Malta Tourism Authority

Ix-Xaghra l-Hamra Golf Course, Mellieha Malta

Technical Appendix 2: Air Quality Baseline Survey

Supporting Document for
Environmental Impact Statement

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CONTENTS

TABLES

AIR QUALITY BASELINE SURVEY

INTRODUCTION

1. A baseline air quality study was undertaken to ascertain the prevailing air quality in the vicinity of the proposed Golf Course at Ix-Xaghra l-Hamra, limits of Manikata, against which the effects of the development and operation of the proposed Golf Course would be assessed.

2. The assessment of the proposed Ix-Xaghra l-Hamra Golf Course on air quality has been undertaken in accordance with the Terms of Reference issued by the Malta Environment & Planning Authority (MEPA) and the Air Quality Method Statement prepared by the EIA consultants and as approved by MEPA on 27th September 2005 . The ToR require background measurements of the existing air quality and micrometeorology of the area.

3. These measurements will be limited to the context of a baseline survey on the following:

   - Prevailing wind currents in order to evaluate the effect of emissions and chemical drift downwind,
   - The current levels of emission chemicals and dust particles downwind from the Site, namely dust deposition, PM_{10}, SO_x, NO_x, and VOC's. See **Table 1**.

STANDARDS AND GUIDANCE

4. Relevant Maltese legislation and European Union Directives are:

   - LN 214 of 2001 Control of Volatile Organic Compound Emissions;
   - LN 225 of 2001 Control of Volatile Organic Compound Emissions;
   - LN 291 of 2002 National emission ceiling for certain atmospheric pollutants regulations;
   - LN 216 of 2001 ambient air quality assessment and management regulations;
   - LN 224 of 2001 Limit values for nitrogen dioxide, sulphur dioxide, oxides of nitrogen, particulate matter, and lead in ambient air regulations;
   - LN 211 of 2001 Combating of air pollution from industrial plants regulations;
   - EU guidelines on air quality including Directive 99/30/EC: Limit Values for SO2, NO2 and NOx, particulate matter and Pb in air;

- EC Directive 2000/69/EC relating to limit values for benzene and carbon monoxide;
- EC Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment;
- EC Directive 1999/30/EC. On air quality limit values and guide values for sulphur dioxide and suspended particulates;
- EC Directive 779/80/EEC on air quality limit values and guide values for sulphur dioxide and suspended particulates (OJ L 229, 30.8.80, and subsequently amended);
- EC Directive 96/62/EC on ambient air quality assessment and management (OJ L 296, 21.11.96);
- EC Directive 99/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations (OJ L 85, 29.3.99);
- EC Directive 91/692/EEC) standardizing and rationalizing reports on the implementation of certain Directives relating to the environment;
- EC Decision 97/101/EC of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States (OJ L 35, 5.2.97);
- Amended proposal for a Directive of the European Parliament and of the Council on limit values for benzene and carbon monoxide in ambient air (COM (2000) 223, final; 11.4.2000; 1998/0333 (COD); and
- EU Directive 2000/71/EC of 7 November 2000 to adapt the measuring methods as laid down in Annexes I, II, III and IV to Directive 98/70/EC of the European Parliament and of the Council to technical progress as foreseen in Article 10 of that Directive.

5. The limits for air-borne pollutants are the following.

Table 1: Evaluation Criteria

Name of Pollutant	Criteria based on	Value according to Directive 99/30/EC
SO_2	Daily mean	125 ug/m^3
NO_X	Daily mean	40 ug/m^3
Ozone	Daily mean	110 ug/m^3
Carbon Monoxide	8 - Hourly mean	10 mg/m^3NA
PM_{10}	Daily mean	50 ug/m^3

Source EU DIR 99/30/EC

6. Although no EU standards for dust sedimentation exist, guidelines for dust deposition in the UK show that with a wind velocity of 4m/sec and a deposition velocity of 0.03m/sec produce an average concentration of 0.1 mg/m^3 of suspended dust. This results in a daily average dust deposition rate of 260 mg / m^2/ day.

7. Typical UK deposition rates[1] are:

- Rural 40 – 60 mg / m^2/ day
- Urban 80 – 120 mg / m^2/ day
- Industrial Areas (within 500 metres) 40 – 500 mg / m^2/ day
- Coal transport facilities 130 – 900 mg / m^2/ day

AIR QUALITY BACKGROUND SURVEYS

8. The sampling for the respective parameters was carried out on-site as follows:

	PM10	Dust deposition	VOCs	SO_2	NO_x
Date	11th August 2005 – 17th August 2005	17th August 2005 – 21st August 2005	19th August 2005	19th August 2005	19th August 2005
Mean Wind direction	North	North	North Westerly	North Westerly	North Westerly
General Weather conditions	Clear	Clear	Clear	Clear	Clear
Sampling location	North Side, Manikata Church	North Side, Manikata Church	North Wall, water reservoir	Manikata Church Car-Park	

Sampling Methodology

9. The methods and sampling strategies and measurements for the various emissions are described in the relevant EU Directives. The Directives are referenced in the Air Quality Framework Directive 96/62/EC. An ample description is given in the Position paper for PM_{10}, published on 8 April 1997, entitled Guidance report on the Annexes to Decision 97/101/EC.

10. The standard methods of sampling, measurements and evaluation are the following:

Dust particulates (PM_{10})

11. Council Directive 99/30/EC, Annex IX is relevant to the measurement of dust particulates. The method requires that an amount of air is aspirated onto a filter and

[1] Source: EIS for PA 04179/99: Verdala Golf Course and Country Club Planning Services Consultancy and Land Use Consultants 2002

the mass of particles passing through a 10 micron filter is weighed and extrapolated against the normalized volume of sampled air.

12. For dust settling measurements, a Buckner funnel with an appropriate filter paper is allowed to stand in the open for a number of days. Solid precipitates are collected on the filter; they are measured by gravimetric analysis. Sampling and analytical methods were based on the Italian State referenced methods, UNICHIM.

Sulphur dioxide (SO_2): :UNI 122/1986

13. Principle of method: an amount of air, 200 L, is bubbled through a chemical solution using tetrachloromercurate colour reagent to absorb the gases. The reacted gases are then determined spectrophotometrically. The concentration of absorbed gas is extrapolated against the normalized volume of sampled air.

Nitrogen oxides (NO_x): UNI 122/1986, ISO 11564:1998

14. Principle of method: an amount of air, 200L, is bubbled through a chemical solution using Naphthylethylenediamine colour reagent to absorb the gases. The reacted gases are then determined spectrophotometrically. The concentration of absorbed gas is extrapolated against the normalized volume of sampled air.

Benzene (C_6H_6) and Volatile Organic Carbons (VOC's) UNI 10493

15. The gases are adsorbed on diffusion tubes containing charcoal. The adsorbed gases are then dissolved in an appropriate solvent and measured by gas chromatography. The concentration of adsorbed gas is extrapolated against the normalized volume of sampled air.

Results

16. The mean daily values calculated on the basis of the analytical results of the respective samples for the Ix-Xaghra l-Hamra Golf Course sites are included in **Table 2**.

Table 2: Air quality monitoring results

	PM10	Dust deposition	VOCs	SO_2	NO_X
Dates:	11th August 2005 to 17th August 2005	17th August 2005 to 21st August 2005	19th August 2005	19th August 2005	19th August 2005
Mean Wind direction:	North	North	North Westerly	North Westerly	North Westerly
General Weather conditions:	Clear	Clear	Clear	Clear	Clear
Sampling location:	North Side, Manikata Church	North Side, Manikata Church	North Wall, il-Gibjun tal-Manikata	Manikata Church Car-Park	

	PM10	Dust deposition	VOCs	SO_2	NO_x
Analytical Results	<5 µg/Nm^3	294 mg/m^2/day	0.16 mg/Nm^3	42 µg/Nm^3	33 µg/Nm^3
Value according to Directive 99/30/EC (See Table 1)	50 ug/m^3	-	-	125 ug/m^3	40 ug/m^3

CONCLUSIONS

17. The air quality measured at the Site of the proposed Ix-Xaghra l-Hamra Golf Course compares favourably with the EU standards for all indicators. All the measurements carried out in this exercise gave values that are below the limits indicated in the respective EU Directives.