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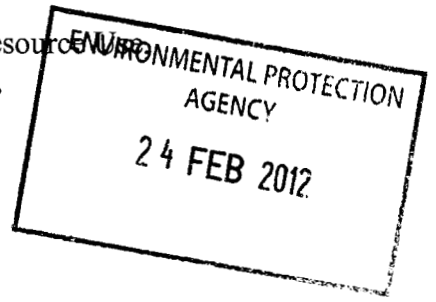
Administration
Office of Climate, Licensing & Resource Use
Environmental Protection Agency,
PO Box 3000,
Johnstown Castle Estate,
Co. Wexford.



23rd February 2012

RE: Response to Notice (8/12/2011) in Accordance with Article 16(1) of the Waste (Licensing) Regulations

Dear Sir/Madam,

Please find attached the enclosed responses to EPA Letter 8th December 2011 for Further Information, Particulars & Evidence. A table of contents is also attached for your information. One original copy plus two copies have been provided. In addition 16 copies of PDF format on CD-ROM are enclosed as requested.

Of note in this submission:

- The complex Air Dispersion Model concluded that suitable dispersion can be achieved with a 14 metre high stack under worst case scenario conditions. A decision has been taken to propose building the stack to this height over providing pre-treatment for the CHP engine.

- The Waste Licence Application Non- Technical Summary did not warrant revision as the specifics of the stack height of the CHP engine were not discussed, and also no new abatement will be introduced to the proposed licence application which would required inclusion in the Non-Technical Summary.

Should you require any further information please do not hesitate to contact me.

Yours Faithfully,

Helen Behan
Environmental Consultant
Bord na Mona Environmental Ltd. t/a Anua
045 439376

Response to EPA Letter 8th December 2011 for Further Information, Particulars & Evidence.

1. **Attachment 1**: EPA Letter 8th December 2011

2. **Attachment 2:** Detailed description for emission to air & CHP Plant, to include information relating to biogas pre-treatment and emissions as discharged.
   a. Tables E.1 (ii) & E.1.(iii)

   Tables E.1 (ii) Rev 2 & E.1.(iii) Rev 2 have been provided in Attachment 2. The description for emission to air has not changed from the previous information submitted to the Agency. The Jenbacher Biogas Engine JMS 312 GS-B.L remains the proposed CHP engine for electricity production.

3. **Attachment 3 & 4:** Description of proposed technology and other techniques for preventing, or where is not possible, reducing emissions from the CHP plant in particular relating to biogas scrubbing prior to combustion.
   a. Tables F1, F2 to F8

   Table F1 has been updated to confirm that there is no abatement for the CHP engine in Attachment 3. The complex Air Dispersion Model concluded that suitable dispersion can be achieved with a 14 metre high stack under worst case scenario conditions. A decision has been taken to build the stack to this height over providing pre-treatment for the CHP engine.

   Tables F2 has been updated to include monitoring for SOx on an annual basis from the biogas engine in Attachment 4.

4. **Attachment 5:** Complex Air Dispersion Modelling Report is provided on the impact assessment for proposed emissions to air form the CHP plant with regard to the relevant air quality standards & to the EPA guidance note 'Air Dispersion Modelling from Industrial Installations Guidance Note G4.

5. **Attachment 6**
   a. Updated drawings under Attachment 2 (EIS)

Drawing no/Revision	Description/Title	Reason for Change
C(IRL)WL-27 Rev 2	General Arrangements	The stack text indicates 8m, following completion of complex air dispersion model, stack increased to 14m; this is indicated on drawing.

6. **Attachment 7** Amendment to EIS Non-Technical Summary
   a. A Small amendment was made to page 9, this paragraph is indicated with a vertical red line adjacent. No other paragraphs have been revised.

   The Waste Licence Application Non- Technical Summary did not warrant revision as the specifics of the stack height of the CHP engine were not discussed and there is no new abatement that will be introduced to the proposed licence application which required inclusion in the summary.

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Regional Inspectorate, Inniscarra
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Mr Paddy Hedigan
Clean (Ire) Refuse & Recyling Ltd
Ballinagun West
Cree
County Clare

08/12/2011 – 19th Jan

W0253-01

Re: Notice in accordance with Article 16(1) of the Waste Management (Licensing) Regulations

Dear Mr. Hedigan,

I am to refer to the above referenced application for a waste licence relating to a facility at Clean (Ire) Refuse & Recyling Ltd, Ballinagun West, Cree, County Clare and to thank you for submitting the necessary information which has enabled the Agency to confirm that the application complies with the requirements of Articles 12 and 13 of the relevant Waste Management (Licensing) Regulations.

The stage has now been reached where the Agency is giving detailed consideration to the application and to complete this task the following information, particulars and evidence are required in accordance with Article 16(1) of the Regulations.

ARTICLE 16(1) - FURTHER INFORMATION, PARTICULARS AND EVIDENCE

With reference to recent correspondence with the Agency regarding the operation of the CHP plant, please provide complete answers to the following:

- **Provide a detailed description for emissions to air from the CHP plant, emission reference no. (A2.2), to include information relating to biogas pre-treatment and emissions as discharged. Re-submit an up-dated Table E.1 (ii) and Table E.1 (iii) *Main Emissions to Atmosphere* of the application form, to include flow data and concentration in mg/m^3 for all parameters.**
- **Describe the proposed technology and other techniques for preventing or, where this is not possible, reducing emissions from the CHP plant, emission reference no. (A2.2), in particular relating to biogas scrubbing prior to combustion. Re-submit an up-dated Table F.1: *Treatment, Abatement and Control Systems* and Table F.2 to F.8: *Emissions Monitoring and Sampling Point.***
- **Provide an impact assessment for proposed emissions to air from the CHP plant with regard to the relevant air quality standards. In the assessment please have regard to the EPA guidance note *'Air Dispersion Modelling from Industrial Installations Guidance Note (AG4).***

In the case where any drawings already submitted are subject to revision consequent on this request for further information, a revised drawing should be prepared in each case. It is not sufficient to annotate the original drawing with a textual correction. Where such revised drawings are submitted, provide a list of drawing titles, drawing numbers and revision status, which correlates the revised drawings with the superseded versions.

Your reply to this notice should include a revised non-technical summary (EIS and Application Form), which reflects the further information you supply in compliance with the notice, insofar as that information impinges on the relevant non-technical summary.

Please supply the information in the form of a one original plus two copies within 6 weeks of the date of this notice. In addition submit sixteen copies of the requested information to the Agency in electronic searchable PDF format on CD-ROM. Please note that all maps/drawings should not exceed A3 in size.

Please note that the application's register number is **Reg. No W0253-01.** Please direct all correspondence in relation to this matter to Administration, *Licensing Unit, Office of Climate Change, Licensing & Resource Use, Environmental Protection Agency, Headquarters, PO Box 3000, Johnstown Castle Estate, County Wexford* quoting the register number.

Yours sincerely,

Una O' Callaghan

Una O'Callaghan
Inspector
Office of Climate Change, Licensing & Resource Use

Cc Ms Helen Behan, Environmental Consultant, Anua Technical Services, trading as Bord Na Mona Environmental Ltd, Main Street, Newbridge, Co. Kildare.

TABLE E.1(ii) MAIN EMISSIONS TO ATMOSPHERE (1 Page for each emission point)

Emission Point Ref. Nº:	A2-2
Source of Emission:	CHP Engine
Location :	Within Biostabilisation Building
Grid Ref. (12 digit, 6E,6N):	102720,165889
Vent Details Diameter: Height above Ground(m):	 0.25 metres 14 metres
Date of commencement:	Not Applicable (no build commenced)

Characteristics of Emission :

(i) Volume to be emitted: **Not Available**			
Average/day	40,800 m^3/d	Maximum/day	40,800 m^3/d
Maximum rate/hour	1,700 m^3/h	Min efflux velocity	$m.sec^{-1}$
(ii) Other factors			
Temperature	°C(max)	°C(min)	°C(avg)
For Combustion Sources: Volume terms expressed as :	☐ wet.	✓ dry.	5 $\%O_2$

(iii) Period or periods during which emissions are made, or are to be made, including daily or seasonal variations (*start-up /shutdown to be included):*

Periods of Emission (avg)	60 min/hr 24 hr/day 365 day/yr

TABLE E.1(iii): MAIN EMISSIONS TO ATMOSPHERE - Chemical characteristics of the emission (1 table per emission point)

Emission Point Reference Number: A2-2

Parameter	Prior to treatment(1)				Brief description of treatment	As discharged(1)					
	mg/Nm^3		kg/h			mg/Nm^3		kg/h.		kg/year	
	Avg	Max	Avg	Max		Avg	Max	Avg	Max	Avg	Max
Nitrogen Dioxide	Not Available	Not Available	Not Available	Not Available	No treatment	500 (note 2)	500 (note 2)	0.85 (note 2)	0.85 (note 2)		
Carbon Monoxide	Not Available	Not Available	Not Available	Not Available	No treatment	1000 (note 2)	1000 (note 2)	1.7 (note 2)	1.7 (note 2)		
Sulphur Dioxide	Not Available	Not Available	Not Available	Not Available	No treatment	300 (note 2)	300 (note 2)	0.51 (note 2)	0.51 (note 2)		

1. Concentrations should be based on Normal conditions of temperature and pressure, (i.e. 0°C,101.3kPa). Wet/dry should be the same as given in Table E.1(ii) unless clearly stated otherwise.
2. in dry exhaust at 5% oxygen
3. The frequency of operation has not been devised at this time.

TABLE F.1: ABATEMENT / TREATMENT CONTROL

Emission point reference number : *A2-2(CHP Engine)*

Control[1] parameter	Equipment[2]	Equipment maintenance	Equipment calibration	Equipment back-up
No Abatement	Not available	Not available	Not available	Not available

Note Attachment 10 'Additional Information' of EIS contains information on

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

Attachments F2-F9

Attachment F.2 Air

F.2.2 The monitoring location for the emission from the CHP Biogas Enginer are shown below:

LOCATION OF CHP ENGINE STACK		
Proposed Location	**National Grid Reference**	**Geographical location**
A2-2	102720N, 165889E	South East of Facility

TABLE F.2 to F.8 Emission ***Point Reference No(s). :*** A2-2

Parameter	Monitoring frequency	Accessibility of Sampling Points
NOx	Annually	Not Available
CO	Annually	Not Available
SOx	Annually	Not Available

The location of this emission has not changed since previously submitted.

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DISPERSION MODELLING OF AIR EMISSIONS FROM THE PROPOSED NEW AIR EMISSION POINT AT THE CLEAN IRELAND FACILITY IN CO. CLARE

For the Attention of: Mr. Paddy Hedigan
Clean Ireland
Ballyinagun,
West Cree
Co. Clare

Prepared by: Andrew Mahon
Air Monitoring Teamleader

Reviewed by: Mr Sean Creedon
Senior Environmental Consultant

Report Reference: **ECS4155– February 2012**

Bord na Móna Environmental Ltd T/A Anua
Registered Office: Main Street, Newbridge, Co Kildare, Ireland. Registered No: 303313, VAT No: IE6323313B
Directors: R. Scanlan (Chairman), P. Bennett, P. Fox, C. Ó'Gógáin

Executive Summary

Anua Environmental was commissioned by Clean Ireland to carry out an Air Dispersion Modelling impact assessment of a Jenbacher biogas engine stack which is proposed to be installed on the planned composting plant at the Clean Ireland facility, Ballyinagun, West Cree, County Clare as part of a proposed IPPC licence Technical Amendment.

This assessment established that the parameter of potentially greatest impact in terms of ambient air quality was hourly NO_2 based on design emission concentrations and flow rates,

The assessment of required stack height for the biogas engine to meet the criteria of process contribution of less than 66.7% of the ambient air quality standard potential air quality was therefore based on hourly NO_2 impact from the operation of the engine using the worst case 2009 met data.

Dispersion model runs were undertaken to determine the impact of emissions from 8m, 10m, 12m, 14m and 16m stacks using the same emission, metrological, terrain and operating data.

The predicted model results for the examined stack heights indicate that a stack height of 14m will be sufficient to meet the criteria of process contribution of less than 66.7% of the ambient air quality standard for hourly NO_2.

Runs were also undertake to determine predicted impacts of SO2 and CO emissions from a 14m stack which were compared against the ambient air quality limits for these parameters. These dispersion model runs indicated that these parameters will not have a significant impact on ambient air quality at the boundary or beyond the boundary of the facility on the surrounding area. The model contains a number of significant assumptions which would indicate that the actual impact on ambient air quality would be significantly lower than that presented in the assessment.

Respectively Submitted

Mr. Andrew Mahon
Air Monitoring Teamleader

Mr. Sean Creedon
Senior Environmental Consultant

TABLE OF CONTENTS

1.0 INTRODUCTION

Anua Environmental, was commissioned by Clean Ireland to compile a dispersion modelling assessment as part of a proposed technical amendment to the existing Waste Reg No. W0253-01 arising from the planned development of a composting facility and installation of a Biogas engine within the boundary of the Clean Ireland facility in West Cree, Co. Clare.

The scope of this assessment was to determine the required stack height for the proposed Biogas engine based on technical specification of a Jenbacher gas engine (JMS 312 GS-B.L Biogas 526kW el.) and potential air quality impact of the operation of the engine on the ambient air levels of Nitrogen Dioxide, Sulphur Dioxide, and Carbon Monoxide on the surrounding environment.

The impact assessments are presented in the form of concentration contours/isopleths produced using US EPA approved and recommended Irish EPA dispersion modelling techniques (AERMOD version 7.4.1 Pro Plus -3D Analyst version 2.2.1.1. AERMOD pro plus). The assessment adhered to the requirements of the Air Dispersion Modelling from Industrial Installations Guidance Note (AG4). Concentration contours are superimposed on an aerial photograph of the locality indicating percentile pollutant concentrations (using a worst case year of hourly meteorological data).

2.0 SCOPE

2.1 Scope of Assessment

The scope of the assessment is to establish the required stack height to ensure compliance with ambient air quality standards arising from the potential impact on ambient air quality of the operation of the proposed biogas engine. The specific scope will examine the potential ground level impacts of the biogas engine

The assessment will examine the impact of the following parameters, NO_2, SO_2, CO

The location of the existing power station is outlined in Figure 2.1 below.

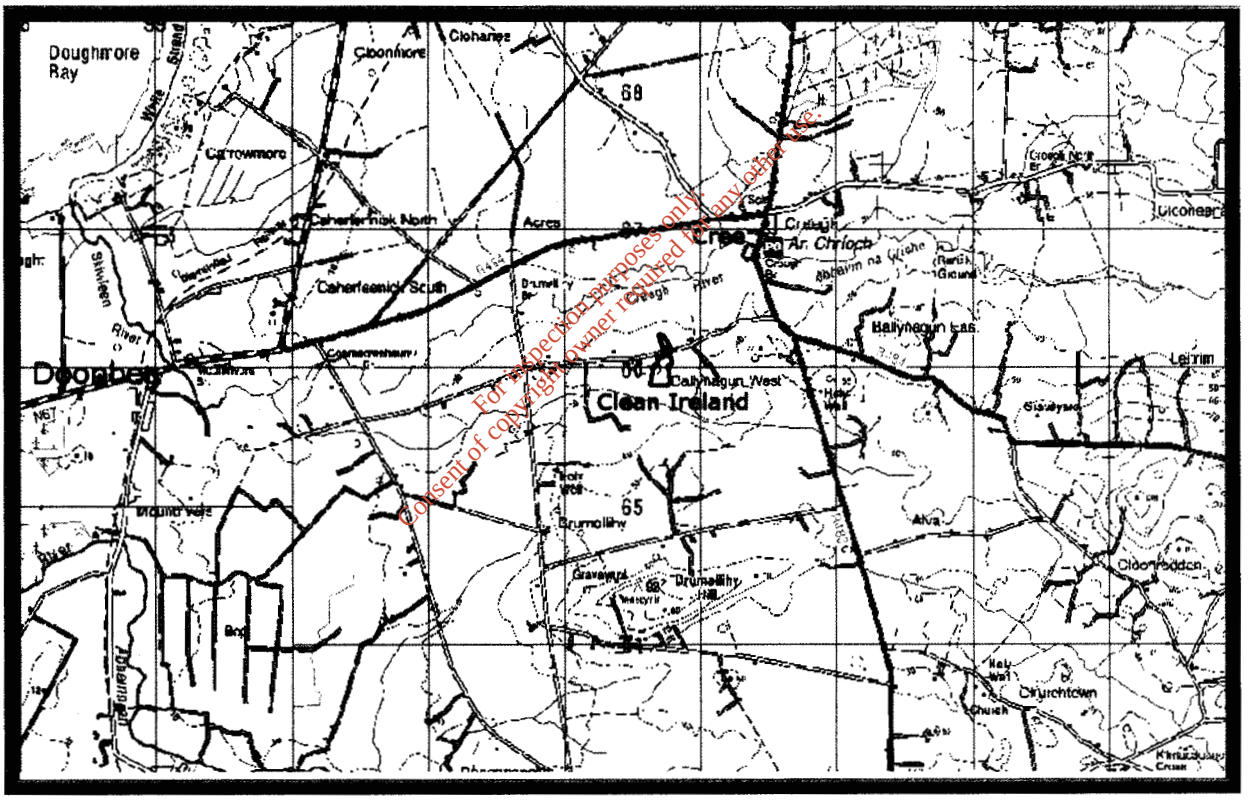


Figure 2.1 Location of Existing Clean Ireland Facility

Figure 2.2 overleaf indicates the proposed location of the Biogas Engine emission point within the boundary of the facility.

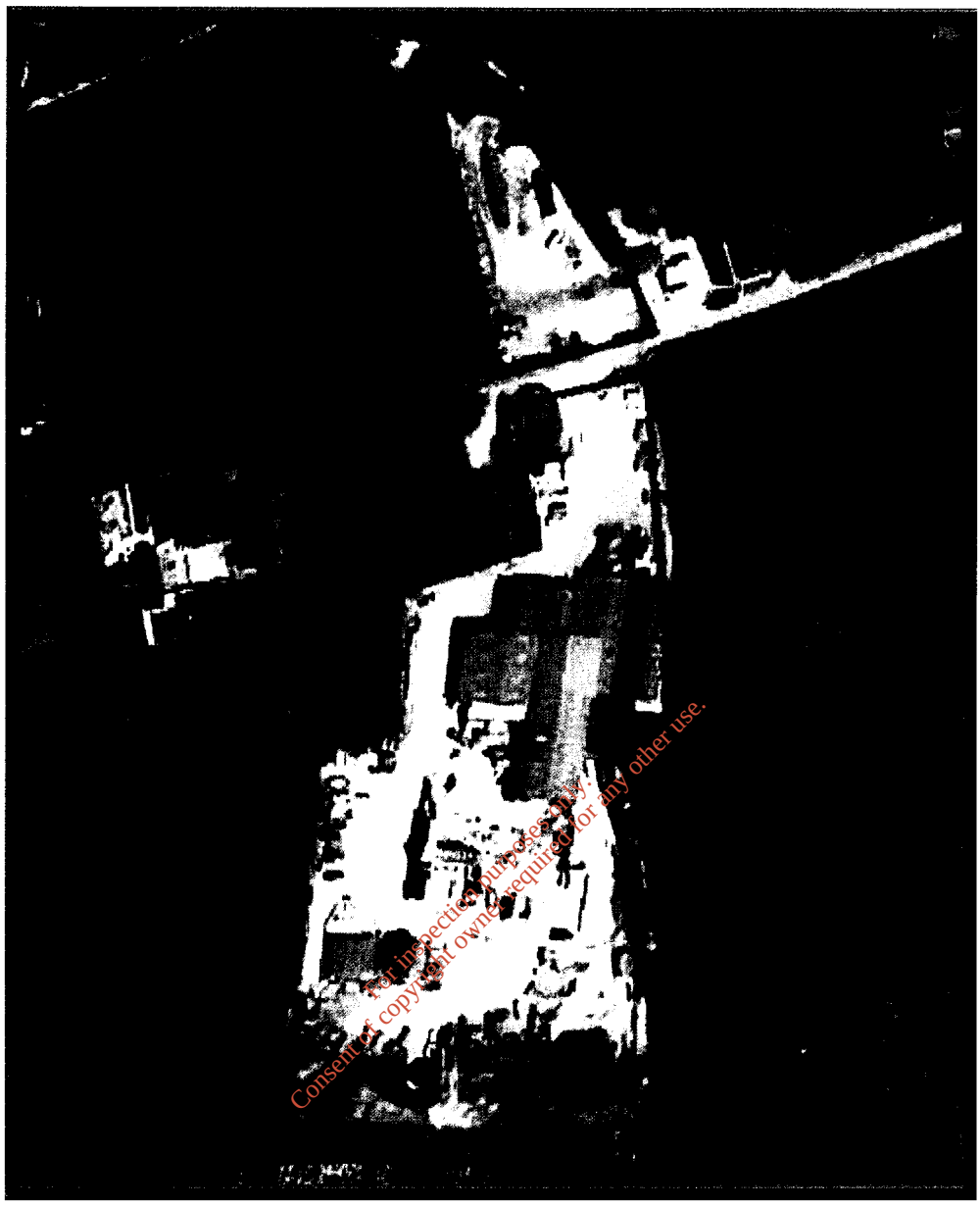


Figure 2.2 Proposed location of Biogas Engine Stack

3.0 POLLUTANTS/AIR QUALITY GUIDELINES

3.1 Pollutants

Following review of the technical specifications for the proposed Jenbacher Biogas engine the most significant air pollutants emitted during the operation of the engine were identified. These pollutants include Nitrogen Dioxide (NO_2) and Sulphur Dioxide (SO_2) and Carbon Monoxide (CO)

3.2 Nitrogen Dioxide

Nitrogen Dioxide is classed as both a primary and a secondary pollutant, and it is one of a number of important oxides of nitrogen present in the atmosphere. Nitric Oxide (NO) and Nitrogen Dioxide (NO_2) are the most abundant man-made oxides of nitrogen in urban areas. These are formed in all high temperature combustion processes, although NO predominates. Around 90% of the emissions from combustion sources are of NO rather than NO_2. However, since the NO can all potentially be converted to NO_2 it is usual to express all of the NO_x as NO_2 when making mass emissions estimates.

As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). The main sources of primary NO_2 from the facility will be from air emission stacks (4 in total) from the proposed peaking plant and the main emission stack from the existing facility. As a secondary pollutant NO_2 is derived from the oxidation of primary NO. Secondary pollution is usually derived from regional sources and may be used as an indicator of general air quality in the region.

Overall NO_x levels in Ireland may be regarded as moderate by international standards (reference: "Ireland's Environment 2004", EPA April 2004).

Nitric oxide is not generally considered to be harmful to health at the concentrations found in ambient atmosphere. Once NO is mixed with air containing ozone, it quickly combines with oxygen forming NO_2. In significant concentrations nitrogen dioxide can be highly toxic, causing serious lung damage with a delayed effect. Other health effects of exposure to nitrogen dioxide include shortness of breath and chest pains. It is also involved in the production of ground-level ozone, acid rain and smog.

Ambient Air Quality Standards Regulations 2011 (S.I. No.180 of 2011) established an hourly limit of 200 $\mu g/m^3$ and an annual mean limit of 40 $\mu g/m^3$ in respect of NO2.

The hourly limit will permit no more than 18 values above the limit in a calendar year. Both limit values came into force on 12 April 2011.

Pollutant	Regulation	Limit Type	Margin of Tolerance	'Limit Value'	'Alert Threshold'	'Upper Assessment Threshold'	'Lower Assessment Threshold'
Nitrogen Dioxide	S.I 180 2011	Hourly limit value NO_2 for the Protection of Human Health. Averaging period = 1 hour	50% on the 19th July 1999 decreasing on 1 Jan 2001 linearly to reach 0% by 1 Jan 2010	200 $\mu g/m^3$ NO_2, not to be exceeded more than 18 times a calendar year	400 $\mu g/m^3$ measured over three consecutive hours	70% of limit value (i.e. 140 $\mu g/m^3$), not to be exceeded more than 18 times in any calendar year)	50% of limit value (i.e. 100 $\mu g/m^3$), not to be exceeded more than 18 times in any calendar year)
		Annual limit value NO_2 for the Protection of Human Health. Averaging period = Calendar year	50% on the 19th July 1999, reducing on 1 January 2001 linearly to reach 0% by Jan 2010	40 $\mu g/m^3$ NO_2		80% of limit value (i.e. 32 $\mu g/m^3$)	65% of limit value (i.e. 26 $\mu g/m^3$)
		Annual limit value for the Protection of Vegetation (for NO_x) Averaging period = Calendar year	None	30 $\mu g/m^3$ NO_x		80% of limit value (24 $\mu g/m^3$)	65% of limit value (i.e. 19.5 $\mu g/m^3$)

3.3 Sulphur Dioxide

SO_2 is produced when fuels containing sulphur are burned. SO_2 is a corrosive acid gas and when mixed with moisture in the atmosphere creates sulphuric acid, which falls as acid rain. Both wet and dry deposition has been implicated in the damage and destruction of vegetation and in the degradation of soils, building materials and watercourses. The major sources of SO_2 in Ireland are from energy generation (electricity stations) and commercial & residential heating units. Transport's contribution is less significant since the introduction of sulphur less fuels but vehicles do emit some SO_2.

As is the case for Nitrogen Oxides the ambient air quality guidelines for Sulphur Dioxide are outlined in S.I. Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). Table 3.2 overleaf outlines the applicable Air Quality Standards.

Pollutant	Regulation	Limit Type	Margin of Tolerance	'Limit Value'	'Alert Threshold'	'Upper Assessment Threshold'	'Lower Assessment Threshold'
Sulphur Dioxide	S.I 180 of 2011	Hourly limit value for the Protection of Human Health. Averaging period = 1 hour	150 $\mu g/m^3$ (43%)	350 $\mu g/m^3$, not to be exceeded more than 24 times a calendar year	500 $\mu g/m^3$ measured over three consecutive hours at locations representative of air quality over at least 100 km^2 or an entire zone or agglomeration, whichever is the smaller.	-	-
		Daily limit value for the Protection of Human Health. Averaging period = 24 hours	None	125 $\mu g/m^3$, not to be exceeded more than 3 times a calendar year		60% of 24-hour limit value (i.e. 75 $\mu g/m^3$, not to be exceeded more than 3 times in any calendar year)	40% of 24-hour limit value (i.e. 50 $\mu g/m^3$, not to be exceeded more than 3 times in any calendar year)
		Limit value for the Protection of Ecosystems. Averaging period = Calendar year; and winter (1 Oct to 31 March)	None	20 $\mu g/m^3$		60% of winter limit value (12 $\mu g/m^3$)	40% of winter limit value (8 $\mu g/m^3$)

3.4 Carbon Monoxide (CO)

Carbon monoxide is a colourless, odourless gas produced when fuels containing carbon are burned when there is insufficient oxygen. In the presence of an adequate supply of oxygen, most carbon monoxide produced during combustion is oxidised fully to Carbon Dioxide (CO2). However, this is not the case in spark ignition engines in motorcars, especially under idling and deceleration conditions. CO is regarded as a primary pollutant from all combustion processes. The emissions from petrol combustion are by far the main source of CO.

CO exerts its toxic effects after preferentially binding with haemoglobin (preventing the binding of oxygen needed by cells) via the capillaries of the lungs. It is mildly toxic to humans by inhalation, but can cause fatalities in significant concentrations as it essentially causes suffocation of the cells

Table 3.3 overleaf illustrates the ambient air quality guidelines for CO as outlined in S.I. Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011)

Pollutant	Regulation	Limit Type	Margin of Tolerance	'Limit Value'	'Alert Threshold'	'Upper Assessment Threshold'	'Lower Assessment Threshold'
CO	S.I 180 of 2011	Maximum Daily 8 hour mean limit value for the Protection of Human Health.	60%	10 mg/m^3	The Commission will also consider whether alert thresholds can be set, consistent with other pollutants in this Directive, for PM_{10}, $PM_{2,5}$ or particular fractions of particulate matter, as appropriate. -	70% of limit value (7mg/m^3)	50% of limit value (5mg/m^3)-

4.0 DISPERSION MODELLING DESCRIPTION

4.1 Introduction

Any material discharged into the atmosphere is carried along by the wind and diluted by wind turbulence which is always present in the atmosphere. This process has the effect of producing a plume of polluted air that is roughly cone shaped with the apex towards the source and can be mathematically described by the Gaussian equation. Atmospheric dispersion modelling has been applied to the assessment and control of odour for many years, originally using Gaussian form ISCST 3 and more recently utilising advanced boundary layer physics models such as ADMS and AERMOD. Once the emission rate from the source is known (g/s), the impact on the surrounding vicinity can be estimated. These models can effectively be used in three different ways. Firstly, to assess the dispersion of pollutants and to compare with the appropriate Air Quality Standards (AQS), secondly, in a "reverse" mode, to estimate the maximum pollutant emissions which can be permitted from a site in order to prevent significant air quality impact occurring and thirdly, to determine which process is contributing greatest to the ambient air quality impact and estimate the amount of required abatement to reduce this impact to within acceptable levels. In this latter mode, models have been employed for imposing emission limits on industrial processes, odour control systems and intensive agricultural processes.

4.2 AERMOD

AERMOD is a new generation air modelling system used to support regulatory and non-regulatory modelling requirements worldwide. The application is used to assess the impact of air emissions from industrial sources, and can predict pollutant concentrations from point, line, area, volume, and flare sources with variable emissions in all terrain regimes. AERMOD simulates essential atmospheric physical processes and provides refined concentration estimates over a wide range of meteorological conditions and modelling scenarios. The state-of-the-science dispersion modelling system includes:

- An advanced meteorological pre-processor to compute site-specific planetary boundary layer (PBL) parameters;
- Highly developed dispersion formulations that incorporate current PBL understanding and variables for both convective and stable boundary inversions
- Enhanced treatment of plume rise and plume penetration for elevated inversions allowing for effects of strong updrafts and downdrafts that occur in unstable conditions;
- Improved computation of vertical profiles of wind, turbulence, and temperature;
- Sustained treatment of receptors in terrain ranging from flat to complex;

- In homogeneity of the atmosphere by calculating dispersion as a function of height; and
- A "dividing streamline" approach for computations in complex terrain.

Percentile analysis for pollutant emissions are calculated for the maximum 1-hour averages and 24hr averages using the Analyst 3D post-processing utility. This utility determines the maximum concentration of a pollutant from all receptors at a specific percentile, for a specific averaging period. Employing the percentile facilitates the omission of unusual short term meteorological events that may cause elevated pollutant concentrations and hence a more accurate representation of the likely average pollutant concentrations over an averaging period.

The most recent version of both the AERMOD and 3DAnalyst software was applied in this assessment:

AERMOD version 7.4.1 Pro Plus
3D Analyst version 2.2.1.1. AERMOD pro plus

5.0 DISPERSION MODELLING ASSESSMENT

5.1 Emission Parameters

The significant air emission from the proposed Jenbacher Biogas Engine were identified from the technical specifications submitted to Anua for this assessment and are outlined below.

Parameter	Emission Concentration (mg/m^3)	Volumetric Flow rate (m^3/s)	Emissions rate (g/s)
SO_2	300	1.30	0.14
NO_2	500	1.30	0.24
CO	1000	1.30	0.47

Parameter	8m Stack	10m Stack	12m Stack	14m Stack
X-Co-ordinate	470236.8	470236.8	470236.8	470236.8
Y-Co-ordinate	5842955.5	5842955.5	5842955.5	5842955.5
Base Elevation (m)	36.5	36.5	36.5	36.5
Release Height (m)	8	10	12	14
Volume Flow (m^3/s)	1.30	1.30	1.30	1.30
Stack Temperature (^oK)	723	723	723	723
Stack Dimensions	0.25	0.25	0.25	0.25
SO_2 Emission rate (g/s) Note 1	0.142	0.142	0.142	0.142
NO_2 Emission rate (g/s) Note 2	0.236	0.236	0.236	0.236
CO Emission rate (g/s) Note 3	0.472	0.472	0.472	0.472
Periods of Operation Note 4	24 hours	24 hours	24 hours	24 hours

Note 1: Emission rate is based on emission concentration of $300mg/Nm^3$
Note 2: Emission rate is based on emission concentration of $500mg/Nm^3$
Note 3: Emission rate is based on emission concentration of $1000mg/Nm^3$
Note 4: This period of operation is worst case. The actual operating hours were unknown at time of this assessment

5.2 Modelled Domain/Receptors

Two Cartesian receptor grids were constructed for this assessment firstly a grid of 22 x 22 receptor points (total of 484 receptors) spaced 50 metres apart. The co-ordinates of these receptor grid corners are given below:

NW Corner	(469800, 5843605) [Easting, Northing]
NE Corner	(470850, 5843605) [Easting, Northing]
SW Corner	(469800, 5842555) [Easting, Northing]
SE Corner	(470850, 5842555) [Easting, Northing]

The second smaller Cartesian receptor grid was constructed of 17 x 27 receptor points (total of 459 receptors) spaced 10 metres apart. The co-ordinates of these receptor grid corners are given below:

NW Corner	(470170, 5843180) [Easting, Northing]
NE Corner	(470330, 5843180) [Easting, Northing]
SW Corner	(470170, 5842920) [Easting, Northing]
SE Corner	(470330, 5842920) [Easting, Northing]

In addition, receptors were located at selected locations on the boundary of the site. The site boundary is indicated in Figure 5.1 as a purple line.

Figure 5.1 Site boundary

5.3 Meteorology/Surface Characteristics

The meteorological data for five years, from 2007 to 2011, for Belmullet Meteorological Station was used in the dispersion modelling assessment. This meteorological station is approximately 170km from the Clean Ireland facility location. The meteorological data for 2009 was identified as the worst case met year for this assessment (see Table 6.1 in results section). A graphical depiction of the frequency of wind speed and wind direction for 2009 is highlighted in Figures 5.2 below.

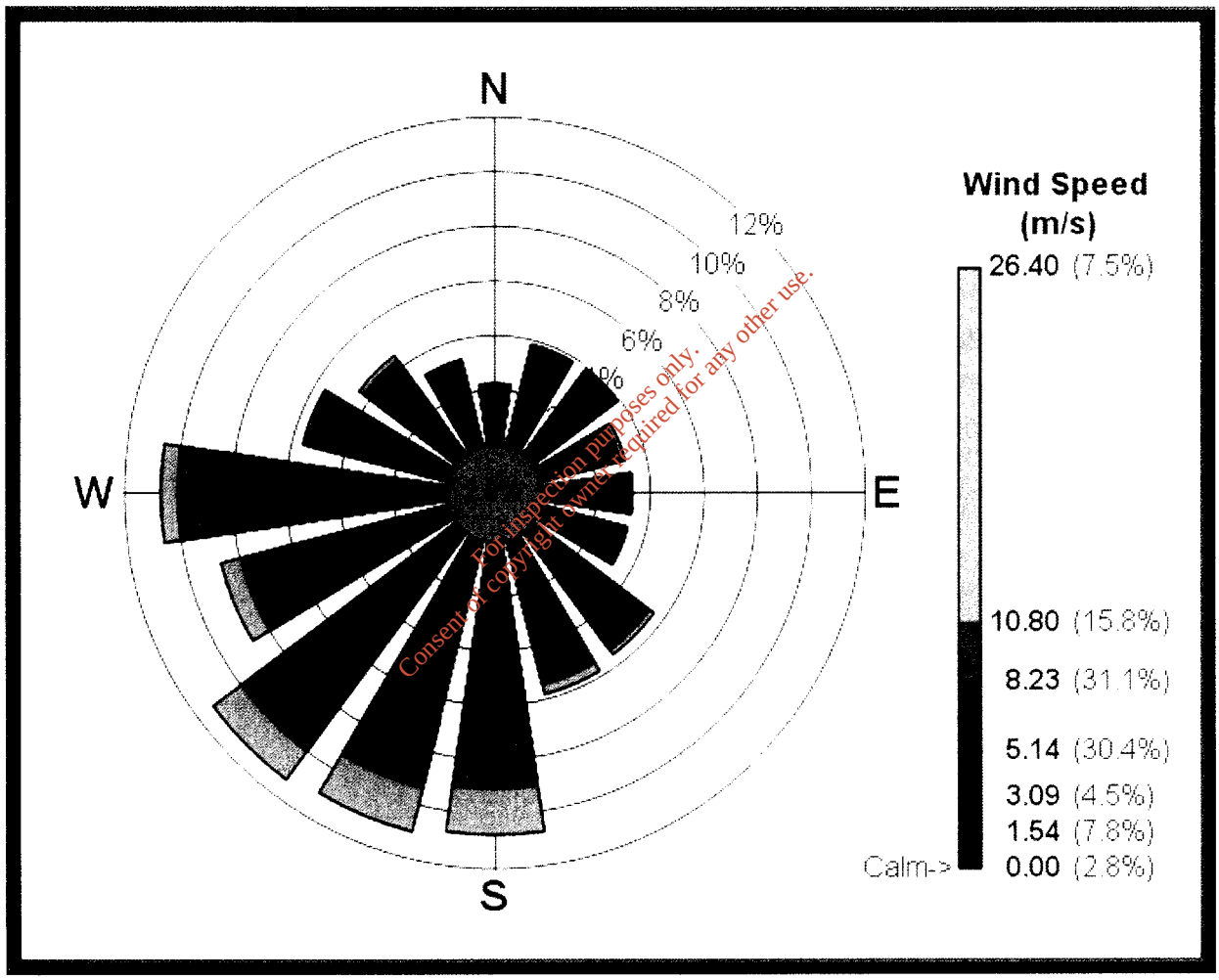


Figure 5.2 Windrose for Belmullet meteorological station 2009

The surface characteristics in the surrounding area of the Belmullet Meteorological Station are relatively uniform with significant areas of grassland and water. Also, there are a number of sections of bogland in the surrounding area. These characteristics were incorporated into the meteorological data using the AERMET program. Using this program the data was processed from Stage 2 to Stage 3 using the site specific surface characteristics. The three surface characteristics for each type of land use (bog, grassland and water) were inputted into the AERMET program prior to processing to the Stage 3 phase. The three characteristics are surface roughness $\{z_o\}$, the Albedo $\{ r \}$ and the Bowen ratio $\{ B_o \}$.

5.4 Treatment of Terrain

The terrain grid was constructed based on the ordnance survey maps and of the surrounding area. Grid references of know elevations were collated and using the SURFER 8 Contouring and surface mapping program a terrain grid corresponding to the receptor grid was created.

The elevations of the receptor locations were obtained from ordnance survey maps of the area. Elevations and heights of the surrounding terrain were obtained from a 1:50,000 scale discovery series ordnance survey map. Elevations were taken from map contours and bench marks throughout the area of the receptor grid. Terrain heights were taken into account for all of the modelling undertaken.

For the purpose of this modelling assessment elevated terrain data was used. The terrain heights ranged from 17 meters. to 40 meters.

5.5 Treatment of Buildings and Site Plan

All buildings proposed and existing as shown on the planning application were included in the dispersion model. Table 5.4 below outlines the description, location and elevation of each of the buildings inputted into the model.

Building ID	Description	x co-ordinate	y co-ordinate	Elevation	Height
COMPLA	Composting Plant	470200.8	5843017	36.5	10.72
ENGSHP	Engineering Workshop	470196.8	5843075	36	8.89
PTL	Left side of proposed timber shredding building	470244.7	5843087	35.68	10.23
PTR	Proposed Timber shredding shed Right	470264.4	5843050	35.1	10.3
DMR	Dry Mix Recyclable Processing	470262.9	5843124	35.1	8.1
BMA	Baling of Material Area	470290.4	5843125	32.84	7.91
A1	Long narrow part of existing shed	470304.1	5843122	34.01	10.11
A2	Short piece to side of main shed	470309.5	5843099	33.48	10.66
A3	Existing shed no given ID	470248.2	5843111	35.68	10.23
A4	Existing shed structure in middle of main shed	470274.2	5843106	35.68	10.3
DDS	Drop down skip processing Area	470271.2	5843087	34.42	10.3
OFFICE	Office block	470267	5843170	34.695	6.5
5UWZT001	Shower and stores	470264.8	5843158	34.31	4.58
OFFICE2	Office building 2	470264.6	5843148	34.31	5.1
GLASS	glass bunker	470251.3	5843274	31	4.65
BIO1	Biofilter	470238.2	5842956	36.5	4.553
PUMP.S	Pumping station	470291.6	5842974	36.5	4

The site boundary and location of each building within the site was obtained from an autocad site layout drawing supplied by Clean Ireland which was geo-referenced and overlaid on an aerial photograph of the site using ArcMap10. This was then used as the base map for Aermod and all building were drawn into the model using the autocad base layer to insure the correct placement and dimensions for each building. The main processing (existing and proposed extension) building has been split into a number of sections to more accurately reflect the variation in roof height within this structure (Building highlighted blue in Table 5.4)

5.6 Conversion Ratios for NOx/NO_2

In determining the impact of Nitrogen Dioxide from combustion sources it is important to note that of the Nitrogen Oxides, Nitric oxide is the most significant form emitted (typically more than 90%). Conversion of Nitric oxide takes place in ambient air and the conversion rate is dependent on a number of factors such as ambient Ozone concentration, presence of daylight and the presence of organic compounds and radicals. The Air Dispersion Modelling Guidance note (AG4) produced by the EPA outline the approach taken to estimating the portion of the nitrogen oxide emission converted to nitrogen dioxide.

As per Appendix H of the guidance note the approach taken was to apply the Plume Volume Molar Ratio Method (PVMRM). The PVMRM uses both plume size and O_3 concentration to derive the amount of O_3 available for the reaction between NO and O_3. The number of O_3 moles is determined by the size of the plume segment and the measured background ambient O_3 concentration. For a given NO_x emission rate and ambient ozone concentration, the NO_2/NO_x conversion ratio is primarily controlled by the volume of the plume. The method has been shown to give better agreement with monitoring data than other methods as a function of downwind distance from the source. The default options in AERMOD-PVMRM are used namely:

- For background ozone, a single representative value (54.6µg/m^3 – Average of Zone D figures for 2010,2009 and 2008)
- NO_2/NO_x equilibrium ratio = 0.90
- NO_2/NO_x in stack ratio = 0.75

5.7 Background Pollutant concentrations

The Irish EPA carries out ambient air quality monitoring under the specific requirements of the Air Quality Standards Regulations 2011. These regulations require that the EPA provide the public with information on ambient air quality. This information must be up to date and available on a widespread basis. These regulations are a result of the Air Framework Directive 2008/50/EC. This directive requires that member states divide their territory into zones for the assessment and management of air quality. In Irelands case there are four zones ranging from Zone A to Zone D. The extent of monitoring and assessment in each zone is determined by population size and air quality status. The facility location falls within Zone D (the predominantly rural zone). Therefore the average air quality levels recorded by the EPA for this zone will be used as the background concentrations for this assessment. Table 5.5 below outlines the background level applied in the assessment.

Year	Parameters	Concentration ($\mu g/m^3$)
2010	NO_2 Annual	7.7
	NO_2 Hourly Maximum	87.3
	NO_X annual	11.7
	Ozone	55.2
	CO	0.004
	SO_2 Annual	2.5
	SO_2 Daily Maximum	10.5
	SO_2 Maximum Hourly	17.0
2009	NO_2 Annual	7.3
	NO_2 Hourly Maximum	74.7
	NO_X annual	10.3
	Ozone	57.9
	CO	0.3
	SO_2 Annual	5.0
	SO_2 Daily Maximum	13.3
	SO_2 Maximum Hourly	38.8
2008	NO_2 Annual	11.4
	NO_2 Hourly Maximum	109.0
	NO_X annual	20.2
	Ozone	50.7
	CO	0.4
	SO_2 Annual	4.8
	SO_2 Daily Maximum	18
	SO_2 Maximum Hourly	58.4

Note 1: Background levels were taken from 'Air Quality in Ireland 2008, 2009 and 2010- key indicators of Ambient Air Quality' EPA respectively

Using the background concentrations outlined in Table 5.5 and applying the guidance outlined in Appendix E of the Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), the background adjusted predicted impacts can be calculated. The rules governing the combing of Short term process contribution with Background Concentration are outlined below. These guidelines are taken from the UK DEFRA and are applied to the NO_2, SO_2 and parameters.

NO_2 – The 99.8th%ile of total NO_2 is equal to the minimum of either A or B below:

a) 99.8th%ile hourly background total oxidant (O_3 & NO_2) + 0.05 x (99.8th%ile process contribution NO_x)
b) The maximum of either

- 99.8th%ile process contribution NO_x + (2 x annual mean background NO_2); or
- 99.8th%ile Hourly background NO_x + (2 x annual mean process contribution NO_x)

SO_2 – The 99.7th%ile of total 1- hour SO_2 is equal to the maximum of either A or B below:

a) 99.7th%ile Hourly background SO_2 + (2 x annual mean process contribution SO_2); or

b) 99.7th%ile hourly process contribution SO_2 + (2 x annual mean background SO_2)

C – The 99.2th%ile of total 24- hour SO_2 is equal to the maximum of either A or B below:

a) 99.7th%ile 24 hour mean background SO_2 + (2 x annual mean process contribution SO_2); or

b) 99.7th%ile 24 hour mean process contribution SO_2 + (2 x annual mean background SO_2)

In the case of annual averages and CO, these are combined with the background annual averages to calculate the projected annual levels.

6.0 ASSESSMENT OF IMPACTS

6.1 Predicted Maximum Ground level impacts at the boundary from 8m Stack 2007-2011

Year	Parameter	Averaging Period	Process contribution Predicted Conc.	Grid Reference		Background Adjusted Predicted Impact Note 2	Limit Values	% Of Limit Value
			($\mu g/m^3$)	X co-ordinate	Y co-ordinate	($\mu g/m^3$)	($\mu g/m^3$)	
2007	Nitrogen Dioxide Note 1	1 hr average as a 99.8 percentile	151.6	470193.3	5843053	169.2	200	84.6
2008	Nitrogen Dioxide Note 1	1 hr average as a 99.8 percentile	122.1	470193.1	5843047	139.7	200	69.8
2010	Nitrogen Dioxide Note 1	1 hr average as a 99.8 percentile	154.0	470193.1	5843047	171.6	200	85.8
2011	Nitrogen Dioxide Note 1	1 hr average as a 99.8 percentile	126.9	470193.3	5843053	144.5	200	72.2

Note 1: Levels of predicted Nitrogen Dioxide are estimated using the PVMRM utility. This approach is outlined in Section 5.7.

Note 2: Adjusted background predicted impact was calculated using – 99.8th%ile process contribution NOx + 2 x (annual mean background NO_2), as this information was used for selecting worst Met year.

Parameter	Averaging Period	Process contribution Predicted concentration	Grid Reference		Background Adjusted Predicted Impact	Limit Values	% Of Limit Value
		($\mu g/m^3$)	X co-ordinate	Y co-ordinate	($\mu g/m^3$)	($\mu g/m^3$)	
Nitrogen Dioxide Note 1							
	Annual Average	7.9	470307.3	5842996.9	16.7	40	41.7
Sulphur Dioxide	1 hr average as a 99.73 percentile	95.3	470193.1	5843047	103.5	350	29.6
	Daily average as a 99.18 percentile	38.4	470192.4	5843032	46.6	125	37.3
	Annual Average	5.3	470307.3	5842996.9	9.4	20	46.8
CO	Annual Average	0.3 mg/m^3	470185.4	5842987	0.6 mg/m^3	10 mg/m^3	6.3

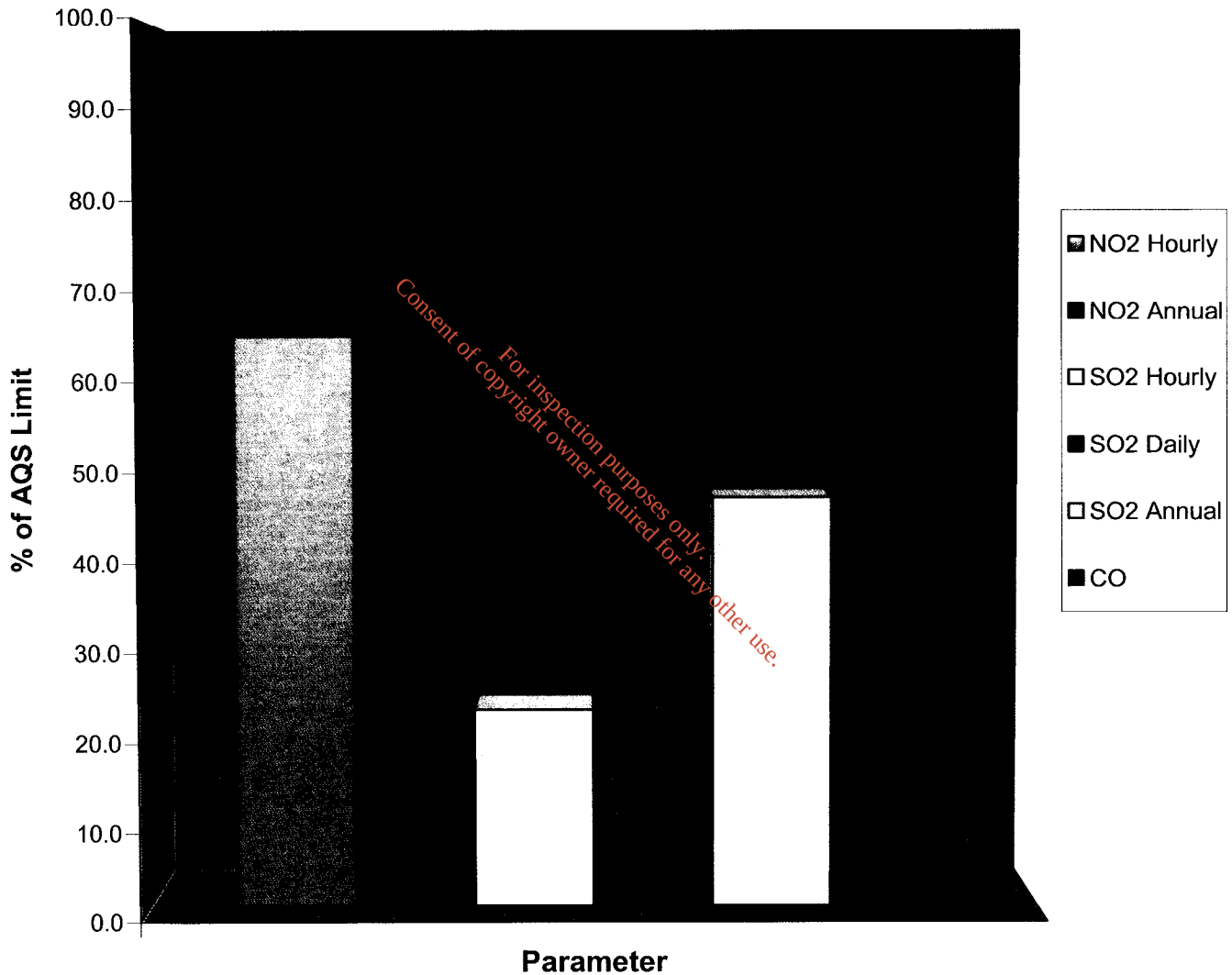
Note 1: Levels of predicted Nitrogen Dioxide are estimated using the PVMRM utility. This approach is outlined in Section 5.7.

Parameter	Averaging Period	Stack Height (m)	Process contribution Predicted concentration	Grid Reference		Background Adjusted Predicted Impact	Limit Values	% Of Limit Value
			($\mu g/m^3$)	X co-ordinate	Y co-ordinate	($\mu g/m^3$)	($\mu g/m^3$)	
Nitrogen Dioxide Note 1	1 hr average as a 99.8 percentile	8	158.4	470193.1	5843047	176.0	200	88.0
		10	139.6	470193.1	5843047	157.2	200	78.6
		12	122.8	470193.1	5843047	140.4	200	70.2
		16	92.7	470193.1	5843047	110.3	200	55.2

Note 1: Levels of predicted Nitrogen Dioxide are estimated using the PVMRM utility. This approach is outlined in Section 5.7.

Note 2: This was deemed the must suitable stack height based on impact on ambient air quality and visual impact of the structure.

Parameter	Averaging Period	Process contribution Predicted concentration	Grid Reference		Background Adjusted Predicted Impact	Limit Values	% Of Limit Value
		($\mu g/m^3$)	X co-ordinate	Y co-ordinate	($\mu g/m^3$)	($\mu g/m^3$)	
Nitrogen Dioxide Note 1							
	Annual Average	7.8	470307.3	5842996.9	16.6	40	41.4
Sulphur Dioxide	1 hr average as a 99.73 percentile	69.8	470170	5843040.0	78.0	350	22.3
	Daily average as a 99.18 percentile	29.1	470192.4	5843032	37.3	125	29.9
	Annual Average	5.2	470307.3	5842996.9	9.3	20	46.5
CO	Annual Average	0.2 mg/m^3	470170	5842980	0.5 mg/m^3	10 mg/m^3	5.5



ordnance survey maps Figure 6.1 Comparison of predicted impacts with the appropriate limit values expressed as a percentage

6.2 Sensitivity Analysis

6.2.1 Meteorological Data

The sensitivity of the predicted impacts was examined against the met data set (Belmullet 2007 to 2011) used for the assessment using the pollutant of highest impact namely NO_2. The results of this sensitivity analysis are shown in Table 6.1 and clearly demonstrates that the maximum predicted impact for NO_2 occurs using the 2009 data set.

6.2.2 Stack Heights

The results of varying stack height on ambient air quality impact are clearly shown in table 6.3. NO_2 hourly was modelled using the 2009 met set against varying stack heights from 8m to 16m. As expected the predicted maximum impact off site decreases with each increase in stack height. A stack of 14m is deemed sufficient to ensure dispersion of stack emissions from the Biogas engine which do not result in ambient concentrations above the ambient air quality standards set out in S.I 180 of 2011.

6.2.3 Volume Flow

This assessment was conducted using the theoretical maximum volumetric flow in all model runs, and assuming 24hour operational on a yearly basis. Any alteration of these figures will result in a decrease in ambient air quality impact as predicted by the model runs completed in this assessment.

6.3 Discussion of Results

The results in Table 6.1 indicate that the meteorological conditions in 2009 would lead to the greatest impact on ambient air quality based on the provided emission concentrations and volumetric flow rates. Therefore the 2009 met set was used as the worst case scenario for determining the required stack height to meet ambient quality standards.

Table 6.2 sets out the results of predicted impacts based on the 2009 data set from an 8m stack on ambient air quality when the other emission parameters from the biogas engine were considered to ensure that hourly NO_2 was having the highest impact on the ambient air quality. The results when converted to a percentage of the Ambient air quality limits clearly show that hourly NO_2 impact is by far the greatest at 88% of the limit value with annual SO_2 46.8% of the ambient limit the next highest impact value.

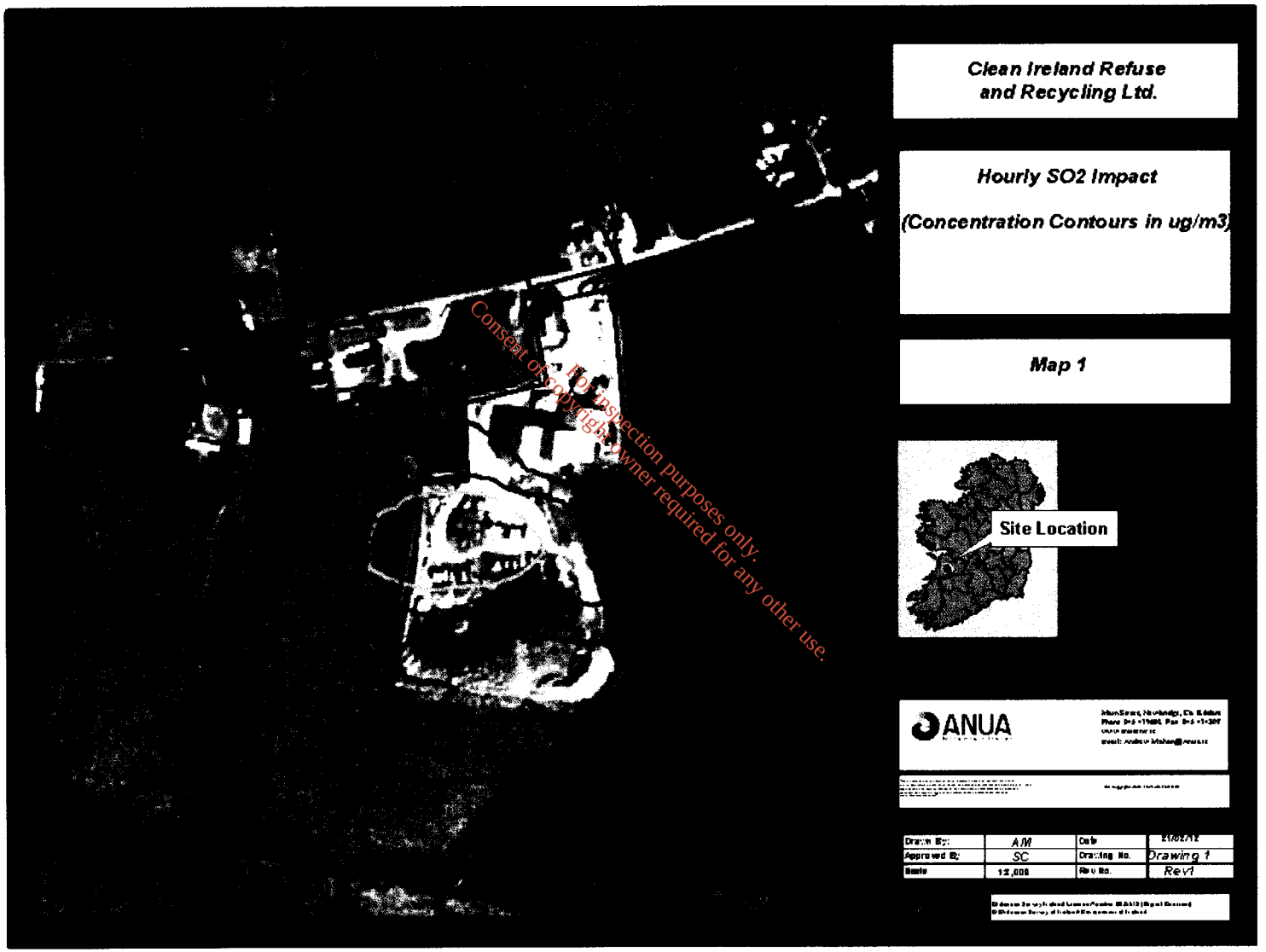
Table 6.3 presents the resultant impact of increasing stack height on the ambient air quality beyond the site boundary for hourly NO_2 based on 2009 meteorological conditions. To ensure the ambient air quality limits would not be breeched the background levels of NO_2 were added to the highest predicted NO_2 process contribution beyond the boundary. Background levels were averaged from 'Air Quality in Ireland 2008, 2009 and 2010- key indicators of Ambient Air Quality' reports published by the EPA. As can be seen from the results the ambient air quality standards were not breeched at any of the modelled stack heights, however due to the recognised inherent uncertainty in model accuracy a stack of 14m is deemed sufficient to achieve an ambient impact of less than two thirds the ambient air quality standard limit.

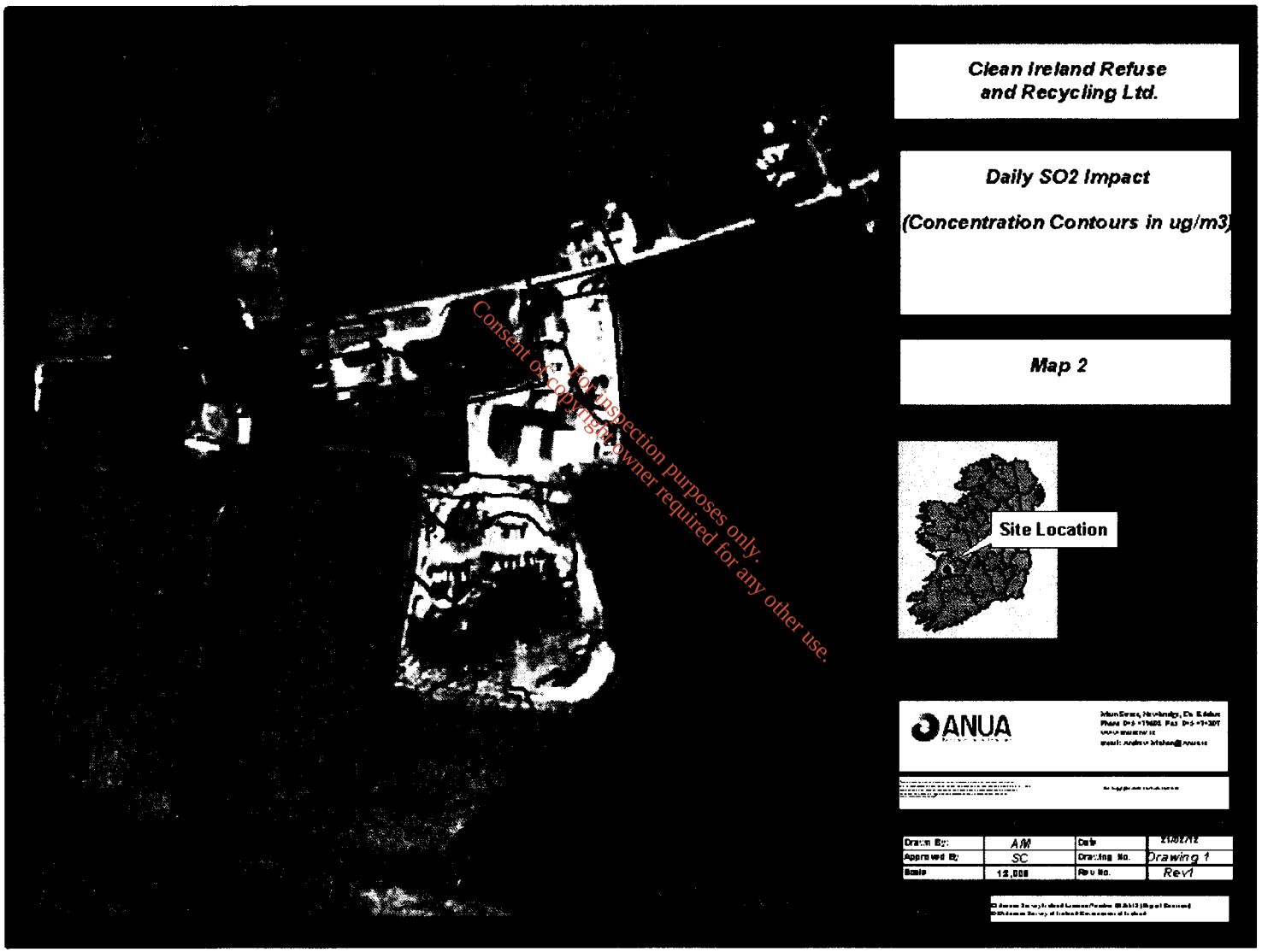
Table 6.4 presents the results of model runs conducted to ensure that a stack of 14m would result in the required dispersion for all the emission parameters associated with the proposed biogas engine namely NO_2 SO_2 and CO. The results clearly show that all ambient air quality standards would be met with a stack height of 14m and are also presented graphically in Figure 6.1

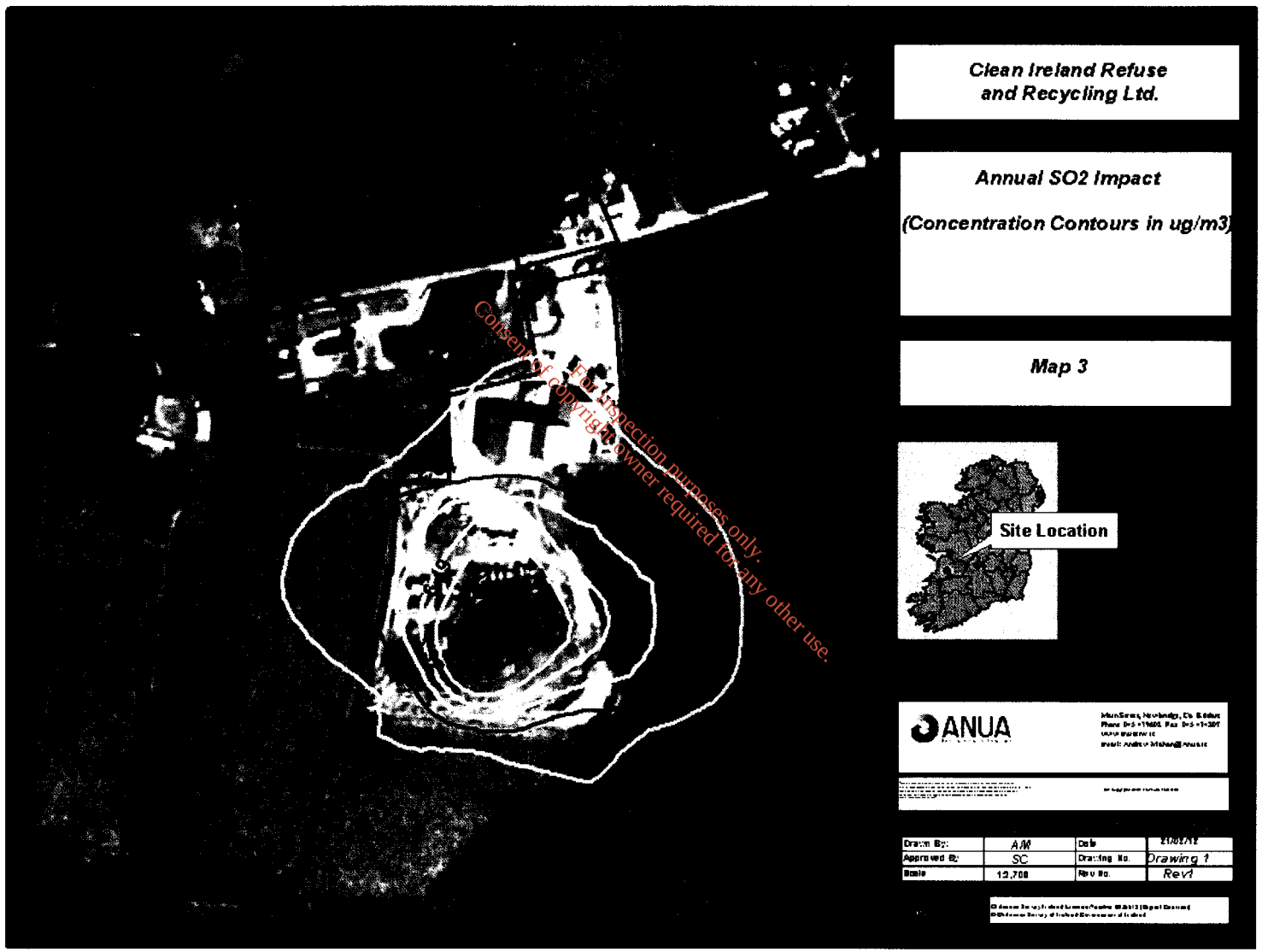
6.3 Conclusions

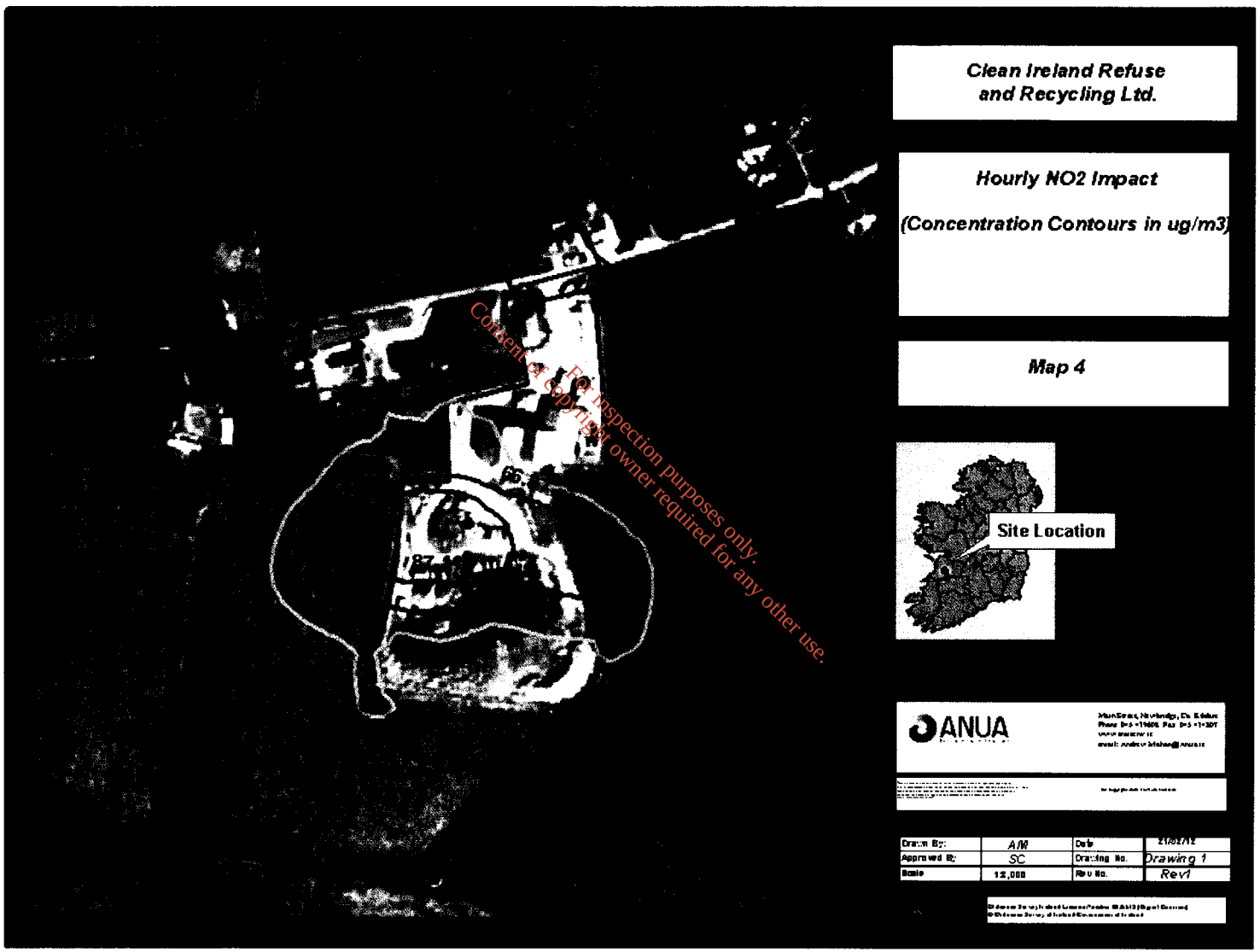
Comparison of the predicted impact of all suggested stack heights indicate that a stack height of 14m for the proposed Biogas engine will result in the emission not having a significant impact on ambient air quality at the boundary or beyond the boundary of the facility on the surrounding area. The model contains a number of significant assumptions (such as 24 hour operation of the biogas engine) which would indicate that the actual impact on ambient air quality would be significantly lower than that presented in the assessment.

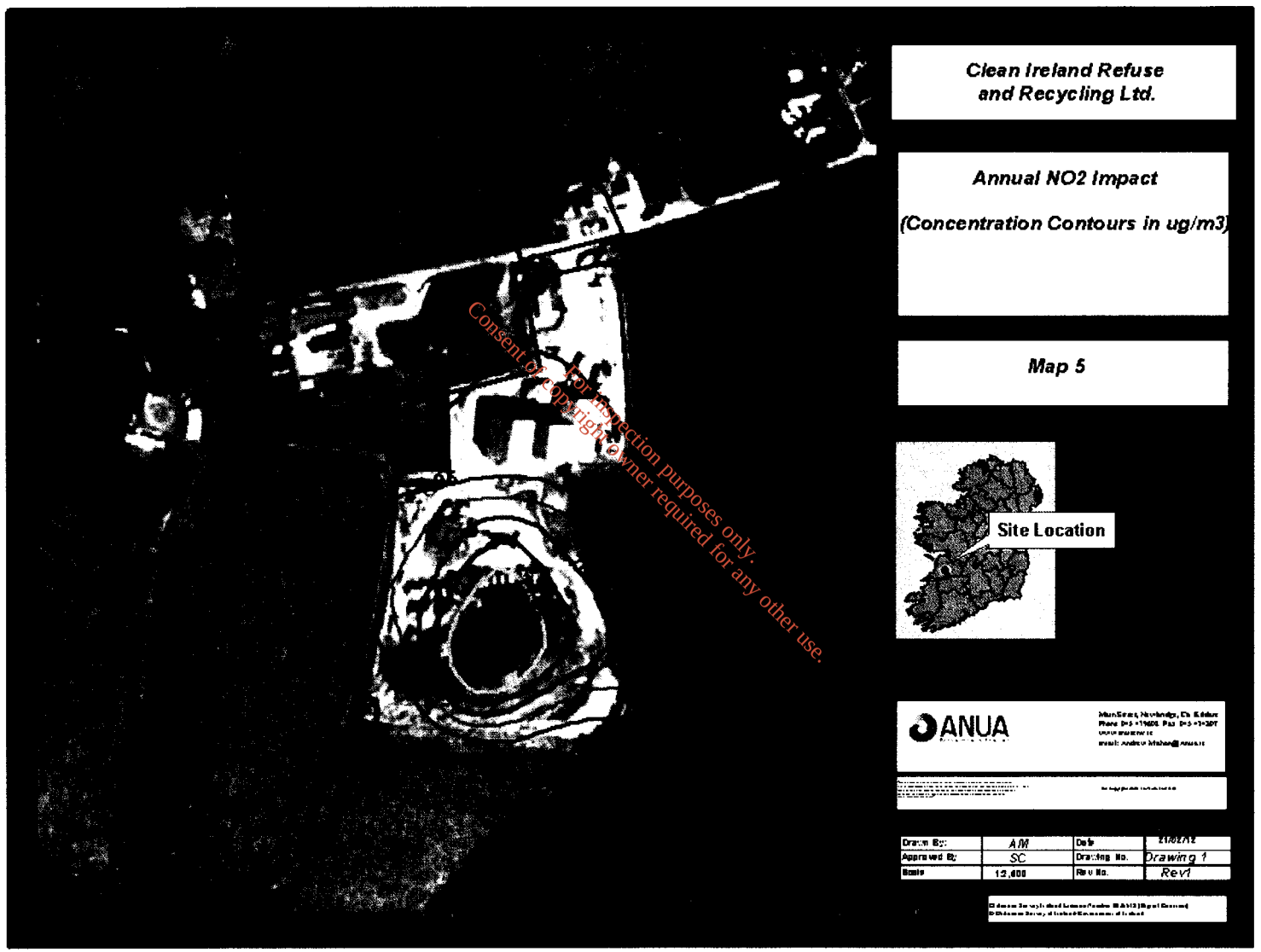
Appendix 1
Isopleths

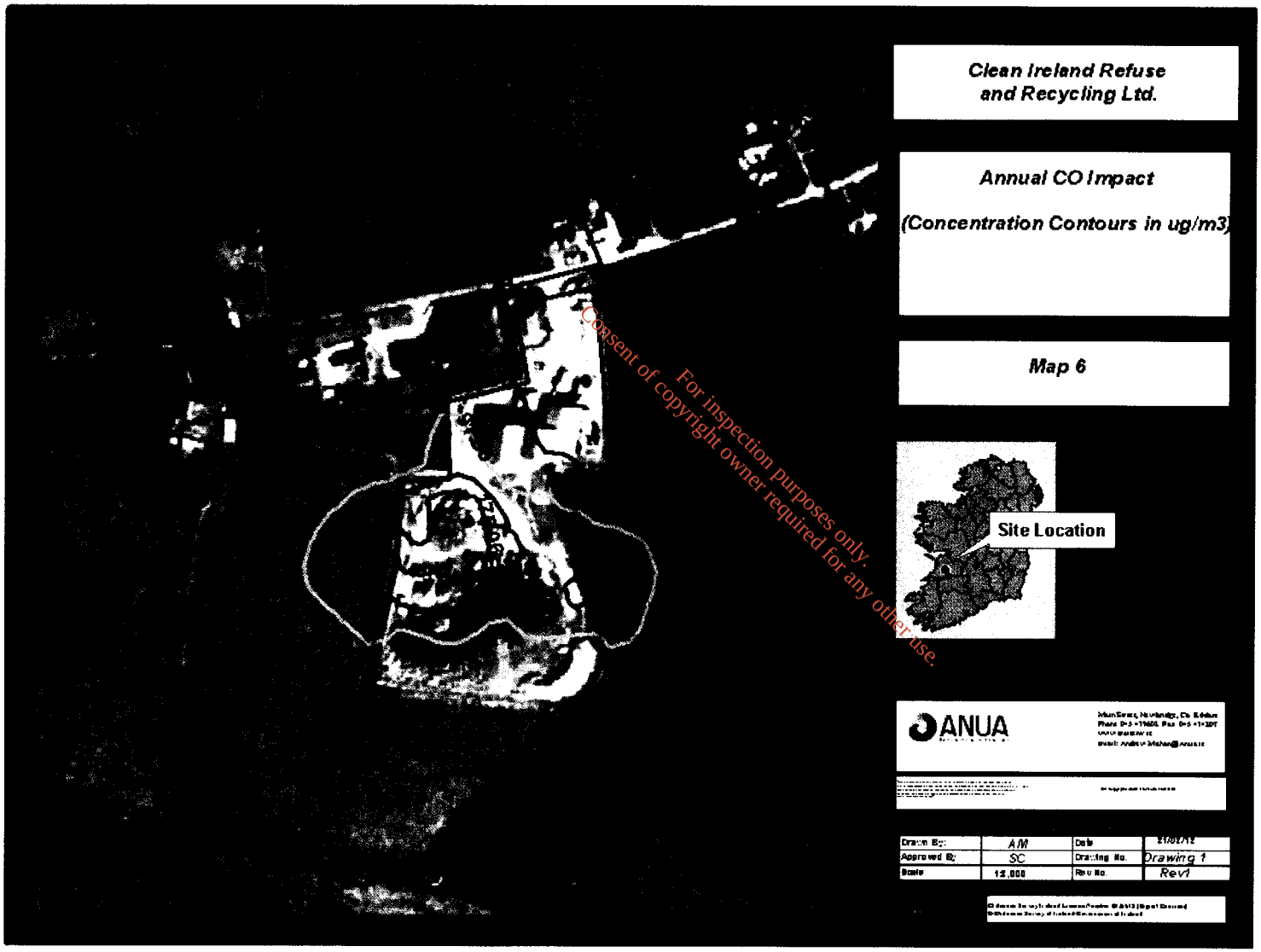












NON-TECHNICAL SUMMARY

OF THE

ENVIRONMENTAL IMPACT STATEMENT

FOR A

WASTE TRANSFER STATION

AT

BALLINAGUN WEST,

CREE,

CO. CLARE

- An Environmental Impact Statement -

Volume II

NON-TECHNICAL SUMMARY

Date: February 2012 (Revision 2)

A Submission by Bord na Móna Environmental Limited on behalf of
Clean (Irl) Refuse & Recycling Ltd.

TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of an Environmental Impact Assessment on an existing and proposed upgrade of a waste transfer station at Cree, Co. Clare. The proposed development will be located at the existing Clean (Irl) Refuse & Recycling Ltd site to accommodate an increase in annual tonnage intake, the introduction of new waste processing activities and the expansion of the site area.

Bord na Móna Technical Services was commissioned by Clean (Irl) Refuse & Recycling Ltd. to complete an Environmental Impact Statement to accompany a Waste Licence and subsequent Planning Application.

2 PROJECT DESCRIPTION

2.1 Site Description

The site for the proposed development is located in the town land of Ballinagun West, approximately 1.4km southwest of Cree, Co. Clare . The site occupies a total area of c.3.0ha. The site is wholly owned by Clean (Irl) Refuse & Recycling Ltd. The site is currently occupied by the existing waste processing buildings, which will not be altered as part of this development.
The site is located within a predominantly rural environment with agricultural lands and a number of residential properties located along the roadways. The entrance is located to the north of the site on the L-6108.

2.2 Project Description

Initial Development Phase

In terms of the existing area of the site, the only increase to the site area under the proposed development will be an increase in area of c.0.4ha at the north of the facility thereby extending the site to the north only. The existing processing buildings and site infrastructure (ballistic separators, balers, conveyor belts) will not be impacted by the introduction of the new processes and development of the site. The most significant development of the site will be localised to the most southerly section of the site where it is proposed to build a biostabiliation plant with adjacent biofilter. The Biostabilisation plant will house a CHP engine which will utilise biogas to generate electricity with potential to feed into the national grid. Extensions to the existing processing buildings, relocation of the glass bunkers, installation of diesel storage bunded unit, and the creation of End of Life Vehicle unit will be secondary in terms of the scale of the development.

It is envisaged that, due to the different aspects of the development, construction will take place at the site during approximately five phases following the planning process. The facility will remain operational during this time and works will be carried out at defined intervals. The site development works and construction sequence for the proposed development will, in general, comprise the following main steps. In turn such phases will generate construction traffic on a temporary basis:

- Stripping of field and overlaying with hardcore
- Construction of earthen berms skip storage area
- Hardstanding Phase 1 of skip storage area
- Construction of extensions to processing buildings
- Construction of glass bunkers
- Construction of End of Life Vehicle Unit
- Installation of wheel/truck wash and leachate holding tank
- Construction of Biostabilisation Plant and Biofilter
- Hardstanding Phase 2 of skip storage area
- Ongoing hardstanding of the hardcore areas

Operational Phases

It is intended that the longevity of the facility is greater than 20 years. The development of the site will permit the continuation of existing waste processes which include:

- Dry recyclable processing
- Wet waste processing
- Baling of material
- Dropdown skip processing
- Timber shredding processing
- Construction and Demolition waste processing

The introduction of new waste processes/activities which will include:

- Biostabilisation (dry fermentation and in vessel composting tunnels) of source segregated brown waste and organic fines from Municipal Solid Waste (MSW) using mechanical separation technique
- Utilisation of Biogas from dry fermentation process in a CHP Engine to providing heat and electricity
- End of Life Vehicle processing
- Hazardous waste acceptance and storage
- Storage of Refuse Derived Fuel (RDF)
- Truck wash
- Wheel wash
- Skip storage

Proposed hours of operation:

7a.m. to 12a.m. Monday to Saturday
8 a.m. to 6p.m. Sunday

Proposed hours of waste acceptance/handling:

8a.m. to 8a.m. Monday to Saturday
8a.m. to 6p.m. Sunday

Proposed hours of any construction and development works at the facility and timeframes:

9a.m. to 6p.m. Monday to Friday
9a.m. to 1p.m. Saturday

Biostabilisation

Clean (Irl) Refuse & Recycling Ltd. is proposing to build and operate a state-of-the-art, totally enclosed facility to convert up to 15,000 tonnes per year of biodegradable materials found in the residential and commercial waste streams into fully stable and marketable soil amendment products. This facility will utilise proven, best available control technologies and best management practices for processing biodegradable waste materials, such as landscape materials, food, wood and non-recyclable paper, into valuable soil enhancing products while minimising any potential impacts to the environment or nuisances to neighbours.

The reception and pre-treatment of the bio-waste will occur within the waste reception building. The bio-waste is loaded into dry fermentation chambers for a duration of 28 days. Digestion (AD) process is initiated through the spraying of activated anaerobic percolate onto the biomass. The

biomass is heated to 37-40°C and biogas production is facilitated. This biogas is drawn off the tunnels and stored prior to use as fuel in a CHP gas engine. 50% of the load is transferred to incoming stock and 50% is transferred to the composting tunnel, giving each particle a retention time of 56 days. The next step takes involves in-vessel composting of the bio-waste where the treatment takes place is closed aerated tunnels for 14-28 days. Following composting, screening of the material will take pace to separate different size particles. The screened compost is transferred to a pasteurisation tunnel and heated in the presence of oxygen to 60-80 degrees C for sixty minutes in accordance with the Animal by-products regulations. After the pasteurisation, the blowers automatically revert to heat exchange mode to bring the temperature down and thus facilitate further mesophylic maturation during the remaining 4-7 days. The final product is transferred to the compost storage area at the rear of the biosatbilisation plant. .

Since the facility is totally enclosed, potential environmental impacts can be managed and controlled so that there will be negligible impact on the environment and nuisances can be minimised for surrounding neighbours and the community at large. All process and building air will be collected and treated to eliminate offensive odours and dust from migrating off site. Similarly any liquids generated in the tipping area will be collected and reused in the process. This eliminates any potential pollution of ground water or surface water sources under, on or near the facility. Noise is also limited as all activities will take place indoors. Finally, the enclosed nature of the facility restricts access to pests such as rodents, birds or insects so pest control measures within the facility can be effective in eliminating pest infestations or problems.

Provision to End of Life Vehicle unit

This process will involve depolluting the vehicle prior to disassembling the body of the vehicle. All parts will be recycled by incorporating the material into the existing segregation process at the facility. Independent bunding will be put in place for the storage of oil filters, engine oils, lead acid batteries and engine parts retaining grease or other hydrocarbons. Scrap metals will be removed to designated scrap metal area at the facility.

Truck wash

A truck wash area will be situated at the north east perimeter to with a leachate holding tank for washings of trucks. The activity will be fully contained and will not have the potential to contaminate surface water on site.

Wheel wash

A wheel wash will be introduced to the site to ensure that no waste is transferred across the site hardstanded surface or on external roads.

CHP Engine (electricity production)

A CHP engine will be housed in the Biostabilisation plant. Biogas generated during the fermentation process will be stored in gas storage tanks and used as required. The biogas will be used by the engine to generate heat and power, sufficient to meet the demands of the running of the Biostabilisation plant and also with potential to export to the national grid.

Skip storage

The storage area will be placed in the extended area to the north of the site which is currently not within the site boundary. The area will be primarily used to store empty skips and will be hardstanded in the two phases. It is estimated that the area will be able to store up to 50 skips. Skip trucks entering the storage area will be infrequent and screening will be put in place to reduce the visual impact

3 ENVIRONMENTAL IMPACT STATEMENT

The environmental impacts of the proposed extraction development are described within the Environmental Impact Statement under the following categories:

Human Beings	Flora and Fauna
Soil & Geology	Hydrology
Hydrogeology	Air
Noise	Traffic
Climatic Factors	Landscape
Cultural Heritage	Material Assets
Interactions of the above	

In order to assess the impacts of the development on the site and its environs, a series of field investigations and desk based studies were conducted by technical staff from Bord na Móna Technical Services from September 2008 to December 2008. These studies enabled an assessment of the environmental impacts, if any, that activities may have on the receiving water, soil, ecological and air environments.

3.1 Human Beings

The existing Clean (Irl) Refuse & Recycling Ltd. site is located at Cree within the Kilrush rural area in County Clare, c.14km north of Kilrush and c.38km southeast of the town of Ennis. The site is situated within the Ballinagun West townland. The main access to the site is via a local road west (c.0.8km) off the R483 Kilrush to Quilty road. The proximity to the small village of Cree is c1.4km. The population of the surrounding area is consistent with the rural setting, with the area characterised by one off housing and ribbon development along the nearby roadways. There are 13 residences within 500 m of the site and a total of 22 houses located along the local road L-6108 on which the Clean (Irl) Refuse & Recycling Ltd. is sited off.

Impacts of the Proposed Development

Noise

A noise assessment was carried out at the facility and it concluded that the noise levels from on-site activities associated with the operational phase of the development will not significantly impact on the ambient noise levels from the surrounding areas, providing mitigation measures are put into place during the construction and operational phases. Screening by means of earthern berms, and the enclosure of waste activities and plant will reduce noise emissions from the site.

Traffic

A traffic impact assessment was conducted in order to assess the potential impacts of traffic movements generated in relation to the proposed increase in tonnages. It is estimated there will be under a three fold increase in traffic movements from 88 to 222 per week of Clean (Irl) Refuse & Recycling waste vehicles only. This figure is exclusive of the traffic movements associated with employee private cars, which will account for a maximum of 50-60 movements per day or 275-330 per week. The proposed routes via the R484 and R483 to national roads are established waste collection routes. However, due to the nature of the business the traffic generated will be intermittent and the volume will be dependent on customer requirements. A number of mitigation measures were proposed to alleviate potential impact points.

Human Health

A number of air pollutants have known or suspected harmful effects on human health and the environment. In many areas these pollutants are principally the products of combustion from space heating, power generation or from motor vehicle traffic. The air pollutants derived from the waste activities can be separated into traffic derived emissions, dust deposition, biofilter emissions and CHP engine emissions. The presence of on-site vehicles will give rise to NO_2, BTEX and SO_2 emissions. Good site practices will be implemented to minimise these emissions. All vehicles and machinery will be switched off when not in use to eliminate any unnecessary emissions. Dust minimisation measures will be implemented during the construction phase of the project in order to reduce the potential for the migration of dust from the site and from the construction traffic using public roads. Full enclosure of the composting process will ensure that the emission of bio-aerosols to the surrounding environment will be minimised and that the levels of this parameter will not have a significant impact on the surrounding environment. The CHP engine will be state of the art using BAT to ensure reduction of potential air pollutants.

Site Structure / Land Use

Land use in the vicinity of the project site is predominately agricultural with a number of residences located along the nearby roadways. The maximum height of the Biostabilisation plant (apex 10.7m) will be slightly lower than that of the highest apex of existing buildings (waste processing sheds apex 10.84m). The biofilter stack will be 6.5m in height, but as this is at the rear of the Biostabilisation plant, the visibility will be impaired from surrounding view points. The CHP engine will have an emission stack of 14m in height which will be located adjacent at the rear wall of the Biostabilisation building. The CHP engine stack will riser c. 3 metres above the highest point of the roof however, it is not considered to be a significant visual impact on the surrounding landscape given the nature of the site and associated buildings. To accommodate the extension of the existing waste processing

buildings for the timber shredder and the storage of C&D waste, the maximum apex of the extension will be 12.23m to ensure working plant will not cause damage to the interior of the building during operation. The proposed skip storage area will have earthen berms created to conceal skips that may be stored at this area. Existing railway sleepers at the east perimeter and earthen berms at the west perimeter have been constructed in such a manner as create minimum visual intrusion on the existing residents and road users, which would reduce long-term visual impacts. Landscaping at the southern and eastern berm contribute to the visual aspects of the site.

Socio-Economic

The development has, although limited, varied social and economic effects. These effects may be categorised as follows:

- Primary Socio-Economic Effects: It is considered likely that the operational phase of the development has and will have minimal impacts on the existing population structure of the area. The job creation benefits are secondary to the development, as it is the service provided by the company to the extended region that benefits the local and regional customers in terms of a contribution to waste management policy. The continuation of the facility will serve to retain the jobs currently associated with the facility and will involve the recruitment of two permanent operators for the operation of the Biostabilisation Plant.

- Service required (electricity, telecommunications, etc.) for the development will be obtained through existing service lines and introduction of the CHP engine to generate electricity for the operation of the site.

3.2 Flora & Fauna

A baseline surveys were undertaken by Bord na Móna Technical Services during the summer of 2008.

The site is not designated as a Natural Heritage Area or a Special Protection Area under the Birds Directive (79/409/EEC) or as a Special Area of Conservation in accordance with the Habitats Directive (92/43/EEC) nor is it designated under any of the other nature conservation designations currently used. No species on the list of the Flora Protection Order 1999 or rare species lists of the Red Data Book were found at the site. The main habitats occurring within the site area are detailed below, with their classifications (according to the Heritage Council) in parentheses.

(i) Hedgerows (WL1)

(ii) Earth Banks (BL2)
(iii) Drainage Ditches (FW4)
(iv) Buildings and Artificial Surfaces (BL3)
(v) Refuse and Other Waste (ED5)

Other habitats occurring within the vicinity, but not directly associated with the site include:

(vi) Conifer Plantation (WD4)
(vii) Marsh (WS1)
(viii) Treelines (WL2)
(ix) Scrub (WS1)
(x) Broadleaf Woodland (WD1)
(xi) Wet Grassland (GS4)
(xii) Stonewalls and Other Stonework (BL2)

The surrounding land is a mixture of one-off housing and fields; with hedgerows, chain & link fencing or low-rise stone walls defining land and property boundaries. The dominant habitat identified at the site is the artificial surface in terms of the greatest area however, the habitat with the greatest variety of wild flowers and grasses, was the Earth Banks or 'earthen berms' which define sections of the boundary for the site. The area for the expansion of the site, where it is proposed to be a hardstanded skip storage area, is located on an agricultural well drained field which is common to the immediate surrounding area at the north of the local roadway. This piece of land is currently soil stripped, with existing habitats in the hedgerows at the east and north remaining unaffected. Earthen berms have been introduced for screening and boundary purposes and will eventually be colonised with species typical throughout the Irish countryside. None of the plant species or habitats recorded are rare or endangered.

Impacts of the Proposed Development

The level of risk of the existing and proposed operations having any significant impact on either the pNHA at White Strand Carrowmore Marsh which lies c.3km west of the proposed site, or the designated SAC of Carrowmore Dunes (SAC 002550) which is the closest designated area to the site, is low. Existing berms will remain in place and there will be no significant impact on the established habitats at the boundary Earth Banks. There will be no alteration to the Hedgerows at the boundary sections and the habitat will therefore be conserved.

Mitigation Measures

The development of the area will not encroach or impact upon the drainage ditch or hedgerow at the east of the proposed area. The Earthen berms created and planted with native tree and

shrub species will be maintained. Existing landscaping around the boundary of the facility shall be maintained through regular inspection and replacement planting of species or individual plants that may die off.

The habitats encountered on the site and its environs are widespread and very typical throughout the Irish countryside and none of the habitats were recorded as having high conservation value.

3.3 Soil & Geology

The study area is underlain by Gley Soils and Quaternary Glacial Tills. The Gley soils have development due to the low permeability characteristics of the glacial till. The quality of the soil is generally clean and is indicative of Irish Soils. The glacial till is known to be >1.9 m in thickness and is described as mottled brown clay with clasts (Namurian rocks). The permeability characteristics are poor. The bedrock geology underlying the site is identified as Namurian Sandstones which consist of siltstones and sandstones.

Impacts of the Proposed Development

Due to the nature of the waste activities on site, there is the potential for the discharge of potential polluting substances into the subsurface such as leachate from waste handled on site, storage of hazardous waste, hydrocarbons from vehicles and fuel storage. Mitigation measures and best practice operations ensure there is no negative impact on the underlying subsurface. The site is covered with hardstanding to protect the underlying subsurface.

Mitigation Measures

All potentially polluting substances are stored and handled in designated areas on site. These designated areas (fuel storage area/hazardous waste storage area/waste acceptance area) are bunded and designed to contain any of the substances therein. A leachate collection system on site diverts any leachate into a holding tank where it is collected for treatment in the Local Authority wastewater treatment plant. Spillage kits will be located throughout the facility in case of an unforeseen spillage/leakage of potential polluting substances. All equipment on-site is serviced regularly. The facility will operate under a waste licence with conditions in place to protect the underlying subsurface.

3.4 Hydrology

The proposed site is located within the River Creegh sub-catchment, which is in turn located within the Mal Bay hydrometric area (hydrometric area no. 28). The hydrometric area is described as the surface catchment drained by all streams entering tidal water in Malbay between Gerorge's Head and Black Head, Co. Clare. There is no direct discharge into a river

or stream from the facility. There are however two outfalls from the site discharge surface water into field ditch drains, which ultimately drain into the River Creegh.

As part of this study, a desk based assessment of the River Creegh was carried out using information gathered from the Environmental Protection Agency and Clare County Council. The quality of the surface water network around the site was examined. Two monitoring locations on the River Creegh are used by both the EPA and Clare County Council. Biological monitoring has been undertaken at Creegh Bridge and Mountrivers Bridge and the results of the river indicate that the river is generally classifed as being slightly polluted.

The surface water quality results for the discharge from the site indicate that the quality of the water within the vicinity of the site is, in general, not impacting on the quality of the River Cree.

Potential Impacts of the Proposed Development

There is potential for release of pollutants to surface waters from the following identified sources:

- Leachate generation from contact of water with waste
- Surface covering and drainage design impacts the quality of surface water draining across the site
- Handling and storage of raw materials or hazardous materials where the potential exists for uncontrolled discharge of materials such as fuels, lubricants and hydraulic fluids to both ground and surface water. Fuel dispensing is undertaken in a controlled, paved, bunded environment, where there are drip trays and spill kits available

Mitigation Measures

Leachate will be generated in the reception hall and curing area of the Biostabilisation Plant. All leachate within the Biostabilisation building will be self-contained due to the proposed design of the floor area and building. Two overground leachate tanks will have a capacity such that all leachate generated from the floor area may be stored. Wheel wash and truck wash will be carried out in designated areas where all leachate will be contained and removed off site for disposal with an approved waste contractor. Glass, Timber and C&D waste will be stored indoors. Baled waste will be stored indoors, baled RDF, material will be stored in containers until removed from site. The hardstanded areas will be extended to cover the entire site and surface water discharged from the facility will passed through an oil/silt interceptor
All hydrocarbons and hazardous waste from the depollution of End of Life Vehicles will be in designated bunds, quarantine items will be indoors and in designated containers. All hazardous waste will be stored in quarantine items, which will be indoors and in designated containers

3.5 Hydrogeology

Groundwater recharge in the study area is through diffuse sources (ie. rainfall), with recharge estimated at c. 200 – 2500 mm/yr. There were no karst features identified in the area. According to the Geological Survey of Ireland (GSI), the aquifer classification is given as locally important bedrock aquifer which is generally moderately productive only in local zones. Groundwater quality beneath the site is generally clean and free from contamination. Groundwater is used at the facility and local as a means of domestic water supply as there is no mains water servicing the area. It is assumed that houses have individual private wells for domestic usage or avail of the Drumehilly Group water Scheme. Groundwater vulnerability is classified by the GSI as high to extreme. The site is covered by hardstanding areas which provide protection to the underlying groundwaters.

Groundwater abstractions on site are minimal and are considered similar to that of a small farm and domestic residences, water requirements for the composting process will be met for the most part by harvesting roof water in three 30m^3 tankers located adjacent to this plant. These low abstraction rates will not be significantly increased and are not considered to have a negative impact on the underlying aquifer.

Treated domestic effluent from the wastewater treatment plant on site is discharged to groundwaters via a percolation area. A site suitability assessment was carried out on-site and ongoing monitoring of the treated effluent indicated that this discharge should not have a significant impact on the underlying groundwaters.

Potential Impacts of the Proposed Development

Due to the nature of the waste activities on site, there is the potential for the discharge of potential polluting substances into the groundwaters such as leachate from waste handled on site, hazardous waste storage and hydrocarbons from vehicles and fuel storage. Mitigation measures and best practice operations ensure there is no negative impact on the underlying groundwaters.

Mitigation Measures

All potentially polluting substances are stored and handled in designated areas on site. These designated areas (fuel storage area/waste acceptance area) are bunded and designed to contain any of the substances therein. A leachate collection system on site diverts any leachate into a holding tank where it is collected for treatment in the Local Authority wastewater treatment plant. Spillage kits will be located throughout the facility in the case of an unforeseen spillage/leakage of potential polluting substances. All equipment on site is serviced regularly.

A surface water drainage system directs run-off from the yard area through a siltation trap and oil interceptor for discharge off site. The facility will operate under a waste licence with conditions in place to protect the underlying subsurface.

3.6 Air

To determine the baseline air quality and subsequently assess the impact of the development the following approach was taken:

- Identification of the potential pollutants
- Monitoring of pollutants to assess the current air quality levels
- Discussion of the potential impact to air quality during the operational phases of the development
- Mitigation measures to minimise these potential impacts.

Potential Impact of the Proposed Development

Examination of both the existing and proposed processes indicates that a number of potential pollutants may be produced at significant levels to have an impact on the existing air quality. The identified pollutants include:

- Particulates (Dust Deposition)
- Incomplete combustion products
- Traffic derived pollutants
- Odour
- Bio aerosols

Mitigation Measures

Dust minimisation measures will be implemented during the construction phase of the project in order to reduce the potential for the migration of dust from the site and from the construction traffic using public roads.

The presence of on-site vehicles will give rise to NO_2, BTEX and SO_2 emissions. Good site practices will be implemented to minimise these emissions. All vehicles and machinery will be switched off when not in use to eliminate any unnecessary emissions.

The operation of the CHP engine will be in line with BAT requirements. The plant itself will be a new previously unused piece of equipment that will operate to the highest technical specifications. The raw material feed stock for the operation of this unit will only consist of

wood chip, paper and cardboard and will therefore not come in under the requirements of the Waste Incineration Directive. As the plant will be new, it will comply with the BAT emission requirements for this type of gasification process. Therefore, the potential impact of this unit will be minimal.

Full enclosure of the composting process will ensure that the emission of bio-aerosols to the surrounding environment will be minimised and that the levels of this parameter will not have a significant impact on the surrounding environment.

All activities that have a high potential for odour generation such as feedstock blending, tunnel loading/unloading, composting, curing, turning of curing piles and screening will be carried out within the proposed building or enclosed composting system to ensure capture and treatment of any odours produced.

3.7 Noise

A survey of baseline noise levels at the site of the waste transfer station of Clean (Irl) Refuse & Recycling Ltd. has been conducted during 2007 and 2008 by Bord na Móna Technical Services, to determine current noise levels at the site perimeters and at noise sensitive locations situated close to the facility.

Potential Impacts of the Proposed development

All operations at the development may give rise to potential impact on the existing noise environment.

Noise levels recorded during the operation of the facility show that noise levels are in compliance with the 55dBA L_{eq} daytime value at the noise sensitive location. The majority of the boundary locations are also within the limit. The screening berms around the boundary of the site will also act to reduce the noise impact further. In addition the presence of the proposed Biostabilisation Plant will act as a buffer for noise emitted from the south of the site. Construction noise will be intermittent and best practices will be employed to mitigate any increase in noise levels from the facility.

Mitigation Measures

The control of on-site activities through the implementation of good management practices will combine to ensure that the noise generated at the site will not have any undesirable effects on the existing neighbouring environment. Measures such as cladding of the trommel may be required to reduce plant noise. The movement of plant at C&D waste storage area and feeding into conveyor belt will be enclosed along with the proposed enclosure of the timber shredder.

All processing equipment associated with the Biostabilisation Plant including shredders, mixers, front-end loaders and screens will be operated within enclosed buildings during defined working hours each day, thus reducing any noise from these sources. The engine associated with the CHP engine will have noise reducers in line with BAT.

3.8 Traffic

A Traffic Impact Assessment was carried out to examine the potential impacts on the existing road networks of the traffic generated as a result of the proposed upgrade at Clean (Ireland) Refuse & Recycling Ltd.

Existing access into the site is through a gated entrance at the north of the site *via* the weighbridge only. The location of the main entrance to the facility will not be altered under the proposed upgrade of the facility. It is envisaged that the proposed skip storage area at the north of the site will be accessed though the existing car park. The design of the existing site access ensures that vehicles entering the site do not impede the traffic flow on the public road.

Impacts of the Proposed Development

The construction techniques will directly correlate with the type of traffic that will be required to complete the upgrade of the site. Several different types of construction vehicles will have to be brought on site. Processing buildings to be constructed will be prefabricated in sections and will arrive by HGV to site where they are assembled *insitu* using a crane which will also have to transported to the site. Traffic levels associated with the proposed infrastructure upgrade will result in a significant but temporary impact to traffic in the locality.

The current number of Clean (Irl) Refuse & Recycling Ltd household customers is approximately 18,000, and with the proposed development of the site the company aims to increase the customer base (household) to 30,000. The existing collection routes will continue to be used, and extra routes may be added to the collection schedule depending on the need for the bin collection service in the area. Traffic movements will increase with the rise in tonnages. The greatest increase is related to C&D waste, which shows over a 300% increase in movements.

Mitigation Measures

To minimise traffic disruption, waste trucks will not pass through Kilmihill outside peak hours (i.e. 7am-9am and 4pm to 6 pm.) and National roads will be used as traffic routes as alternatives to local roads. Brown bin waste collection will be centralised at an alternative depot to reduce the number of traffic movements to the site in Cree.

Construction traffic will be infrequent over a long duration of time and existing lay-bys on the L-6108 will continue to serve the public vehicles.

3.9 Climatic Factors

The closest synoptic station is Shannon synoptic station located east of the Creegh site (c.37km). Data for this station has been used as it is more likely to represent climate conditions at the Cree site due to its proximity to the coast.

The climate of the development site is characterised as follows:

- The prevailing wind direction over Ireland is from the south and west, and this is likely to be the case at the site.
- The strongest winds for the Cree site occur during the period from October to March
- The strongest winds for the Cree site (greater than 10knots / 5.15m/s) occur during the period from October to March (excluding November)
- Air temperature ranges from a mean monthly temperature of 5.4°C in January to 15.7°C in July

The development is not energy intensive and does not result in large scale emissions to the atmosphere. The use of natural lighting, energy efficient lights and ventilation equipment will minimise the energy requirements and hence the impact on the climate. It is not considered that the development has any impact on the climate in this area.

3.10 Landscape and Visual Impacts

The site is situated in a rural setting in west Clare where the immediate surrounding landscape is dominated by flat green fields intermingling with gently rolling hills. There are no landscape sensitive areas, designated routes, designated views or areas protected for nature in the immediate vicinity of the site. The recreational areas in the vicinity of the site are mainly beaches and small coastal villages, with White Strand beach being the closest recreational area at approximately 5km from the site in Cree.

Potential Impact of the Development

The proposed site will have a long term impact as it is intended that the facility will operate for a further twenty to fifty years. The expansion of the site is considered to be a visual intrusion rather than an obstruction, as the proposed development will be an addition to the existing intrusion on the landscape thereby, impinging on the existing view without obscuring

it. The development will give rise to visual intrusion for the private dwellings on the local road, however it is contended that visibility is limited due to natural cover and intermingling drumlins.

Mitigation Measures

The visual impact will be minimised through the appropriate mitigation measures follows:

- Existing berms, hedgerows and landscaping at the east and south perimeter will be maintained
- Buildings will be constructed to be uniform with existing buildings and will reflect typical agricultural structures in the area
- Southern boundary will be fully stabilised and planted following construction works

3.11 Cultural Heritage

An archaeological assessment of the Clean (Irl) Refuse & Recycling Ltd. site and its environs was undertaken by archaeologist Annette Quinn of Tobar Archaeological Services at the request of Bord na Mona Technical Services in May 2005, in conjunction with a planning application relating to buildings at the site.

This assessment examined the archaeological heritage of the development area in order to identify any known or potential archaeological constraints. It also assesses any likely impacts on any known or potential features of archaeological importance and offers recommendations for the mitigation measures to be taken.

The archaeology assessment did not indicate any archaeological features in the development area. The development will not physically affect any recorded monument listed within the Record of Monuments and Places (RMP). No surface features of an archaeological nature were identified. There are no Monuments listed in the RMP within the development site.

The nearest recorded monument (in excess of 100m of the proposed site) (RMPCL047-050) is located west of the proposed site in the townland of Ballinagun West. The monument consists of a substantial earthen enclosure which is situated immediately south of the existing public roadway.

Cree Bridge (RPA 198) is listed as a protected bridge under the CDP 2005-2011 and is described as a three arched road bridge (c.1820) over a river. There are no other listed architectural features in the vicinity of the Clean (Irl) Refuse & Recycling site.

Potential Impacts of Quarry Development

By their very nature, developments of this kind are likely to have an impact on their environs. Topsoil stripping, ground reductions and general landscaping works have the potential of revealing hitherto unknown sites, features and artefacts of archaeological potential and interest. Furthermore, extant remains, whether or not previously identified and recorded, also have the ability to be damaged or destroyed. There are no recommended mitigation measures arising from the archaeological study of the site.

3.12 MATERIAL ASSETS

It is contended that the material asset values of the surrounding area will not be significantly affected by the development as the environmental impacts (air, noise and water pollution, visual intrusion, traffic impacts) of the activity are shown to be minimal.

The development is in character with activities currently being undertaken at the site.

4.0 CONCLUSIONS

In summary, it is contended that the negative impacts of the development of the waste transfer station at Cree, Clare can be minimised or eliminated by adherence to the mitigation measures. The Environmental Impact Statement, therefore, shows that no significant adverse effect on the environment should occur as a result of this development.