WOOD LANE – EXISTING FLARE

Request for Further Information – Air Quality

Prepared For: Tudor Griffiths Ltd

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1.0 INTRODUCTION

SLR Consulting Ltd has been commissioned by Tudor Griffiths Ltd to undertake Atmospheric Dispersion Modelling (ADM) in support of the Environment Agency's (EA) 'Request for Further Information', in relation to the Environmental Permit (EP) application (reference: EPR/CP3698VW/V004) for the Biomass Facility at Wood Lane, Ellesmere, Shropshire, SY12 0HY (the 'Site').

An Air Emissions Risk Assessment (AERA) and Schedule 5 Notice response have previously been submitted in support of the EP application.

The Request for Further Information relates specifically to the flare located at the adjoining Landfill Site, and the potential for the new building which houses the biomass boilers to subsequently impact emission dispersal from the flare.

1.1 Scope and Objective

The scope has been defined by the EA's Request for Further Information, as follows:

"*1.* *The response to this question focuses on why the air dispersion report submitted in the application for the biomass plant did not consider the emissions from the flare. What was requested is an assessment of whether the new biomass plant (and associated building) which is higher than the flare stack could impact on the dispersion from the flare stack when the flare operates.*

As far as I can see from viewing the site plans for the waste/biomass facility (EPR/CP3698VW) and the landfill facility (EPR/RP3231XX), the flare is located within the installation boundary of both permits. If this is correct, I feel that more information on the operation of the flare may be justified and required.

(a) *Demonstrate that the gaseous dispersion from operation of the flare stack has not been altered due to the construction, height and location of the biomass building;*

(b) *If the biomass building has the potential to alter the dispersion from the flare stack, demonstrate how any change to that dispersion and its potential environmental impact will be assessed.*"

This report addresses the above comments, and therefore the objective of the study is to assess, using atmospheric dispersion modelling, the impact of emissions from the flare stack and their dispersal with and without the biomass building and its potential environmental impact.

2.0 AMBIENT LIMIT VALUES

The following Air Quality Assessment Levels (AQALs), incorporating standards and Environmental Assessment Levels (EALs), have been applied in this assessment for human health (Table 2-1) and designated ecological receptors (Table 2-2).

Table 2-1
Air Quality Assessment Levels – Human Health

Pollutant	Long-term Standard	Short-term Standard
Nitrogen dioxide (NO_2)	40µg/m^3 Annual mean.	200µg/m^3 1-hour mean, not to be exceeded more than 18 times per calendar year.
Carbon monoxide (CO)	-	10,000µg/m^3 8-hour average across 24-hour period.
		30,000µg/m^3 1-hour mean.
Sulphur dioxide (SO_2)	-	266µg/m^3 15-minute mean, not to be exceeded more than 35 times per calendar year.
		350µg/m^3 1-hour mean, not to be exceeded more than 24 times per calendar year.
		125µg/m^3 24-hour mean, not to be exceeded more than 3 times per calendar year.
Benzene (C_6H_6)	5µg/m^3 Annual mean.	195µg/m^3 1-hour mean.

Table 2-2
Air Quality Assessment Levels – Ecological

Pollutant	Long-term Standard	Short-term Standard
Nitrogen oxides (NO_X)	30µg/m^3 Annual mean.	75µg/m^3 Daily mean.
SO_2	10µg/m^3 where lichens or bryophytes are present, 20µg/m^3 where they are not. Annual mean.	-

3.0 ASSESSMENT METHODOLOGY

The following sections present the relevant updates to the assessment methodology. All remaining inputs remain as per the original AERA to support the EP application.

3.1 Emission Scenarios

Two emission scenarios have been assessed:

- Scenario 0 (Sc0): Without biomass building; and
- Scenario 1 (Sc1): With biomass building.

3.2 Emission Parameters

The flare emission parameters applied in the modelling are provided in Table 3-1. The flare emission parameters have been input on the basis of manufacturer's design and specifications, and recent monitoring reports[1]. The flare has a capacity of 1,000m^3/hr with a 10:1 turndown ratio. The flare operates intermittently, most recent data indicate 357 hours of operation (treating 350m^3/hr of landfill gas) in 2020, and this is considered typical by the operator.

Table 3-1
Emission Parameters

Parameter / Source	Flare
Stack Location (NGR x, y)	x342325.11, y332512.55
Flow (Am^3/s)	5.5
Stack diameter (m)	1.0
Velocity (m/s)	7.0
Emission temperature (^{o}C)	1,000
Actual O_2 % (dry)	9.13
Actual moisture %	6.60
Normalised Flow (Nm^3/s) (dry, 3% oxygen, 101.3kpa, 273k)	0.73
NO_x (mg/Nm^3)	150
NO_x (g/s)	0.11
CO (mg/Nm^3)	50
CO (g/s)	0.04
Volatile Organic Compounds (VOCs) (assessed as C_6H_6) (mg/Nm^3)	10
VOCs (g/s)	0.01
SO_2 (mg/Nm^3)	35
SO_2 (g/s)	0.03

[1] Envirodat monitoring report, Monitoring dates: 19th September 2018, Job Number: R18281.

3.3 Meteorological Data and Preparation

The meteorological data previously utilised from Shawbury station has been updated to incorporate three years of recent data i.e. 2018 to 2020, inclusive. A windrose is presented in Figure 3-1.

The meteorological data (3 years of hourly sequential data) was obtained in .met format from the data supplier and converted to the required surface and profile formats for use in AERMOD using AERMET View meteorological pre-processor. Details specific to the site location were used to define the surface characteristics; albedo, bowen ratio and surface roughness, applied in the conversion (see Table 3-2).

Table 3-2
Applied Surface Characteristics

Zone (start)	Zone (end)	Albedo	Bowen Ratio	Surface Roughness (m)
45	195	0.18	0.57	0.058
195	45			0.621

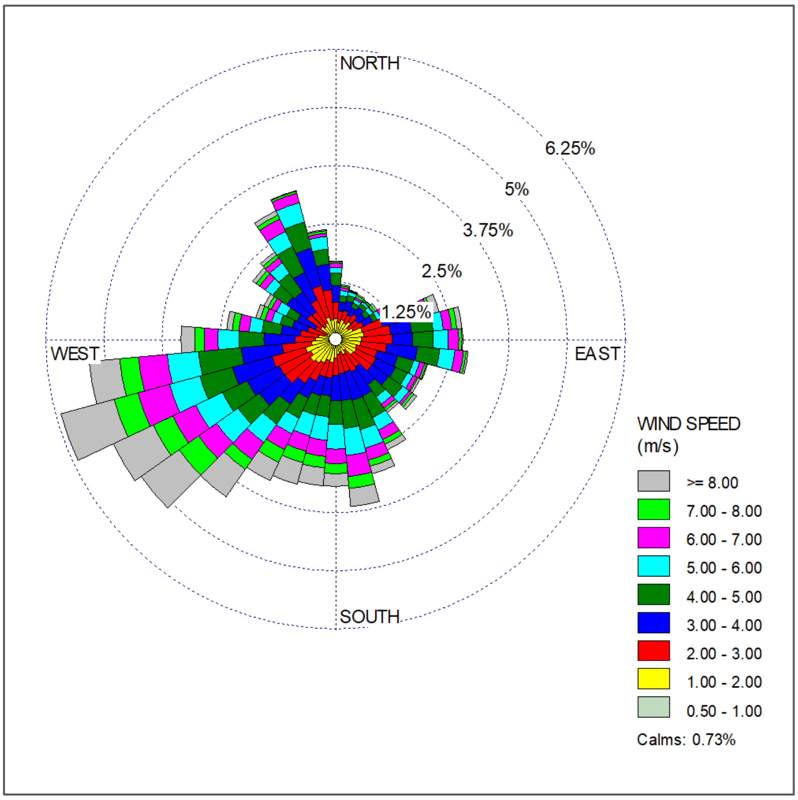

Figure 3-1
Shawbury 2018-2020 Windrose

4.0 ASSESSMENT RESULTS

The maximum ground level concentrations outside the site boundary are presented in Table 4-1 below. The impacts are insignificant without (Sc0) and with the building (Sc1), i.e. less than 1% of annual mean standards and less than 10% of short term standards for the protection of human health and sensitive ecosystems.

Table 4-1
Predicted Impacts

Pollutant	Averaging Period	Sc0 PC ($\mu g/m^3$)	Sc0 PC as % of Standard	Sc1 PC ($\mu g/m^3$)	Sc1 PC as % of Standard
NO_2	Annual mean	<0.1	<0.1%	<0.1	<0.1%
	1-hour 99.79%ile	1.6	0.8%	3.4	1.7%
SO_2	Annual mean	<0.1	<0.1%	<0.1	<0.1%
	1-hour 99.9%ile	1.5	0.5%	3.3	1.3%
	1-hour 99.73%ile	1.1	0.3%	2.2	0.6%
	24-hour 99.18%ile	0.5	0.4%	1.0	0.8%
VOCs (as C_6H_6)	1-hour mean	0.4	0.2%	0.7	0.4%
	Annual mean	<0.1	<0.1%	<0.1	<0.1%
CO	8-hour mean	1.5	<0.1%	2.6	<0.1%
	1-hour mean	1.8	<0.1%	3.7	<0.1%
NO_x	24-hour mean	3.8	5.0%	5.9	7.9%
	Annual mean	<0.1	0.1%	<0.1	0.1%

Note:
The maximum annual mean GLC outside the site boundary in Sc0 occurred at NGR x342420, y332564; and in Sc1 this occurred at x342280, y332624.

The biomass building therefore does not significantly alter the dispersal from the flare stack, as the conclusions drawn from Sc0 and Sc1 remain the same.

5.0 CONCLUSION

In conclusion, the biomass building does affect the dispersion of emissions from the flare, however the effects are not significant, as the impacts from flare emissions remain ‘insignificant’ at the point of maximum ground level impact with and without the building. On this basis it can be concluded that the impacts on human health and sensitive ecosystems are ‘insignificant’.

APPENDIX A

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