value plus margin of tolerance for 2007 (46µgm^{-3}). These sites were Withams Road, Jumper's - Rosia Road, South Barracks Road, Glacis Rd, Upper Withams Entrance, Dockyard Road, Rock Hotel - Europa Road, Governors Meadow - Rosia Promenade, Winston Churchill Roundabout, Woodford Cottages - Europa Rd, Anchorage - Rosia Road and Red Sands Road.

The number of operational sites within the diffusion tube network was increased during 2007. The increase has, in the main, focused on providing further information on NO_2 concentrations and spatial variation in the vicinity of Jumper's. The increased

focus on this area explains the higher number of sites recording elevated concentrations in 2007 compared with previous years.

The indicative annual mean NO_2 concentrations at a further six sites (Devil's Tower Rd, Rosia Rd, Picton House – Rosia Prom, Water Gardens, Prince Edwards Rd and Lime Kiln Rd) were above the EC Directive Limit Value (and Gibraltar Air Quality Objective) of 40µgm^{-3} to be achieved by 1st January 2010. These indicative levels recorded are due to traffic. The levels of NO_2 just like in the rest of Europe, is expected to diminish following the introduction of the type 4 engines in new vehicles. The type 4 engine produces much less NO_2 and therefore as the older vehicles are replaced the levels of NO_2 are expected to drop.

The indicative annual mean NO_2 concentrations measured at kerbside and roadside sites in Gibraltar range from 35µgm^{-3} to 56µgm^{-3}. These concentrations are comparable with roadside NO_2 concentrations in large UK towns and cities such as Glasgow, Exeter and Brighton.

1.7 CONCLUSIONS AND RECOMMENDATIONS

This is the third year of automatic monitoring which has produced robust and high quality data. Any reduction or increases to the 2005 and 2006 recorded concentrations cannot be used to establish any reliable trends or patterns as we would have to gather at least a few more years' data before we are able to do so. They nevertheless can be viewed as indicators and usefully compared against air quality objective levels.

The Ratified Data for the automatic air pollution monitoring network show that there were no exceedances of the carbon monoxide, sulphur dioxide, ozone and benzene objectives contained in our national legislation or within the European Air Quality Directives or Daughter Directives. Nitrogen dioxide, for 2007, was within the annual mean + marginal tolerance, i.e. 46µg/m^3 at the automatic monitoring station, but it exceeded the annual mean objective of 40µg/m^3 which should be met by 2010.

Ozone continues to come close to the long term target values set down in our national legislation and in the European Air Quality Directives. As this pollutant is not produced locally but is brought to us by mass air movements we need to keep a close watch especially during the peak months of April to September when EU Information thresholds may be threatened triggering public information duties.

The annual mean for Nickel during 2007 shows that it is within the target value, the highest recorded level was 31ngm^{-3} in period 14th August to 10th September 2007. Nickel needs to be monitored and though arsenic, cadmium and poly aromatic hydrocarbons are below their corresponding lower assessment levels these will continue to be monitored in light of the paucity of data available. We will continue to monitor for the next three years.

Nickel at present is only being monitored for 50% of the time, i.e. on alternate days. DD4 requires that we monitor for a minimum of 90% of the year. As recommended in 2006 report the partisol filter unit currently being used to monitor Arsenic, Cadmium, Nickel and PAH (measured as Benzo(a)pyrene), be exclusively used for the metals and a high volume sampler has been purchased to monitor the PAH (measured as

Benzo(a)pyrene). These network monitoring upgrades are scheduled to be in place by end of May 2008.

The results from the passive monitoring network in Gibraltar have revealed that the indicative annual mean NO_2 concentrations at twelve sites located in built-up areas were greater than, or equal to, the EC Directive Limit Value plus margin of tolerance for 2007 ($46\mu gm^{-3}$). These sites were Withams Rd, Jumper's - Rosia Rd, South Barracks Rd, Glacis Rd, Upper Withams Entrance, Dockyard Rd, Rock Hotel - Europa Rd, Governors Meadow - Rosia Prom, Winston Churchill Roundabout, Woodford Cottages - Europa Rd, Anchorage - Rosia Rd and Red Sands Rd.

The number of operational sites within the diffusion tube network was increased during 2007. The increase has, in the main, focused on providing further information on NO_2 concentrations and spatial variation in the vicinity of Jumper's. The increased focus on this area explains the higher number of sites recording elevated concentrations in 2007 compared with previous years.

The indicative annual mean NO_2 concentrations at a further six sites (Devil's Tower Rd, Rosia Rd, Picton House – Rosia Prom, Water Gardens, Prince Edwards Rd and Lime Kiln Rd) were above the EC Directive Limit Value (and Gibraltar Air Quality Objective) of $40\mu g\ m^{-3}$.

In response to these elevated concentrations the Government has commissioned an automatic monitoring station to measure nitrogen dioxide in the area of Jumpers. The station is scheduled to be up and running by end of May 2008.

This automatic monitoring station will further elucidate nitrogen dioxide concentrations and will provide additional measurements to track the progress and impact of the OESCO permitting scheme established under the Integrated Pollution Prevention and Control Act (IPPC).

This year Particulate Matter (PM_{10}) Daily mean has breached our National and European Limit Value. The Scoping Study conducted during 2007 established the methodology to identify the proportion of PM_{10} exceedances that are the result of 'natural' transboundary PM_{10} (i.e Saharan dust). This is an issue throughout the Iberian Peninsula. The methodology applied to the 2006 data in order to quantify how many of the PM_{10} Daily mean limit value exceedences in Gibraltar were due to the influence of these natural events will also be applied to the 2007 data as soon as we are in possession of Spain's Report on their exceedances which are due to natural sources.

The Government, as part of the network monitoring upgrades, has commissioned a second Particulate Matter (PM_{10}) monitoring unit. A TEOM FDMS near real-time PM_{10} analyser has been purchased. This instrument will provide a better understanding of diurnal patterns of PM_{10}, adding further information to the source apportionment process. This instrument will also add value to the Gibraltar Air Monitoring Programme by providing near-real time alerts to the public via the web.

One of the Partisol PM_{10} gravimetric samplers will be relocated, from Rosia Road, to Bleak House.

This will provide information on ambient background concentrations in Gibraltar (without the influence of road traffic emissions).

Chapter 2 Water Quality

2.1 BATHING WATER QUALITY

In the 1970's The European Commission decided that bathing water quality should be monitored and tested in order to protect bathers from health risks and to preserve the environment from pollution. This resulted in one of the first pieces of European environmental legislation: the Council Directive 76/160/EEC on Bathing Water Quality issued in 1976. This was transposed into local legislation by the Public Health (Quality of Bathing Water) Rules 1992.

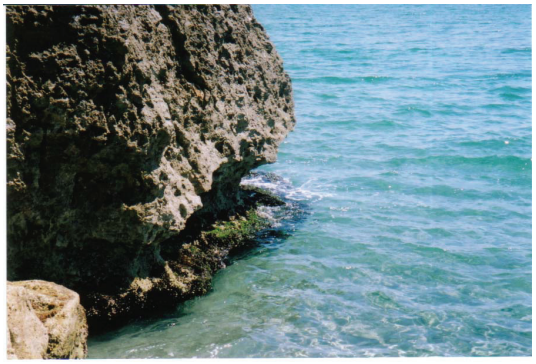
The 1976 Bathing Water Directive set binding standards for bathing waters throughout the European Union. The annual Bathing Water Report and Tourist Atlas can be viewed at http://ec.europa.eu/water/water-bathing/index_en.html

The 1976 Bathing Water Directive reflected the state of knowledge and experience of the early 1970s, both technically and socially. Since 1976, epidemiological knowledge has progressed and managerial methods have improved.

A new Bathing Water Directive (2006/7/EC) was adopted last 15th February 2006 and will replace the existing directive by 2014. It still has not been transposed in Gibraltar. Bathing sites will be classified into four categories: "excellent," "good," "sufficient" or "poor".

The new Directive lays down provisions for more sophisticated monitoring and classification of bathing water. Directive 2006/7/EC requires Member States to draw up a management plan for each site to minimize risks to bathers, based on an assessment of the sources of contamination that are likely to affect it

Information on a bathing site's quality classification, the results of water quality monitoring, the site's management plan and other relevant information is to be made readily available to the public, both through displays at the site and through the media and internet.



The classification of water quality at a bathing site will be determined on the basis of a three-year trend instead of a single year's result as at present. This means that the classification will be less susceptible to bad weather or one-off incidents. Where water quality is consistently good over a three-year period the frequency of sampling may be reduced.

Gibraltar has six bathing areas, Camp Bay, Catalan Bay, Eastern Beach, Little Bay, Sandy Bay and Western Beach. These areas are monitored on a fortnightly basis during 15th April to 30th October each year.

The Gibraltar beaches have always met the Mandatory Values and at least three of them have met the more stringent Guide Values consistently each year. Since 2003 all

six sites have met the Guide Values. Below is a table of the results for the period 1998 – 2007.

GIBRALTAR

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1. Camp Bay	●	●	●	●	●	●	●	●	●	●
2. Catalan Bay	●	●	●	●	●	●	●	●	●	●
3. Eastern Beach	●	●	●	●	●	●	●	●	●	●
4. Little Bay	●	●	●	●	●	●	●	●	●	●
5.Sandy Bay	●	●	●	●	●	●	●	●	●	●
6.Western Beach	●	●	●	●	●	●	●	●	●	●

● Meets Guide Values set by National legislation and EEC Directive 76/160/EEC
● Meets Mandatory Values set by National legislation and EEC Directive 76/160/EEC

2.2 POTABLE WATER QUALITY

The supply and quality of potable water in Gibraltar are controlled by the Public Health (Potable Water) Regulations 1994, the Public Health (Potable Water) Rules 1994, Public Health Ordinance (Amendment) Ordinance 2001 and Public Health (Potable Water) Rules 1994 (Amendment) Rules 2001.

The limit values and maximum advisable concentrations (MAC) for potable water is contained in the Schedules to the Public Health (Potable Water) Rules 1994 as amended by Public Health (Potable Water) Rules 1994 (Amendment) Rules 2001.

Water quality is checked under a two tier sampling and analysis programme:

(i) The water undertakings have their own "in house" programme and additionally submit samples of each batch of water produced to the Public Analyst at the Public Health and Clinical Pathology Laboratories. The analysis results are then interpreted by the Environmental Agency and the batch under consideration is only released for general supply if found fit.
(ii) The Environmental Agency also carries out its own independent monitoring programme, sampling the water supplies as they reach the consumers. This programme is designed to meet the sampling criteria outlined in Directive 80/778/EEC as substituted by Directive 98/83/EC and our national legislation.

In 2007, AquaGib Ltd supplied a total of 1,293,898 cubic metres of potable water. The potable water consisted of 93.5% desalinated water and 6.5% well water.

The Public Health (Potable Water) Rules 1994 and the European Directive 98/83/EC require that both "Check" and "Audit" Monitoring is carried out on the potable water supplied to the community.

The purpose of the "Check" Monitoring is:

- ❖ to provide information on the organoleptic and microbiological quality of the water supplied for human consumption,
- ❖ to test the effectiveness of the drinking water treatment and;
- ❖ to determine whether or not the water complies with the relevant parametric values laid down by the Rules and the Directive.

The following parameters are included in the "Check" Monitoring list:

- Ammonium
- Colour
- Conductivity
- Escherichia coli (E.Coli)
- pH
- Odour
- Taste
- Coliform bacteria
- Turbidity.

The purpose of "Audit" monitoring is to determine whether or not the water complies with the relevant parametric values laid down by the Rules and the Directive.

The Rules and Directive require that a minimum of 16 "Check" and 3 "Audit" samples be undertaken in a given year. The Environmental Agency alone has taken and had analysed a total of 157 "Check" and 4 "Audit" samples in 2007. This figure does not include the numerous samples also taken by AquaGib Ltd itself.

The following summary details the number of quality control samples taken by Environmental Agency all samples were below the maximum advisable concentration for each determinant.

Summary of overall quality 2007

PARAMETERS	No. OF DETERMINATIONS	< MAC*	> MAC
Escherichia coli	161	161	0
Enterococci	4	4	0
Acrylamide	4	4	0
Alkalinites	4	4	0
Aluminium	4	4	0
Ammonium	161	161	0
Antimony	4	4	0
Arsenic	4	4	0
Barium	4	4	0
Benzene	4	4	0
Benzo(a) pyrene	4	4	0
Boron	4	4	0
Bromate	4	4	0
Cadmium	4	4	0
Calcium	4	4	0

Chloride	161	161	0
Chromium	4	4	0
Coliform Bacteria	4	4	0
Colour	161	161	0
Conductivity	161	161	0
Copper	4	4	0
Cynide	4	4	0
1,2- dichloroethene	4	4	0
Epichlorohydrin	4	4	0
Fluoride	4	4	0
Hydrogen ion concentrate	161	161	0
Iron	4	4	0
Lead	4	4	0
Magnesium	4	4	0
Manganese	4	4	0
Mercury	4	4	0
Nickel	4	4	0
Nitrate	4	4	0
Nitrite	4	4	0
Pesticides }	4	4	0
Pesticides – Total }			
Phosphorous	4	4	0
Polycyclic aromatic hydrocarbons	4	4	0
Potassium	4	4	0
Odour	161	161	0
Oxidisability	4	4	0
Residual Chlorine	161	161	0
Selenium	4	4	0
Silver	4	4	0
Sodium	4	4	0
Sulphate	4	4	0
Taste	161	161	0
Tetrachloroethene and trichloroethene	4	4	0
Total organic Carbon	4	4	0
Total hardness	161	161	0
Turbidity	161	161	0
Zinc	4	4	0

* MAC – Maximum Admissible Concentration

2.3 THE WATER FRAMEWORK DIRECTIVE (2000/60/EC)

The overriding aim behind the Water Framework Directive (WFD) is to ensure that all our water bodies, both coastal and groundwater, achieve or maintain "Good Status". With this aim in mind, Government appointed consultants to carry out an initial characterisation study and produce a report on their findings. This report provides a summary of Gibraltar's water bodies as required under the Directive. The report included an analysis of the characteristics of the Gibraltar River Basin District

along with a review of the impact of human activity on the status of surface waters and groundwater. Data collected during this reporting process has subsequently been used by the Water Framework Directive Working Group (WFDWG) to develop a monitoring network for Gibraltar.

One of the more pressing objectives of the monitoring network required under the WFD is the classification of our coastal and groundwater bodies. Classifying water bodies requires the use of different classification schemes depending on the type of water body in question. These schemes are still being developed throughout the EU. The compatibility hence harmonisation of such schemes is taking place via the **intercalibration exercise**. The WFD thus requires the need for the following classification schemes:

- Ecological status and chemical status classification schemes for surface water bodies such as coastal waters.
- Ecological potential and chemical status for Heavily Modified Water Bodies (HMWBs).

The WFD classification scheme for surface water quality includes five status categories - high, good, moderate, poor and bad. As mentioned previously, the main aim of the WFD is to achieve 'good status' for all surface waters by 2015. 'Good status' means both good ecological and chemical status. 'High status' is defined as the conditions associated with no or very low human impacts. Such conditions are also known as the reference conditions since they are the best status available - i.e. the benchmark. Reference conditions will obviously vary within the EU due to the diversity of coastal regions. The intercalibration exercise subsequently aims to harmonise the understanding of 'good status' throughout the EU.

The Mediterranean Geographical Information Group (Med-GIG) was created in February 2005 and is currently spearheading the intercalibration process for the Mediterranean region. Countries taking part include Spain, Italy, Greece, France, Cyprus, Malta and Croatia.

The harmonised methods and standards developed through this exercise could then be adopted to produce the Gibraltar River Basin Management Plan. A draft version of this plan needs to be produced for public consultation and the final plan submitted formally to the EU by December 2009.

Chapter 3 Waste Management

It is widely recognised that the management of waste, both in the way it is produced and how it is disposed of, is fundamental in achieving the objectives of sustainable development.

Gibraltar has always sought to handle and manage its waste locally, however, the closure of the municipal solid waste incinerator in 2000 has meant that waste treatment and disposal takes place in Spain.

Wastes generated within Gibraltar are collected by a combination of public and private companies, for subsequent transportation across the border by road haulage vehicles.

3.1 INDUSTRIAL WASTE ARISINGS

The main sources of hazardous/industrial wastes within Gibraltar arise from the following sources, with the following being the figures from each for 2007:

Shipping	1609 m^3
Clinical	204 tonnes
Total Industrial Waste	9608 tonnes

Movements of industrial wastes occur as and when necessary. Materials are stored locally until sufficient quantities of such waste have been collected to warrant the economic transfrontier movement for subsequent treatment and disposal. In the absence of any heavy industry within Gibraltar, sources of hazardous industrial wastes are limited to shipping, the Ministry of Defence (MOD), light industry and clinical/medical sources. A limited amount of hazardous material is also produced from municipal sources or via construction and demolition activities. These are, however, treated as industrial hazardous wastes requiring specialist collection and disposal. The predominant types of hazardous waste that arise from these sources are waste oils, clinical/medical waste grits and asbestos or asbestos containing products.

Records of industrial waste arisings are held by the Environmental Agency as part of its maintenance of the transfrontier shipment database - covering a range of hazardous industrial waste types dating back to 1996. Details of these are set out in Table 3.1.

3.1.1 Waste Oil

Waste oil is the predominant hazardous waste material arising in Gibraltar. This comprises a mixture of waste oil from visiting ships, MOD sources, service stations and other light industry. These materials currently undergo preliminary treatment and water separation at a Slop Oil Reception and Treatment (SORT) facility at Western

Arm, North Mole, before being transferred to Spain and other EU countries for further treatment and regeneration or disposal.

3.1.2 CLINICAL WASTE

The second most predominant hazardous waste material is clinical waste produced by the hospitals (St Bernard's Hospital and the Princess Anne Medical Centre (MOD)) and a number of medical, nursing, dental and veterinary practices. All clinical waste is collected and temporarily stored before being transported in dedicated sealed vehicles to the Ecoclinic SL treatment facility in Granada. The yearly deliveries are as follows:

Number of 60 litre containers	Year
30960	2004
33200	2005
37800	2006
39988	2007

The construction of a new clinical waste incinerator in Gibraltar is well under way at the ex Governor's Cottage Camp site, at Europa Advance Road. This new facility will be operational by May 2008.

3.1.3 ASBESTOS

The prevention and reduction of pollution by asbestos discharges into the natural environment is governed by Part XIV of the Factories Act 1956. This includes the handling, transportation and disposal of waste containing asbestos. In Gibraltar there are currently 3 companies licensed to collect and transport asbestos waste under Part VA of the Public Health Act. One of these is further authorised under the Shipment of Waste Regulations to export asbestos waste to an authorised disposal plant in Spain. A total of 201 tonnes of asbestos waste was exported in 2007.

3.1.4 CONSTRUCTION AND DEMOLITION WASTE

Wherever possible, clean construction and demolition wastes are utilised within Gibraltar for land reclamation purposes; otherwise the wastes are categorised, collected and disposed of as municipal or hazardous industrial waste, as appropriate. Gibraltar is currently producing an average of some 96,000 – 120,000 cubic metres of construction and demolition waste per year.

3.1.6 RUBBER TYRES

Rubber tyres are currently deposited at the refuse holding facility at Europa Advance Road. The accumulation of tyres which had built up at this facility was removed during 2006 and no tyres were taken to Spain for disposal during 2007.

3.2 MUNICIPAL WASTE ARISINGS

Municipal waste encompasses waste from households as well as waste from commercial enterprises. Waste data collated by the Government on the historic municipal waste arisings for Gibraltar, is illustrated in Figure 3.2. Prior to 2000, municipal waste figures included both domestic and bulky items, however, more recent records separate these two wastes (as shown in Figure 3.2)

Municipal waste collection is carried out partly by Gibraltar Industrial Cleaners and partly under contract by Master Services (Gib) Ltd.

The current municipal waste arisings within Gibraltar total 17,086 tpa, based on a civilian population of 29,257. This equates to around 584kg of gross municipal waste arisings per capita per year. This is higher than would normally be expected within a developed European country (typically around 400kg per capita per annum).

The ultimate goal of Gibraltar's waste management strategy is to become as self-sufficient as possible in terms of our waste collection, treatment and disposal. Although our geographical limitations make this difficult, our waste strategy should still aim to optimise waste treatment within Gibraltar and minimise our reliance on external facilities, principally in Spain, for residual waste disposal. Gibraltar's Waste Management Plan 2004 is being revised and the updated version will be released in 2009. The key principles of waste management being looked at in this revision are as follows:

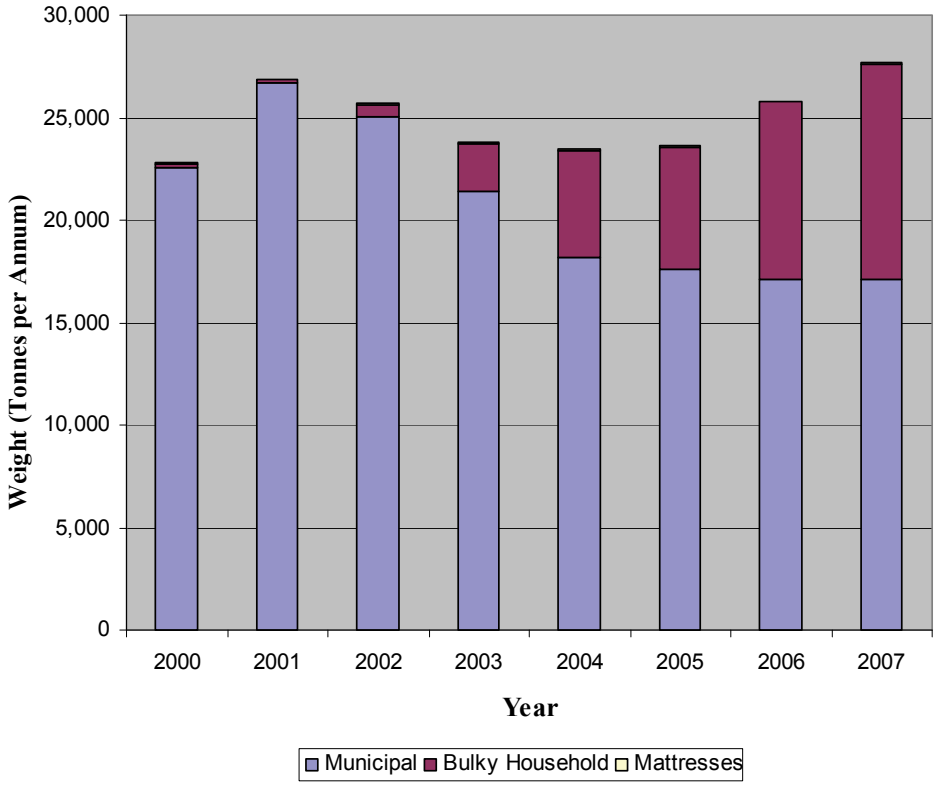
- Reduction of waste at source;
- Recycling and re-use of specific wastes;
- Treatment to reduce volume of wastes - e.g. incineration
- Treatment and use of residues to reduce disposal volumes (e.g. incinerator ash to road-base,); and
- Consideration will be given to where wastes are disposed of in Spain

An important point to remember is that all waste management option processes, no matter how efficient, will continue to require some disposal to landfill. As such, any options should be considered against the need to reduce reliance on landfill as much as possible, an issue that is beginning to figure more prominently due to the requirements of the European Landfill Directive, whose aim objectives are:

"To prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and are, and the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the land filling of waste, during the whole life-cycle of the landfill".

The Landfill Directive sets demanding targets to reduce the amount of biodegradable municipal waste. Strategies are therefore presently being devised that will enable Gibraltar to fully comply with such obligations, the first of which takes effect in 2010 by which time we are required to reduce the amount of our biodegradable municipal waste that is landfilled to 75% of that produced in 1995.

Figure 3.2 Municipal Waste Arisings in Gibraltar 2000-2007



3.3 RECYCLING

The Government is committed to the ideology of recycling non-combustible materials. At present all our municipal waste is sent Sur Europa, a landfill site in Los Barrios, Spain. In 2003, Sur Europa opened a new 'Environmental Park', which now accommodates all of Gibraltar's municipal waste (representing some 13% of the 190,000 tonnes per annum facility capacity). The environmental park employs an array of manual and automated separation and sorting processes to remove recyclable material with the organic fraction being composted in a covered shed to provide a 'saleable' compost product. The residual waste is removed by separate conveyor to a baling plant, before being disposed of to a newly developed landfill adjacent to the facility.

In addition, wood and metal items, principally resulting from commercial wastes, are sorted out locally at the site of the previous incinerator at Michael Dobinson Way. Furthermore, Government provides a separate Civic Amenity Site, presently at Buena Vista, and which is operated by personnel from Gibraltar Community Projects. At this facility, householders are able to dispose of their bulky timber items, white goods,

electrical goods, mattresses, building debris and metal scrap. Large volumes of such items are accepted at the Government's alternative site, being the site of the old incinerator at Michael Dobinson Way, a site that is also being used for the storage of white goods and electrical goods awaiting the identification of appropriate decommissioning plants for these items.

The following items of local waste are currently being sent abroad for recycling:

- **Waste oil** - Partially recycled/regenerated at North Mole Sullage Plant (SLOP Oil Reception & Treatment Ltd SORT)
- **Metals** - Sent as sorted scrap to Spain to join recycling a stream.
- **Batteries – (i)** Car batteries collected by scrap metal dealers and sent to Spain where they join a recycling stream
  (ii) Small recyclable batteries (those containing nickel and cadmium) collected by Environmental Agency from fixed collection points for future recycling abroad
- **Cardboard -** Limited amount sent to Spain to join a recycling stream
- **Refrigerators -** Taken to Spain to join recycling streams for both refrigerant gases and metals
- **Wooden pallets** - Generally returned to suppliers for re-use

A concession for the recycling of glass and cans has been awarded to the Government's current appointed waste contractor, Master Services. Plant and equipment will shortly be acquired for this purpose and systems will be set up to allow for the distribution of bins and subsequent collection of these, as well as for the sorting and subsequent exportation of such items. This will be operational by 2008.

Table 3.1: Industrial Waste Arisings in Gibraltar - 2000 to 2007

Waste Type	2000	2001	2002	2003	2004	2005	2006	2007
Acid Solutions				1.89	1.40			
Alkaline Solutions			32.64	12.84	0.18			
Asbestos		105.35	200.04	74.95	189.47	151.04	454.98	201.20
Bituminous Products						13.10	17.64	40.22
Clinical Waste	128.91	173.29	170.28	94.09	190.07	178.00	257.80	203.68
Electronic Equipment					3.94	0.29	82.22	36.09
Glues				0.18				
Grit						10,746	2992.19	57.28
Halogenated Solvents		0.41	0.43			0.50		
Hexamine								
Incinerator Ash	112.54							
Lead Batteries		0.93	3.49	9.58	11.24	5.78		31.38
Medicines			1.81	0.20		3.94		
Mercury			0.02					
Misc. Chemical Elements			3.04	0.26				4.72
Non Halogenated Solvents			1.60	5.69		4.27	2.91	
Oil-contaminated Soil/Sludge					26.62	4.80		
Oily Sludge					11.31			
Paint chippings		2.13	18.21	3.60	1.54	19.36		8.95
Petrol			0.86					2.72
Photographic Liquids		0.03	0.40		1.39	1.42		
Salts				0.11				
Sand & Soil Hydrocarbons					13.40	4.80	573.86	7946.47
Sand with Metals				277.41	18.54	531.62	97.34	
Waste Oil	20.07	362.34	4,607	2,138	522.86		180	1075
X-Ray Plates				5.00	1.55			
TOTAL (TPA)	262	644	5,040	2,624	1,024	11,655	4659	9608

Chapter 4 Environmental Impact Assessments

Environmental Impact Assessments now form an integral part of the local planning process for all projects deemed to have a potential significant effect on the environment. All such project proposals must conduct an in-depth analysis into all the environmental issues of concern and submit an environmental statement to the Development and Planning Commission (DPC) illustrating the anticipated impacts together with proposed mitigation measures.

Various Government departments are then consulted. The DOE and EA are the main consultees to the DPC on environmental statements. The project proposals cannot be proceeded with until an EIA certificate has been granted stating that the degree of impacts and that the prescribed mitigation is acceptable to the Government.

The next stage of the process in commonly known as 'EIA follow up'. The recommendations of the different consultees are incorporated into the conditions of the license for development. Furthermore, the developers prepare a Construction Environmental Management Plan (CEMP) that is again reviewed by various Government Departments to ensure that impacts arising from the construction works are minimised if not eliminated.

A system is being developed whereby developers will need to report to the relevant competent authorities to ensure that the environmental issues highlighted and in both the environmental statement as well as the CEMP are addressed and the conditions imposed by Government are met.

The main projects which have undergone an EIA in 2007 include:

1. New Airport Terminal
2. New Airport Access Road
3. Eastside Development

Chapter 5 Food Hygiene

5.1 FOOD POISONING

Food poisoning and food borne infections are generic terms applied to illnesses acquired through the consumption of contaminated food or water. The most common food borne infections in Gibraltar are Salmonella and Campylobacter.

Table 5.1.1 Reported cases of food poisoning

Infection	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Campylobacter	65	47	32	24	51	98	92	73	69	42
Salmonella	19	18	90	129	74	103	58	85	38	28

When food poisoning is reported to the EA, the Environmental Health Officer (EHO) conducts an investigation to trace the source of infection. This normally entails visiting households, interviewing affected persons and offering precautionary advice to prevent the spread of infection. Any food establishment which may be associated with an outbreak is inspected immediately and samples of suspect food are taken for analysis.

A thorough investigation is carried out in the establishment into the handling, preparation and cooking of any suspected food in order to establish any malpractices. Health screening of food handlers is undertaken if required.

5.2 FOOD SAFETY SAMPLING PROGRAMME

Foods that normally give rise to bacterial food poisoning are those in which food poisoning bacteria can easily multiply and live. These foods are known as high-risk foods and include cooked meat, poultry and meals prepared with meat and poultry. Some dairy products fall under the category as well.

These foods are sampled in order to ensure that they are free from food poisoning bacteria. Any food found to contain these bacteria are condemned and a thorough investigation is carried out to ascertain the cause of the contamination. Other foods are sampled to ensure that they comply with statutory compositional standards. A total of 150 samples were taken during 2005 and 162 samples were taken in 2006 for bacterial and chemical analysis.

5.3 IMPORTED FOOD

All food consumed locally is imported from countries worldwide. Food was traditionally imported by shipping but today the majority of our food imports enter Gibraltar via the land frontier with Spain. The EA operates an inspection post at the frontier. An EHO and an assistant staff this post. Their role is to inspect all food entering Gibraltar via land, sea and air and to ensure that it complies with our Imported Food Regulations. The inspection is supplemented by a routine and random sampling programme.

5.4 REGISTRATION AND INSPECTION OF FOOD PREMISES

There are 415 food premises in Gibraltar. These consist of restaurants, takeaways, butchers, supermarkets, delicatessens, bakeries, groceries and confectionery outlets. There are no food manufacturing factories.

Food premises in which high-risk foods are handled have to be registered with the Government prior to trading. Registration is granted subject to the premises being fully compliant with our Food Hygiene Regulations.

All food premises are subjected to periodic inspections by EHOs to ensure that they comply with our Food Hygiene Regulations (Table 5.4.1). The frequency of inspection is dependant on the type of food sold from the premises. Premises which sell high risk foods such as takeaways, restaurants, delicatessens etc are subjected to more frequent inspections than those that sell other types of foods.

Inspections of retail outlets to ensure compliance with Food hygiene Regulations

Table 5.4.1 Number of inspections

Year	Number of inspections
2001	1036
2002	1028
2003	971
2004	1161
2005	967
2006	885
2007	832

There were a total of 4 food premises prosecuted during 2007 for failing to comply with the Food Hygiene Regulations.

During the course of inspections EHOs provide advice on food hygiene related issues to Managers and food handlers employed at these premises.

Chapter 6 Noise

Neighbourhood Noise

We all make noise, whether we are talking to others, playing music, entertaining, driving in our cars or just going about our daily business. What is a noise to one person may be pleasurable to another. But too much noise can reduce people's quality of life and, in some extreme cases, even affect their health.

Noise is normally defined as unwanted sound. It could be sound that is too loud or just happens at the wrong time or without warning. If you are concerned about noise coming from a neighbour's home, a local business, vehicles or equipment in the street, often the best way to deal with the problem is to go to the source. Think about talking to the person or company responsible for the noise and explaining the problem. You may find that they don't know they are disturbing you. Remember, we may all be guilty of making noise at some time without knowing it.

Taking formal action

When talking to your neighbour is not possible or doesn't work, you can deal with noise problems by taking formal action, such as:
• complaining to the Environmental Agency and/or;
• complaining to the Royal Gibraltar Police (RGP).

The relevant authorities have the legal powers to act against noise. Under the law, the relevant bodies have a duty to deal with any noise that they consider to be what's known as a **'statutory nuisance'**. In general terms, this means that they can deal with most problems of noise where an individual's behaviour is concerned. Noise can be considered a nuisance regardless of the hours in which it is perceived. Under the Public Health Act noise which is 10dBA above background noise levels during the daylight hours is considered a nuisance.

What do you do to complain?
To complain about noise, contact aforementioned departments. If they visit or witness the noise and agree that it is a statutory nuisance, they will take action. If the noise happens from time to time, they may ask you to keep a diary of when the noise happens, or they may leave equipment to record it. They will measure the noise as part of their investigation into a complaint if they assess that a possible statutory nuisance exists.

What action can be taken?
If the Environmental Agency assesses that the noise is a statutory nuisance, or that a statutory nuisance is likely to occur or recur, they will serve an **abatement notice** – which is a legal notice served on a person causing the nuisance to abate it.

If the noise continues
If a person receives an abatement notice but carries on making noise without executing the works detailed in the notice to reduce the noise levels, they will be summoned. The courts and the police have a range of powers they can use to punish the offender. Courts can impose fines of up to £2000 with a further fine of one tenth of

the amount at level 4 on the standard scale for each day on which the offence continues after conviction therefore.

The Environmental Agency received a total of 50 noise complaints in 2007. These were broken down as follows:

Nature of Complaint	Number of reports
Noisy Establishments	3
Industrial noise	13
Shipping noise	0
Construction	19
Noisy Neighbours	6
Dogs	5
Miscellaneous	4

Chapter 7 Public Awareness

7.1 INTRODUCTION

An issue that continues to be of great importance in the promotion of a healthier and more sustainable environment for all is that of public awareness and education. The Government of Gibraltar firmly believes that the key to tackling environmental issues and creating the behavioural change necessary to bring a stop to unsustainable practices is via education.

7.2 ENVIRONMENTAL EDUCATION

Environmental Education in schools expands upon the aims of education by providing a context outside the classroom in which pupils can discover new ideas and learn new skills. It recognises the need for all of us, but particularly our young people, to develop the knowledge and skills to achieve the necessary change. Environmental education is increasingly being prioritised in national curriculums across the world as its benefits are recognised. It teaches children and young people to be real world problem solvers, encourages critical thinking and helps them to make connections between different disciplines and to appreciate that human beings are intrinsically linked to our environment and depend on it for our survival. This in turn fosters a sense of responsibility and duty of care towards our planet.

7.3 WORLD ENVIRONMENT DAY

Gibraltar, along with over 100 countries around the globe, was busy on Monday the 5th June promoting environmental awareness and protection through a series of activities planned to celebrate World Environment Day 2007.

This is the third year in which Gibraltar celebrated the United Nation's flagship environmental awareness event and the seminar organised by the Department of the Environment was a great success. World Environment Day was established by the United Nations General Assembly in 1972 and is the flagship environmental event through which the United Nations encourages worldwide awareness of the environment. It is celebrated every year on the 5th June in more than 100 countries around the world, and Gibraltar is proud have been added to this growing list of countries. Previous initiatives have focused on contemporary issues such as the decline in biodiversity. This year's theme is perhaps the most contested environmental issue to date – climate change.

The morning session focused on spreading environmental awareness as interpreted through the eyes of our younger population and it must be said, one message was made very clear, Gibraltar's children were very much aware of their environment and they care deeply for it! School plays were held during the morning, and each participating school received a commemorative plate and an environmental DVD.

The afternoon session included several speakers discussing their views on climate change locally and globally. Members of local groups, companies, organisations and Government departments attended the event.

In addition to this, the Ministry for the Environment organised a Trade Fair which was held on Saturday 2nd June from 10.00am to 1.00pm at Casemates Square. Local companies and organisations were invited to display various eco-friendly products for the public to view. The displays ranged from general information on climate change to the display of renewable energy technologies, hybrid and electric vehicles and public transport.

The events all proved to be a great success and the Department is already planning the following year's events which will be focused on the theme of Energy efficiency, with the slogan CO_2: Kick the Habit!

Chapter 8 Energy Issues

8.1 INTRODUCTION

With global energy demand and associated greenhouse gas emissions set to continue rising, the imperative for a shift towards more sustainable energy production and consumption has never been greater. Gibraltar, through our Kyoto and EU commitments, is committed to introducing energy efficient policies in all sectors of our society. Using energy more efficiently is the fastest and most cost effective way of cutting carbon dioxide emissions throughout our community.

8.2 ENERGY EFFICIENCY

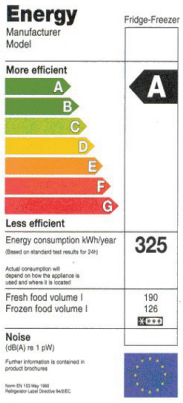
Substantial savings in energy can be made through simple, but effective, changes in the way we use our energy. GOG is promoting this through the development of an Energy Efficiency Action Plan and via the Green Business Programme.

The Energy Efficiency Action Plan tackles various different sectors. The first is the residential, building and public sector.

GOG, through the DPC, requires new development proposals to include sustainability and environmental features in the form of pre-conditions to the licence application. This will be further strengthened by the introduction of Energy Performance Certificates which will give information on the energy rating of a building and provide advice on how to improve it. This scheme is set to commence in 2009 and will hopefully result in the construction of increasing numbers of low carbon buildings.

Energy efficiency improvement measures such as the installation of new efficient boilers, better insulation and ventilation of buildings and the use of motion detectors and energy efficient light bulbs for lighting systems in commercial buildings will all be encouraged and ultimately be made compulsory for the business and public sectors.

The transport sector is also tackled, 98% of the energy consumed within this sector comes from fossil fuels therefore it is a major contributor to global warming. In order to deliver energy savings in this area the Government will encourage the introduction of smarter, more energy efficient transport. These potentials can be achieved by ensuring fuel efficiency of cars, developing markets for cleaner vehicles, ensuring the maintenance of proper tyre pressure, and by improving the efficiency of urban transport systems. Government also recognizes the importance of encouraging behavioural change via a sustained awareness and education campaign.



Cross sectoral measures such as energy labelling of products, improved metering and billing systems and the continuation of the Green Business Programme will also assist Gibraltar in reducing its energy demand and thus its carbon footprint.

Guidance notes are being issued to all Government Departments, advising them of ways in which they can improve their energy performance. These notes include advice on green procurement, the installation of energy efficient lighting, waste management and water saving measures.

The development of the Green Business Programme will continue, with businesses being informed of the need for greener practices within the work place and being encouraged to sign up to this voluntary initiative.

8.3 RENEWABLE ENERGY

Renewable energy is energy generated from natural resources such as the sun, wind and tides. It encompasses all sources of energy, other than fossil fuels or nuclear power, that are naturally and indefinitely replenished. There are various international and European agreements that aim to promote the production of renewable energy such as the Kyoto Protocol and the EU Directive on the promotion of electricity produced from renewable energy sources.

The Government of Gibraltar is dedicated to the idea of generating Gibraltar's electricity from renewable energy sources and is committed to producing 12% of its energy from renewables by 2012, with this increasing to 20% by 2020. In order to assist this endeavour it recently engaged a firm of UK consultants to investigate which of the commercially available renewable technologies would be most feasible for Gibraltar, given its unique environmental and socio-economic setting.

The study examined the various technologies considered to be technically viable (either as currently developed or in the foreseeable future as the technology reaches commercialisation) and assessed their feasibility in relation to Gibraltar's size and needs.

The consultants report concluded that the options which are feasible for consideration as renewable technologies for Gibraltar are the following:

- Wind Power Onshore
- Wind Power Offshore
- Energy from Waste
- Marine Current Generators

Plans for the re-design, update and refurbishment of the existing energy-from-waste plant are already are under way. The potential for energy from wind and tide is still under review.

Chapter 9 Habitats & Biodiversity

The term biodiversity refers to the large range of species, habitats and ecological systems that make up the living planet. The maintenance of a healthy level of biodiversity is essential for the continued well being of the human race. Natural ecosystem processes provide essential services such as air quality management, water purification, climate control, biological pest control and the prevention of erosion to name but a few. In addition to these, eco-systems provide non-material benefits such as leisure and cultural activities as well as being of aesthetic value.

The main threats to biodiversity in Gibraltar continue to be:

- Development pressure
- Habitat fragmentation and loss
- Water management and drainage
- Spread of non-native species
- Human interference

Gibraltar has transposed the EU Habitats Directive (92/43/EEC) which was designed to provide long-term protection for a network of the most important wildlife sites across the EU.

9.1 SITES OF COMMUNITY INTEREST

Wildlife Ltd., under contract to GOG, produced a six year report on the state of Gibraltar's habitats which was published in 2007.

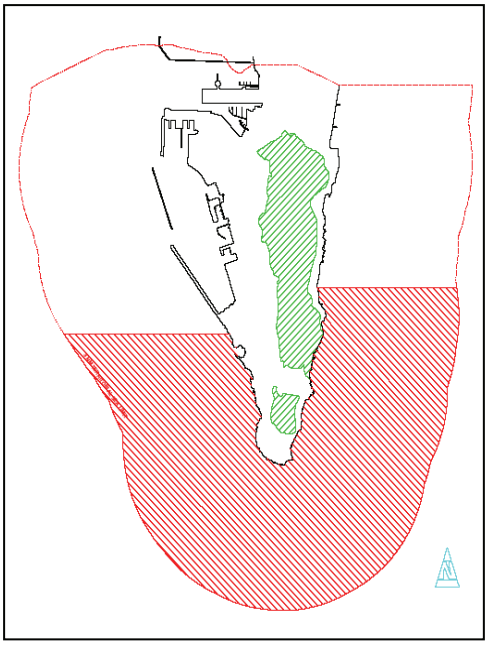


Fig. 9.1 Designated Sites of Community Importance

Under the Habitats Directive, two sites in Gibraltar were designated Sites of Community Importance in 2006: UKGIB0001 Rock of Gibraltar (shaded green) and UKGIB0002 Southern Waters of Gibraltar (shaded red) (see Fig. 9.1).

GOG is currently reviewing a Biodiversity Action Plan, prepared by the Gibraltar Ornithological and Natural History Society (GONHS) for the management of the two sites.

To date, no management body has been formally created for either of the two sites, however, the Gibraltar Tourist Board and the Ministry for the Environment manage, or fund management aspects of, the Upper Rock Nature Reserve. These include cleaning, clearing of firebreaks and the management of the Barbary Macaques.

Table 9.1 shows the different habitats identified in the 2007 report along with the main pressures and threats that they face.

Habitat Type	Area covered by Habitat	Main Pressures and Threats
Submerged or Partly Submerged Sea Caves	A number of submerged and partly submerged sea caves distributed along a stretch of approx. 4.5km	Sand and Gravel extraction Sea level rise due to climate change
Reefs	1.2km²	Leisure Fishing Professional Fishing Nautical Sports Water pollution
Dunes with Euphorbia terracina	0.2 km^2	Invasion by a species Continuous urbanisation
Malcolmietalia Dune Grassland	0.25km²	Invasion by a species Continuous urbanisation
Vegetated Sea Cliffs of the Mediterranean Coast (with endemic Limonium spp.)	0.55km²	Other pollution or human impacts Eutrophication (by gull droppings) Invasion by a species Urbanised areas, human habitation Mountaineering, rock climbing and speleology Air pollution
Vegetated Calcareous Inland Cliffs with Chasmophytic Vegetation	1.4 km^2	Eutrophication (by gull droppings) Invasion by a species Mountaineering, rock climbing and speleology Air pollution
Olea with Ceratonia Forests	2.25km²	General forestry management Other pollution or human impacts Fire (natural) Urbanised areas, human habitation
Matorral with Laurus nobilis	0.08 km^2	Urbanised areas, human habitation Fire (natural) Air pollution Other forms or mixed forms of interspecific floral competition
ThermoMediterranean pre-steppe brush, with low formations of Euphorbia close to cliffs	0.8 km^2	Military manoeuvres Other natural processes (vegetation succession of matorral)
Caves not opened to the public	Unknown within 5km range	Pollution (deposition of litter & waste) Vandalism (including disturbance) Drying out

Ministry for the Environment
Government of Gibraltar

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