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SHANGANAGH CREMATORIUM **STUDY**

Proposed Crematorium and Associated Works

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CONSULTING ENGINEERS

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1 Introduction

Dun Laoghaire Rathdown in May 2016 applied under Part 8 of the Planning and Development Regulations to develop a crematorium, 2 memorial halls and coffee shop in an existing vacant field between the existing burial areas in Shanganagh Cemetery.

A number of observations were made to An Bord Pleanála on foot of this application. Clifton Scannell Emerson Associates, Consulting Engineers were requested to report and comment on these observations. Clifton Scannell Emerson Associates were not part of the design team for the Part 8 submission for the proposed Crematorium. This report is developed by Clifton Scannell Emerson Associates and Byrne Environmental.

This report should be read in conjunction with the proposed drawing plans for the development.

The main areas of concern are as follows:

1. An assessment of whether an Environmental Assessment is required for this development.
2. Report on the emissions from the proposed Crematorium.
3. Report on the traffic generated by this development.

2 Environmental Impact Assessment

This report has been prepared by Clifton Scannell Emerson Associates, on behalf of Dun Laoghaire Rathdown County Council, in response to a third party request for an EIA direction by An Bord Pleanála, submitted under Article 120 (3b) of the Planning and Development Regulations 2001 – 2015. Article 120 (3b) states that:

"Where any person considers that a development proposed to be carried out by a local authority would be likely to have significant effects on the environment, he or she may apply to the Board for a determination as to whether the development would be likely to have such significant effects and the Board shall make a determination on the matter as soon as possible."

The request, submitted by the Corbawn Area Residents' Association, states that there are significant concerns among local residents in relation to the impact of the proposed development on local traffic and also in relation to emissions from the proposed crematorium and associated development at Shanganagh Cemetery, Shankill, Co. Dublin.

2.1 REQUIREMENT FOR ENVIRONMENTAL IMPACT ASSESSMENT

Section 171A of the Planning and Development Act 2000, as amended (the Act), defines Environmental Impact Assessment (EIA) as *"an assessment, which includes an examination, analysis and evaluation, carried out by a planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that shall identify, describe and*

assess in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of a proposed development on the following:

- a) human beings, flora and fauna,*
- b) soil, water, air, climate and the landscape,*
- c) material assets and the cultural heritage, and*
- d) the interaction between the factors mentioned in paragraphs (a), (b) and (c)."*

Section 172(1) of the Act requires that "An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either—

(a) *the proposed development would be of a class specified in—*

(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—

- (i) such development would exceed any relevant quantity, area or other limit specified in that Part, or*
- (ii) no quantity, area or other limit is specified in that Part in respect of the development concerned,*

or

(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either—

- (i) such development would exceed any relevant quantity, area or other limit specified in that Part, or*
- (ii) no quantity, area or other limit is specified in that Part in respect of the development concerned,*

or

(b)

- (i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not exceed the relevant quantity, area or other limit specified in that Part, and*
- (ii) the planning authority or the Board, as the case may be, determines that the proposed development would be likely to have significant effects on the environment."*

We assess the proposed development in the context of Parts 1 and 2 of Schedule 5 of the Regulations in detail below.

The requirement for EIA to be undertaken as part of the proposed development

Parts 1 and 2 of Schedule 5 of the Regulations set out the thresholds at which EIA is required as part of development proposals.

There are no classes of development within Part 1 of Schedule 5 of relevance to the proposed crematorium and associated development on the subject site.

The following class of development within Part 2 of Schedule 5 are of relevance to the proposed development:

Part 2(10) – Infrastructure Projects

“(iv) Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere. (In this paragraph, “business district” means a district within a city or town in which the predominant land use is retail or commercial use.) (Emphasis added)

The proposed development, whilst an ‘urban’ form of development, is not located within a business district and is not situated within a built-up area. As such, given the site area of the proposed development is 4.15ha, the proposal is not of a scale which accords with the above thresholds, being substantially under both the 10 and 20 hectare thresholds, and, as such, there is no mandatory requirement to undertake Environmental Impact Assessment.

It is noted that in accordance with Section 172(1)(b) of the Act, sub-threshold EIA may be required, where the planning authority or the Board determine that, notwithstanding that it is below the thresholds for mandatory EIA, it would be likely to have significant effects on the environment. In this respect we note that Directive 2014/52/EU¹ outlines that, when undertaking EIS screening, *“The screening procedure should ensure that an environmental impact assessment is only required for projects likely to have significant effects on the environment.”* (JSA emphasis).

Schedule 7 of Part 2 of the Regulations sets out criteria for determining whether a development would or would not be likely to have significant effects on the environment. The characteristics focus on:

- The characteristics of the proposed development;
- The location of the proposed development; and
- The characteristics of potential impacts arising from the proposed development

These criteria are very similar to the criteria set out at Annex III of Directive 2014/52/EU and in this respect we note that the Directive requires that:

“The selection criteria laid down in Annex III to Directive 2011/92/EU, which are to be taken into account by the Member States in order to determine which projects are to be subject to environmental impact assessment on the basis of their significant effects on the environment, should be adapted and clarified. For instance, experience has shown that projects using or affecting valuable resources, projects proposed for environmentally sensitive locations, or projects with potentially hazardous or irreversible effects are often likely to have significant effects on the environment.” (JSA emphasis).

¹ Directive 2014/52/EU amends and updates Directive 2011/92/EU, which itself codified Directive 85/337/EU (the EIA Directive) and a number of subsequent amendments

It can be seen from the foregoing that the Directive seeks to focus EIA screening, to projects with potential significant impacts affecting valuable resources, environmentally sensitive locations or potentially hazardous or irreversible effects.

Characteristics of the Proposed Development

The proposed development comprises a new crematorium facility at Shanganagh Cemetery in Shankill, Co Dublin. The facility is located in the vacant field between the two developed cemetery burial areas. It is bounded to the north by Shanganagh Park and to the south by the lands at Woodbrook. The existing car park, bring facility and the existing cemetery are situated along its eastern and western sides respectively.

The proposed facility comprises a series of buildings carefully arranged on the site to create a series of unfolding experiences along a processional route. The following buildings to be provided are as follows:

- An 'upper' and 'lower' hall, for conducting memorial ceremonies;
- An administration building, comprising staff facilities and public toilets;
- A crematorium building; and
- A coffee and flower shop.

The proposal also includes the following associated developments:-

- Additional car parking facilities
- A columbarium wall
- New burial plots
- A meadow
- A woodland copse and walk
- A future pedestrian route to connect to the Woodbrook LAP lands to Shanganagh Park.

The application site occupies an area of 4.15 ha and the proposed buildings occupy a total area of 636 sq. m.

The location of the proposed development

The application site is not located in an environmentally sensitive area. There are no environmental designations pertaining to either the application site or adjoining lands. Furthermore, detailed ecological surveys undertaken as part of the proposed development have found no species or habitats of ecological importance within the application site. The proposed development would therefore not have any likely significant impact on species or habitats of ecological importance.

In respect to potential off-site significant impacts, consideration has been given to environmentally sensitive locations in the surrounding area. In this respect it should be noted that an Appropriate Assessment Screening Report has been undertaken as part of the proposed development and this Report has concluded that *"there will be no likelihood of*

significant effects on any European sites², arising either from the proposed development along or in combination with other plans or projects.” The proposed development would therefore not have any likely significant impact on species or habitats of ecological importance in the surrounding area.

In respect to the use of valuable resources, whilst the application site is currently undeveloped, it should be noted that the Dun Laoghaire Rathdown County Development Plan 2016 – 2022 contains a site-specific objective in relation to the application site “*To encourage the development of a crematorium at Shanganagh Cemetery.*” It can thus be seen from the site-specific objective that the Council’s strategic ambition for the lands is to facilitate the development of a crematorium in the future.

Characteristics of potential impacts arising from the proposed development

The most likely impacts arising during the construction phase are likely to arise from construction activities (i.e. noise and disturbance) and construction traffic. Given the relatively small amount of construction activity required, it is not considered that construction activities or traffic would have a significant impact on the surrounding environment. In any case, Dun Laoghaire Rathdown County Council will prepare a Construction Management Plan (including the management of construction traffic) to control and manage all aspects of the construction phase.

At the operational phase, the most likely potential impacts arising are considered to relate to air quality and vehicular traffic. The accompanying Engineering Report prepared by Byrne Environmental provides detailed assessments of the potential air quality and traffic impacts arising from the operational phase and concludes that the proposed development would not have any likely significant effects subject to incorporation of the recommended mitigation measures as part of the design process.

Conclusion

The proposed development falls below the thresholds at which the requirement to undertake EIA is mandatory.

It is noted that sub-threshold EIA may be required, where the planning authority or the Board determine that, notwithstanding that it is below the thresholds for mandatory EIA, it would be likely to have significant effects on the environment. Having considered the characteristics of the proposed development, the location of the proposed development and the characteristics of potential impacts arising from the proposed development, it has been concluded that the proposed development would not have any likely significant impacts on the environment and there is therefore no requirement to undertake EIA.

² Natura 2000 sites

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3 Emissions Report:- Byrne Environmental Consulting Ltd

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AIR QUALITY ASSESSMENT

FOR A

PROPOSED CREMATORIUM

AT

**SHANGANAGH CEMETERY
DUN LAOGHAIRE
Co. DUBLIN**

FOR

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4th October 2016R1

A handwritten signature in blue ink that reads 'Ian Byrne'.

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Project Number: 13_110

Project: Shanganagh Crematorium Study

Title: Proposed Crematorium and Associated Works



EXECUTIVE SUMMARY

Byrne Environmental Consulting Ltd have assessed the potential air quality impacts associated with a proposed crematorium to be located within the Shanganagh Cemetery, Dun Laoghaire, Co. Dublin with consideration of the receiving environment and the health of people residing in the local area.

The proposed crematorium shall be designed and operated in accordance with *UK DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12)* and will include state of the art exhaust gas abatement systems.

The results of the air quality assessment demonstrates that under maximum operational scenarios, emissions from the crematorium's exhaust stack will be effectively dispersed and emissions will be significantly lower than the air quality limit values specified in the *Air Quality Standards Regulations 2011, S.I. No. 180 of 2011*, thus maintaining local ambient air quality and posing no risk to human health.

1.0 INTRODUCTION

This report presents the results of an assessment of the impact of emissions to atmosphere from a proposed crematorium at Shanganagh Cemetery, Dun Laoghaire, Co. Dublin.

This report presents a description of the cremation process, a characterisation of the existing baseline air quality based on up to date published data, the identification of the potential sources of emissions to atmosphere, a description of the control measures and finally a demonstration of how emissions to atmosphere from the operation of the crematorium will comply with the following relevant air quality assessment criteria documents:

Irish Air Quality Standards Regulations 2011, S.I. No. 180 of 2011

The Danish Industrial Air Pollution Control Guidelines

TA Luft: German Technical Instructions on Air Quality Control.

UK DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12)

2.0 DESCRIPTION OF PROCESS AND SOURCES OF EMISSIONS TO ATMOSPHERE

2.1 PROCESS DESCRIPTION

The proposed development involves the operation of a crematorium building which will house a modern computer controlled gas fired cremation system which will be supplied by one of the leading European cremation systems manufacturers. This assessment report has considered a maximum operational scenario of up to 6 cremations per day.

The cremator and the abatement systems are computer controlled to ensure optimum operating conditions during each cremation. Prior to the charging of the cremator with a coffin, the cremator is preheated to ensure that the secondary combustion zone maintains a minimum 800°C throughout the cremation process to ensure efficient combustion. During the cremation process the combustion gases are extracted from the cremator and pass through the waste gas abatement system.

The waste gas abatement system consists of a heat exchanger, a dust extraction unit and an activated Carbon and Calcium Oxide filtration system which removes organic compounds, HCl and HF, Dioxins, Mercury and mercurial compounds. The rapid cooling of the exhaust gases through the process further minimises the potential for reformation of Dioxins and Furans to occur.

The cleaned gases are finally emitted from a defined height (6.7m above ground level) discharge stack to atmosphere which operates at an optimum exit velocity to ensure the dispersal of the cleaned waste gases.

2.2 SOURCES OF AIR EMISSIONS

The proposed cremation unit will be vented to a clean exhaust stack located above roof level of the crematorium building.

Emissions to atmosphere from the proposed crematorium will include combustion gases NO_x, SO₂, CO, particulate matter and water vapour. Hydrochloric acid, mercury and organic compounds, including dioxins and furans, may also be present in the emission stream.

The cremation unit will utilise natural gas as a fuel which will ensure minimal emissions of SO₂. In addition, the use of low NO_x burners will ensure minimal emissions of NO_x.

Table 1 DFW Cremation Unit Air Emission Characteristics

Maximum Period of emission	8 hours per day, up to 7 days per week
Max Emission volume per hour	2.1 N m ³ / hour
Max Exit Velocity	15m/sec
Max Temperature of emission	160°C
(Effective) Stack height	6.7m above ground level
Stack Diameter	450mm
Fuel type	Natural Gas
Composition of maximum Permissible emissions	Concentration
Hg	50 ug / m ³
HCl	30mg / m ³
Particulates (dust)	20 mg / m ³
CO	100mg/m ³
Organic Compounds	20mg/m ³
PCDD/F	0.1 ng/m ³

Note:

Maximum permissible emission concentrations are derived from DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12) and therefore represent a worst case emissions scenario.

3.0 AIR QUALITY IMPACT ASSESSMENT

3.1 AIR QUALITY ASSESSMENT CRITERIA

The criteria against which the predicted impact of crematorium emissions on ambient air quality was assessed are the *Irish Air Quality Standards Regulations 2011, S.I. No. 180 of 2011 and Ambient Air Regulations, S.I.58 of 2009*.

The **Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC)** was published in May 2008. It replaced the Framework Directive and the first, second and third Daughter Directives. The **fourth Daughter Directive (2004/107/EC)** will be included in CAFE at a later stage. The limit and target values for both Directives are outlined below.

The CAFE Directive was transposed into Irish legislation by the **Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)**. It replaces the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

The fourth Daughter Directive was transposed into Irish legislation by the **Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I. No. 58 of 2009)**

The *DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12)* provides relevant guidance and emissions limit criteria for the operation of the proposed crematorium which are referenced in this assessment report.

Air quality is assessed relative to Air Quality Standards which are the concentrations of pollutants in the atmosphere which achieve a certain standard of environmental quality. Air Quality Standards are formulated on the basis of an assessment of the effects of the pollutants on public health and also on ecosystems, and they are chosen to represent the levels of pollutants in ambient air which would pose risk to human health.

The criteria against which the scenarios modelled in this study are compared to and discussed in relation to ambient air quality standards have been defined nationally and internationally. Air quality standards and guidelines referenced in this report include those from the European Union, Ireland, the World Health Organisation (WHO), Denmark and Germany.

The German TA Luft Technical Instructions on Air Quality Control specify ambient air quality (or emission) standards for Class I, II, and III Organic compounds. These standards are normally defined in respect of either annual averages, 24-hour averages or as the 98-percentile of one-hour averages. Other European Standards of relevance are C-Values from the Danish Industrial Air Pollution Control Guidelines. The C-Value is the value, expressed as the maximum one-hour average concentration, which must

not be exceeded for 99-percent of the time i.e. it is the limit value for the 99-percentile of 1-hour average ground level concentrations.

The model predicts maximum ground level concentrations of pollutants over specified averaging intervals; these values are then compared with the relevant Air Quality Standards to verify that the Standards are not exceeded.

3.2 AMBIENT AIR QUALITY

The existing ambient air quality at the subject site is characterised as being good where the principal sources of air emissions are combustion engine emissions from local road networks including the M11 motorway located west of the site. Domestic heating sources in the general area will also contribute to local air emissions. There are no major industrial installations in the vicinity of the site which may exert an influence on local ambient air quality

In order to assess the existing ambient air quality in the vicinity of the subject site located in Dun Laoghaire, Co. Dublin it is necessary to review available air quality monitoring data from published sources such as the most recent EPA's Annual report entitled *Air Quality in Ireland 2014*. This EPA report provides detailed air quality monitoring data collected from a number of monitoring locations throughout Ireland. There is data available specifically for Dun Laoghaire & Balbriggan areas which is specified as a Zone A area by the EPA.

Table 2 Ambient Air Quality Data Dun Laoghaire/Balbriggan EPA 2014

Parameter	Averaging Period	Concentration Limit Value
Sulphur Dioxide (SO ₂)	Annual	6 mg/m ³
	24 hour	18 mg/m ³
	1-hour	68 mg/m ³
Nitrogen Dioxide (NO ₂)	Annual	15 mg/m ³
	1-hour	105 mg/m ³
Particulate Matter PM ₁₀	Annual	14mg/m ³
Carbon Monoxide (CO)	8-hour mean	116 mg/m ³ (Zone A)
	Annual Mean	53 mg/m ³ (Zone A)
Mercury	Annual mean	1.44 ng/m ³ (Zone D)

Nitrogen Oxides

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m³ for the protection of human health. The standard, taken from Daughter Directive 2000/69/EC, came into force in 2005.

Sulphur Dioxide

The Air Quality Standards Regulations 2011 specify an annual limit value of 20 $\mu\text{g}/\text{m}^3$ for the protection of human health. The standard, taken from Daughter Directive 2000/69/EC, came into force in 2005.

Carbon Monoxide

The Air Quality Standards Regulations 2011 specify a limit value of 10,000 $\mu\text{g}/\text{m}^3$ for carbon monoxide (CO), which is applied to the maximum daily eight-hour mean concentration. The standard, taken from Daughter Directive 2000/69/EC, came into force in 2005.

Hydrocarbons

The Air Quality Standards Regulations 2011 specify a limit value of 5 $\mu\text{g}/\text{m}^3$ for benzene which is based on the annual mean concentration. The standard, taken from Daughter Directive 2000/69/EC, comes into force in 2010. It is the first standard to be adopted for benzene in Ireland and is used as the reference for benzene assessment here.

Particulate Matter PM₁₀

PM₁₀ is particulate matter less than 10 μm aerodynamic diameter (or, more strictly, particles which pass through a size selective inlet with a 50% efficiency cut-off at 10 μm aerodynamic diameter. Airborne particles originate from a wide variety of sources. Significant natural sources of PM₁₀ particles include re-suspension of soil material in rural areas, sea spray and reactions between natural gaseous emissions. Particles are classified into two categories. They may be primary – they are emitted directly from primary sources such as industrial sources, power stations, cement factories combustion process and motor vehicles; or they may be formed from secondary sources – particles formed within the atmosphere from condensation of vapors, or as a result of chemical reaction processes.

The Air Quality Standards Regulations 2011 specifies a limit value of 50 $\mu\text{g}/\text{m}^3$ for the 24-hour average concentration of PM₁₀, not to be exceeded more than 35 times in a calendar year (90.4 percentile).

Hydrogen Chloride

Hydrogen chloride and mercury may also be present in emissions from the cremator. Air quality monitoring for HCl in Ireland is limited to studies completed in respect of existing or proposed industrial facilities. No Literature data was available to give reliable assessments of annual background levels of HCl in Ireland.

Mercury

One of the metals for which limited data is available from the monitoring stations operated by the EPA in Ireland is mercury. Concentrations have only been measured in a Zone D (Macehead) and in the EPA's 2014 Report an annual mean value of 1.44 ng/m^3 is reported.

Dioxins and Furans

Ambient air quality data for ambient levels of dioxins and furans in Ireland is limited to data acquired in support of industrial development proposals; the studies on PCDD/PCDF levels in cow's milk completed by the EPA are also useful sources of information. The UK Toxic Organic Micro Pollutants (TOMPS) Network reports annual average concentrations of PCDDs/PCDFs in rural areas of 4.7 – 14 fg/m³ I-TEQ.

Table 3 Assessment criteria for air quality impact assessment

Parameter	Averaging Period	Concentration Limit Value	Air Quality Standard
Sulphur Dioxide (SO ₂)	Annual	20 mg/m ³	Irish AQS SI No. 180 [1]
	24 hour	125 mg/m ³	Irish AQS SI No. 180 [1]
	1-hour	350 mg/m ³	Irish AQS SI No. 180 [1]
Nitrogen Dioxide (NO ₂)	Annual	40 mg/m ³	Irish AQS SI No. 180 [1]
	Annual	30 mg/m ³	Irish AQS SI No. 180 [1]
	1-hour	200 mg/m ³	Irish AQS SI No. 180 [1]
Particulate Matter PM ₁₀	Annual	20 mg/m ³	Irish AQS SI No. 180 [1]
	24-hours	50 mg/m ³	Irish AQS SI No. 180 [1]
	1-hour	40 mg/m ³	PG5/2(12) [4]
Carbon Monoxide (CO)	8-hour mean	10,000 mg/m ³	Irish AQS SI No. 271 [1]
	1-hour	200,000 mg/m ³	PG5/2(12) [4]
HCl	1 hour mean	50 mg/m ³	Danish C-Value [2]
	1 hour mean	30 mg/m ³	PG5/2(12) [4]
Organic Compounds	TA Luft Class I	50ug/m ³	TA Luft [3]
	TA Luft Class II	200 ug/m ³	TA Luft [3]
	TA Luft Class III	1000 ug/m ³	TA Luft [3]
Organic matter as C	1 hour mean	20 mg/m ³	PG5/2(12) [4]
Mercury	1 hour mean	50 ug/m ³	PG5/2(12) [4]
Dioxins & Furans		0.1ng / ITEQ	PG5/2(12) [4]

Notes

- [1] Irish Air Quality Standard Regulations, SI No. 180 of 2011.
 [2] The Danish Industrial Air Pollution Control Guidelines specify a C-value which is the value which must not be exceeded when expressed as the 99-percentile of 1-hour values.
 [3] TA Luft: German Technical Instructions on Air Quality Control.
 [4] DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12)

3.3 SIGNIFICANCE

Based on published air quality data for the equivalent area in the vicinity of the subject site it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the *Air Quality Regulations 2011* limit values of individual pollutants.

The quality of existing air quality at the subject site must be maintained as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

3.4 SENSITIVITY

The proposed development may be regarded as a relatively small scale activity. It is considered that the existing ambient air quality has sufficient "budget" to accommodate the minor increases in air emissions associated with the cremation process to ensure that the receiving environment is not adversely impacted.

Appropriate mitigation and control measures are incorporated into the design and operation of the crematorium to ensure the existing ambient air quality is maintained and that the operation of the crematorium will not have an adverse impact on the receiving environment, public health or animal welfare.

3.5 AIR DISPERSION MODELLING STUDY

3.5.1 METHODOLOGY

A computer based air dispersion modelling study was conducted to model and mathematically predict combustion gas, organic compounds and particulate emissions from the crematorium exhaust stack based on the maximum operating specifications of the subject plant and to assess these emissions as ground level concentrations expressed as micrograms per cubic meter to allow for direct comparison with National Air Quality Standard Limit Values and relevant air quality criteria for the modelled parameters.

The model chosen for this study was the *Breeze Screen3 Version 2.04* which is an EPA-approved air dispersion computer model used to analyse single-source release scenarios in simple or complex terrain. *Breeze Screen3* enables users to prepare an initial screening analysis to establish a conservative or worst-case estimate of short-term air quality impacts from a specific source. If predicted screening concentrations are under the level of concern as specified in National Air Quality Standards, generally no further analysis is required. In general Screen models are used to predict maximum 1-hour maximum ground level concentrations of modelled substances.

3.5.2 RESULTS

Table 3 below summarises the results of the *Screen3* modelling study as presented in Appendix I of this report. The predicted maximum 1-hour values of each substance modelled are compared against the limit values for each substance as specified in *Air Quality Standards Regulations 2011, S.I. No. 180 of 2011* and the other relevant air quality assessment criteria.

Table 3 Results of SCREEN3 Air Dispersion Modelling Study

Parameter	Maximum 1-hour Ground Level Concentration	Limit Values
Carbon Monoxide	29.92 mg/m ³	200,000 mg/m ³
Particulate Matter PM ₁₀	5.98 ug/m ³	40,000 ug/m ³
HCl/HF	8.98 ug/m ³	50,000 ug/m ³
Organic Compounds TA Luft Class 1	5.98 ug/m ³	50 ug/m ³
Mercury	0.01 ug/m ³	50 ug/m ³

Note The maximum GLC's for all parameters occur within 137m of the emission point.

3.5.3 CONCLUSIONS

The results of the air dispersion model as detailed in Table 3 demonstrates that under maximum operational scenarios, emissions from the crematorium exhaust stack will be effectively dispersed and are very significantly lower than the air quality limit values specified in the *Air Quality Standards Regulations 2011, S.I. No. 180 of 2011*.

3.6 AIR POLLUTION CONTROL MEASURES

To avoid adverse impacts on the ambient air quality and the surrounding environment, the following design measures are in place to control and minimise air emissions from the crematorium.

HCl, HF and Mercury, Dioxins/Furans Abatement System

The waste gases are passed through an activated carbon and Calcium Oxide filtration system which removes organic compounds, Dioxins, HCl, HF, mercury and mercurial compounds from the waste gas. The rapid cooling of the exhaust gases through the process minimises the potential for reformation of Dioxins and Furans to occur.

The cleaned gases are finally emitted from a defined height discharge stack to atmosphere which operates at an optimum exit velocity to ensure the dispersal of the exhaust gases.

Particulate Abatement System

The waste gas abatement system includes a dust filtration unit for the capture of larger particles and a highly efficient (99.9%) bag filter unit for the capture of smaller particles.

Visible Emissions

Emissions from cremations should in normal operation be free from visible smoke and shall not exceed the equivalent of Ringelmann Shade 1 as described in *British Standard BS 2742: 2009*.

Odours

Odours from the cremation process are abated as a result of the very high cremation temperature as well as the passing of the waste gas stream through an activated carbon filtration unit.

Olfactometric sampling at site boundaries during cremations shall be conducted to ensure that odours are not present in air emissions. Where an unacceptable odour is detected, corrective action shall be immediately initiated.

3.7 MONITORING OF EMISSIONS

It is noted that the proposed crematorium is not a Scheduled Activity under the EPA Act 1992 or the Air Pollution Act 1987 and therefore does not require an IPPC licence from the EPA or an Air Emissions Licence from a Local Authority. Notwithstanding this and in accordance with Best Practice as defined in *DEFRA Statutory Guidance for Crematoria "Process Guidance Note 5/2 (12)* the operator of the crematorium in addition to the proposed continuous monitoring, shall engage an independent *MCERT* accredited stack emissions specialist to conduct an annual emissions survey in which CO, PM₁₀, HCl, HF, Organic Compounds, Dioxins/Furans and Mercury shall be analysed.

3.7.1 Continuous Monitoring

The design of the proposed crematorium will include the continuous monitoring of cremation temperatures and Oxygen levels to ensure the correct and optimum operation of the process to ensure emissions are minimised and controlled.

3.7.2 Annual Monitoring

Stack emission testing will be conducted during the first series of cremation ceremonies by an independent *MCERT* accredited consultant. Copies of all emission monitoring surveys shall be maintained on-site for Local Authority and public inspection.

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It is proposed that an annual stack emissions monitoring programme will be conducted for the following parameters.

Carbon Monoxide
Sulphur Dioxide
Nitrogen Dioxide
Particulates
HCl & HF
Mercury
Volatile Organic Compounds
Dioxins/Furans
Smoke Colour

It is proposed that an annual stack emissions monitoring test will be conducted with the initial monitoring being conducted on the commissioning of the crematorium.

Stack testing will be conducted by an MCERT Accredited monitoring organisation in compliance with *DEFRA Statutory Guidance document for Crematoria "Process Guidance Note 5/2 (12)*.

Byrne Environmental
CONSULTING LTD

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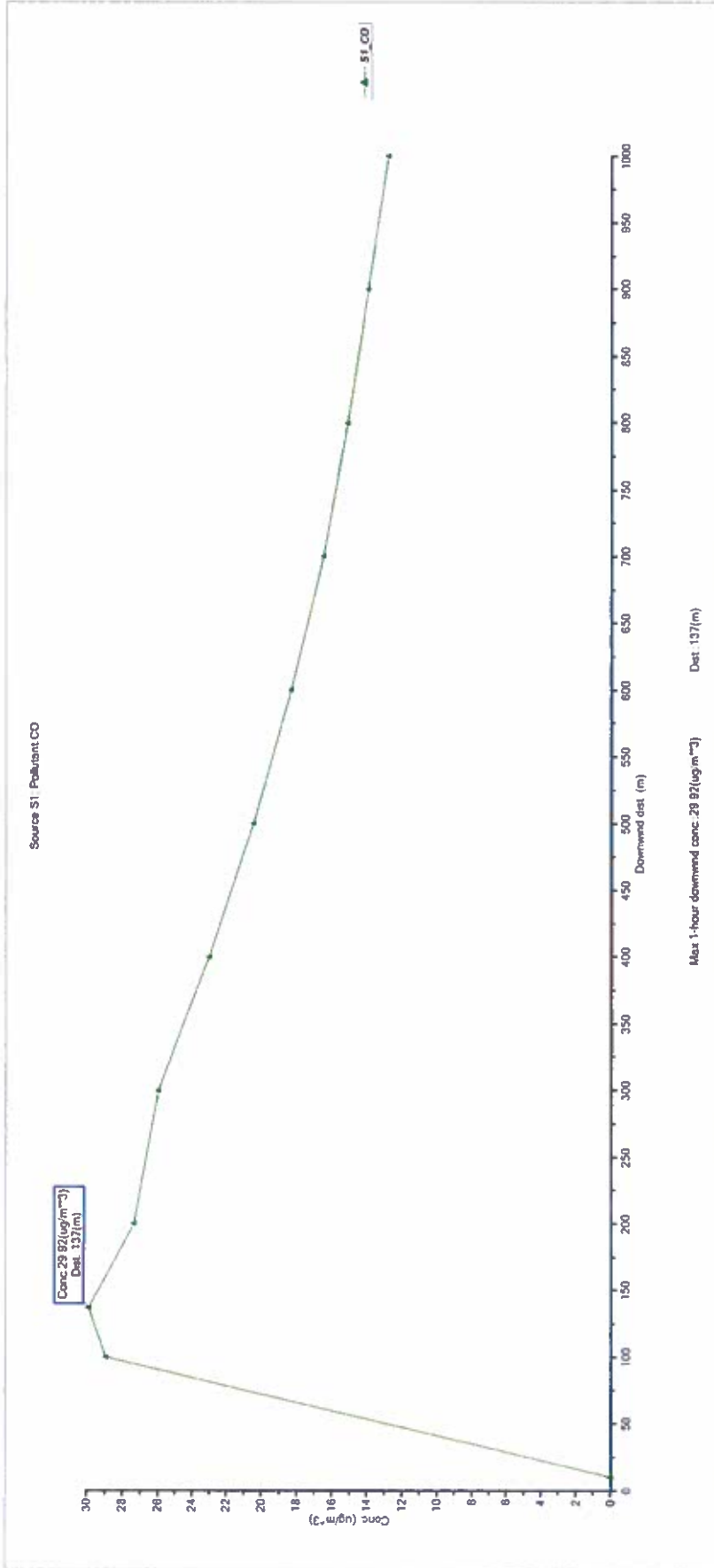
APPENDIX I

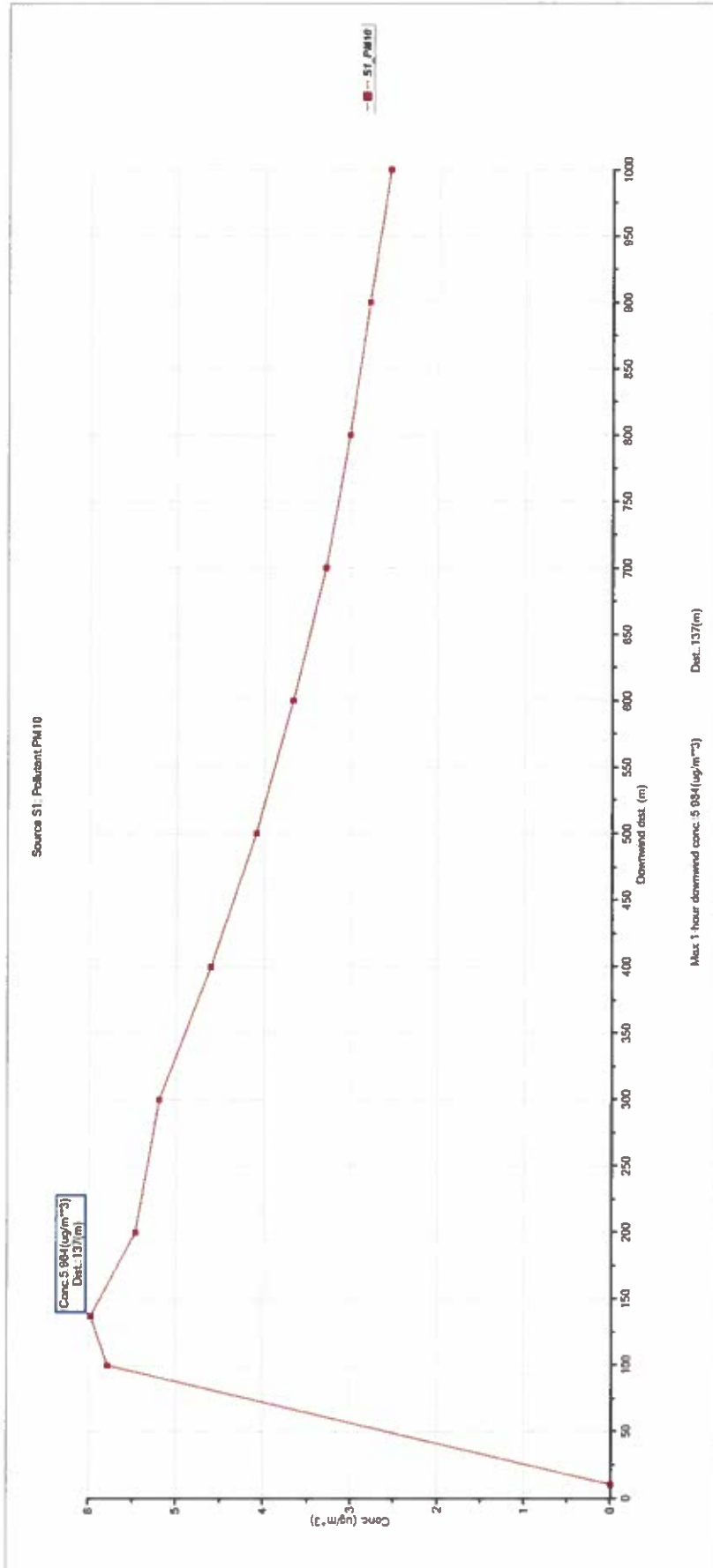
AIR MODEL OUTPUT DATA

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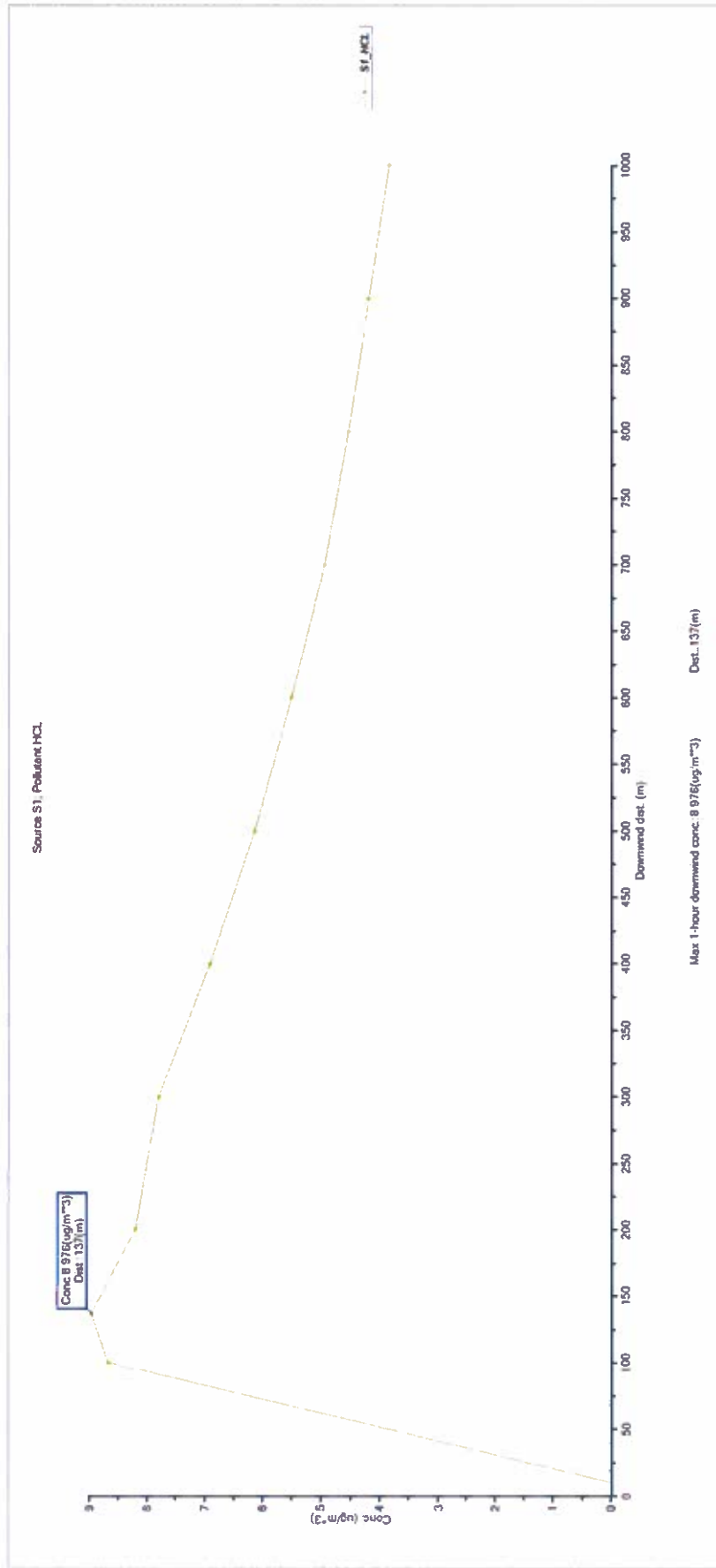


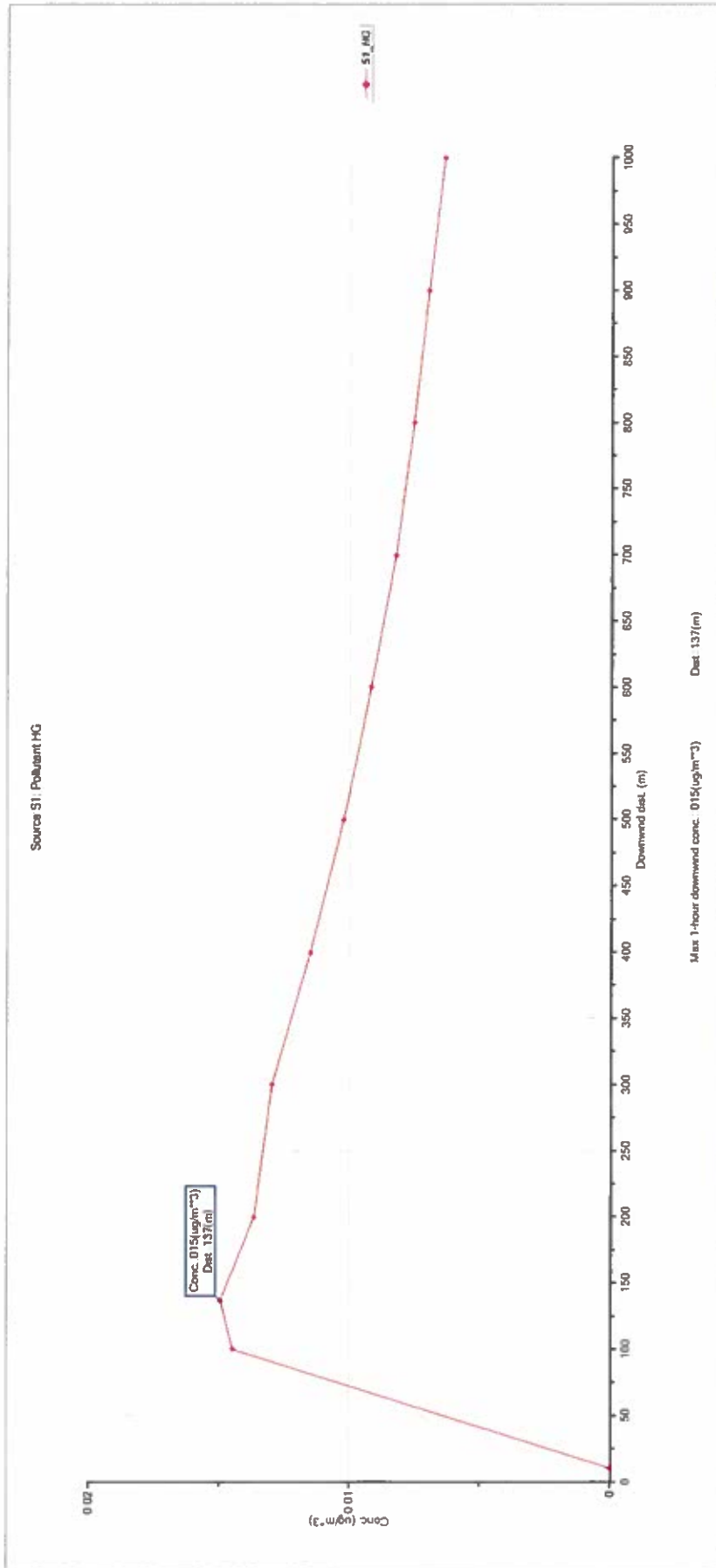


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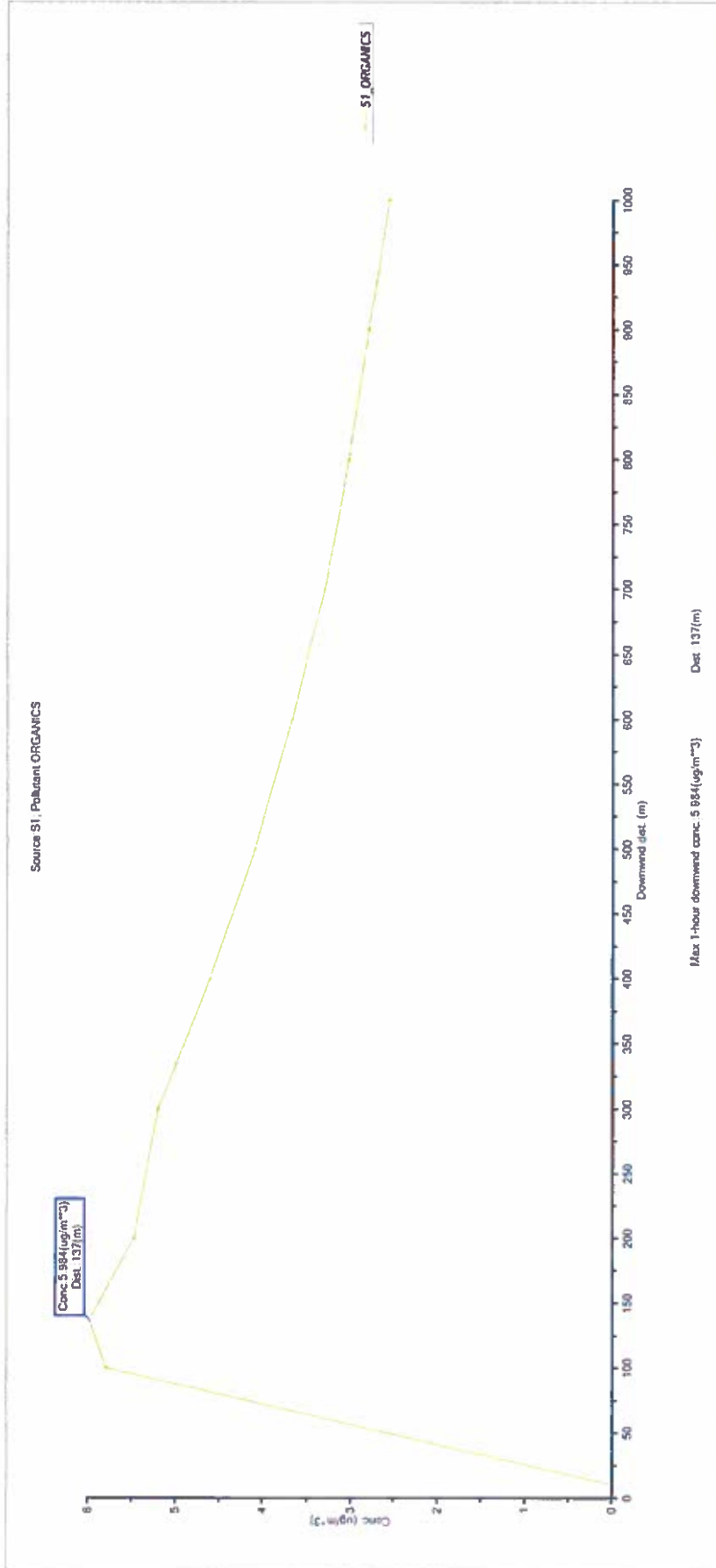




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4 Traffic Report

Presently the road entering the cemetery site comes of the old Dublin to Bray (South of Shankill) road which is the R119. The connecting road is 250m to the cemetery/existing carpark and is 9.1 metres wide. The road also has a height restriction barrier at the entrance.



Main Road Entrance



Road Plan

The road is used primarily for access to Shanganagh Cemetery. Other uses are:

1. Cuala G.A.A. (Saturday/Sunday mornings)
2. Shankill Football Club (Saturday/Sunday mornings)
3. Recycle centre (all 7 days)
4. Walkers access to Shanganagh Park (all 7 days).

Cars visiting the cemetery park in the existing carpark or drive and park in the cemetery grounds. Presently there are in excess of 800 burials per annum TO Shanganagh Cemetery. Number of burials per day varies from none up to ¾ per day. The time period for burials would be from 10.30 to at the latest 2.30 from Monday to Saturday. These times are outside peak traffic flow times on the R119.

4.1 GENERAL

The existing carpark has a total capacity of 85 parking spaces. Presently In general throughout the day Monday – Friday this carpark is not full and has only light parking numbers. On the Saturday/Sunday mornings the spaces are used by the Football Clubs listed. The Clubs would

use the car parking spaces one or two evenings for training. (The cemetery would be closed at these times).



Car Park on a Saturday morning (24th Sept.2016, 57 spaces used of 85)
Car traffic to the cemetery can access directly through the cemetery gates.



Cemetery Entrance

The football teams on the Saturday/Sunday period at present, park along the road from the entrance junction up to the carpark. There is also a children's playground at the front of the park land. The roadway is 9.1m wide and cars can get by with this width. There are clearway markings to assist the traffic flow.



Existing Car Park

4.2 PROPOSED PROJECT

Dun Laoghaire Rathdown County Council propose developing a Crematorium with 2 No. Memorial Halls and a separate coffee shop. The development is to be located in the open field between the main cemetery burial plots and behind the existing.

The expected population would be as follows:

Crematorium Staff	5
Capacity of 2 No. Hall	200 max.
Coffee Shop staff	2
Coffee Shop customers	30 max.

Parking for the crematorium staff and coffee shop staff will be within the proposed site compound.

Parking for the recycle centre will remain the same with its location within the car park relocated.

Parking for burial services will be in the extended carpark at the front. It is proposed that the hearse, mourning cars and disabled drivers only will enter the crematorium site.

The proposal is to extend the car park to 131 spaces. On average for a cremation/ burial services up to 20 vehicles can be expected to attend. This would give giving a maximum of 40 vehicles if 2 services were held at the same time. This is sufficient for the extended car park from Monday to Saturday. In the event of 2 very large funerals taking place at the same time up to 200 people would attend. Taking a conservative average of 2 persons per car this would

give 100 cars maximum. This would be an exceptionally high figure but it is still less than the spaces in the serviced car park (131).

Parking in the revised car park on Saturday morning may become restricted. The cemetery/crematorium staff can allow cars access onto the existing roadway between the main burial plots as an overflow.

The last complete year for deaths in Dun Laoghaire Rathdown (2013) has 1440 deaths in the borough. Presently there are over 50% of cremations within the Dublin Metropolitan area of all deaths. Statistically this would give 720 cremations per annum. Death rates are forecast in the next 10 years to increase marginally (10%). This would give the number of cremations at 800 per annum. Potentially 4/5 cremations per day would be expected. This would generate an average of 100 car movement per day over a 4 hour period (10 to 2). This figure is not significant for the R119 which was the old N11 to bray. It is also at off peak times.

4.3 SITE ACCESS

The main traffic route into the cemetery for services would be from the N11/M11 at the Bray North Exit 5. This exit joins the roundabout at the R119/R761 junction, followed by a left hand turn onto the R119. It is then a straight run to the cemetery (~1km).

Some funeral traffic will go through Shankill Village but this would be from the Killiney/Ballybrack direction.

Burial/Cremation traffic to the cemetery is from 10.00 in the morning to 2.00 approximately, Monday to Saturday. These traffic flows are outside peak traffic times (7.00 to 9.00 in the morning and 4.30 to 7.00 in the evening) and will not effect this.

The roundabout at the R119/R761 junction does have traffic build up going into Bray at peak evenings times and at weekend evening times. Burial/ Cremation traffic is outside these peak times.

Traffic through Shankill village increases at peak times and would be restricted. Burial/ Cremation traffic is outside these peak times.

4.4 CONCLUSIONS

The Cremation services on average would generate up to 100 car movement in the 4 hour morning period (10 to 2). This is on a day of 4/5 cremation services which we would consider is a maximum figure. This level of traffic is not significant for the R119.

Burial traffic to the cemetery will remain the same, except where there may be a slight reduction when Burials are cremated and not buried.

The cemetery itself has ample parking space with normal traffic rates. Where large services occur in the week day parking will be sufficient. Saturday mornings with large services the cemetery staff will have to manage parking within the cemetery itself. This situation occurs at present where there are large funerals within the cemetery.

This proposed development has sufficient onsite parking and will not adversely affect traffic on public roadway (R119).

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