

SANDYSIKE MILL

Environmental Permit Application

Air Emissions Risk Assessment

(addendum)

Prepared for: NWF Agriculture Limited

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1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed by NWF Agriculture Limited (NWF) to prepare an Environmental Permit application for the Sandysike Mill, Sandysike Industrial Estate, Sandysike, Longtown, Cumbria CA6 5SS (the Site). This report presents an addendum to the Air Emission Risk Assessment report (September 2018) setting out the combined screening for:

- A2: Line 1 Cooler LEV via Cyclone (particulate emissions);
- A3: Line 2 Cooler LEV via Cyclone (particulate emissions); and
- A4: Boiler - 1 MW thermal input steam generation plant fuelled by kerosene (combustion emissions).

2.0 EMISSIONS TO ATMOSPHERE

2.1 Cooler Emissions

The emission parameters used in the assessment are provided in Table 2-2 below and are based on emissions monitoring for Total Suspended Particulate (by an MCERTS accredited contractor) in July 2018.

With respect to the fractions of PM₁₀ and PM_{2.5} in the TSP, these have been based upon a study completed by the AIC on emissions from compound animal feed manufacturing sites in the UK in 2015¹. Of the 377 dust samples reported 16 were also analysed for the PM₁₀ and PM_{2.5} fraction. These fractions are reported in Table 2-1 and have been applied in the assessment.

Table 2-1
PM₁₀ and PM_{2.5} Fraction in Animal Feed Cooler Emissions

Parameter	Average emission Concentration mg/Nm ³	Standard deviation mg/Nm ³	Percentage Fraction of Total
Total Particulate	7.3	9.2	
PM ₁₀	1.6	1.8	19.5%
PM _{2.5}	<0.2 ^(a)		<3%

Table Note: a) Only one sample of 16 was above the Limit of Detection

Table 2-2
Cooler Emission Parameters

Parameter	A2	A3
Volume Flow (Nm ³ /s)	3.26	5.53
Total Suspended Particulate (mg/Nm ³)	1.9	8.6
Total Suspended Particulate (g/s)	0.006	0.048
PM ₁₀ (mg/Nm ³)	0.37	1.68
PM ₁₀ (g/s)	0.001	0.009

¹ Agricultural Industries Confederation, 2015. Summary of particulate emissions from the UK compound animal feed industry

Parameter	A2	A3
PM _{2.5} (mg/Nm ³)	0.057	0.258
PM _{2.5} (g/s)	0.0002	0.0014

2.2 Boiler Emissions

Boiler emission parameters, in the absence of monitoring data, have been based upon calculations and emission factors from EMEP/EEA air pollutant emission inventory guidebook 2016². Emissions have been factored based on annual fuel use for assessment of annual mean impacts, but based on boiler capacity (1MW_{th}) for short-term impacts.

**Table 2-3
 Boiler Emissions**

Parameter	Emission Factor (g/Gj)	Emission (g/s) (based upon Boiler Capacity for short-term impacts)	Emission (g/s) (based upon annual fuel use for annual impacts)
NO _x	100	0.100	0.0135
CO	40	0.040	0.0054
SO ₂	140	0.140	0.0190
PM ₁₀ and PM _{2.5}	3	0.003	0.0004

Table note: kerosene use of 109,882 litres/annum

2.3 Effective Release Height and Dispersion factors

For the AERA screening assessment 'effective stack heights' and dispersion factors have been applied as shown in Table 2-4. The vents do not discharge more than 3m above the roof height and therefore effective release height has been treated as 0m.

**Table 2-4
 Dispersion Factors**

Parameter	A2	A3	A4
Effective Release Height	0	0	0
Dispersion Factors (Annual)	148	148	148
Dispersion Factors (1-hour)	3900	3900	3900

² Table 3.24 'Tier 2 emission factors for non-residential sources, medium-sized (> 50 kW_{th} to ≤ 1 MW_{th}) boilers liquid fuels'.

3.0 BASELINE ENVIRONMENT

3.1 Background Air Quality

The CCC LAQM reports and UK Automatic Urban and Rural Network (AURN) have been reviewed for relevant local monitoring data for use in the assessment, however there are no PM₁₀ or PM_{2.5} monitors in proximity to the site.

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by Defra through the UK AIR website and is routinely used to support LAQM and Air Quality Assessments.

Background pollutant concentrations for NO₂, PM₁₀ and PM_{2.5} are based upon a 2015 base year and projected to future years³. The 2018 mapped background concentrations for the 4 grid squares containing the Site and nearby receptors are shown in Table 3-1. The highest concentrations have been applied in the assessment. The SO₂ background has been based on information from APIS, see below.

Table 3-1
Defra Projected Annual Mean Background Concentrations 2018

X-NGR	Y-NGR	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	NO ₂ (µg/m ³)
338500	566500	8.3	5.7	4.2
339500	566500	9.6	6.2	4.3
338500	567500	10.4	6.8	4.5
339500	567500	9.1	6.0	4.2

3.2 Baseline Conditions at Ecological Receptors

The APIS website⁴ is a support tool for assessment of potential effects of air pollutants on habitats and species developed in partnership by the UK conservation agencies and regulatory agencies and the Centre for Ecology and Hydrology and been used to provide information on:

- current baseline concentrations (Table 3-2); and
- Critical Loads and current deposition rates for nutrient nitrogen and for acidity (Table 3-3 and Table 3-4).

Table 3-2
NO_x and SO₂ Concentrations at Ecological Receptors

Name / Type	NO _x (µg/m ³)	SO ₂ (µg/m ³)
ER1 (AW)	6.7	1.08

³ Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home>.

⁴ <http://www.apis.ac.uk/>.

Name / Type	NO _x (µg/m ³)	SO ₂ (µg/m ³)
ER2 (LWS)	6.5	1.08
ER3 (SPA)	12.5	0.93
ER4 (SAC)	5.8	1.05
ER5 (SAC)	12.5	0.93
ER6 (SAC)	7.1	1.16

Table 3-3
Nitrogen Critical Loads and Current Loads

Ref.	Terrestrial Habitat Information (most sensitive)	Critical Load Range (kg N/ha/yr)	Applied C _{Lo} (kg N/ha/yr)	Current Load (kg N/ha/yr)
ER1 (AW)	Acidophilous Quercus woodland	10-15	10	32.62
ER2(LWS)	Acidophilous Quercus woodland	10-15	10	32.62
ER3 (SPA)	Raised and blanket bogs	5-10	5	21.42
ER4 (SAC)	Raised and blanket bogs	5-10	5	19.88
ER5 (SAC)	Coastal stable dune grasslands - acid type	8-10	8	21.42
ER6 (SAC)	Permanent oligotrophic waters	3-10	3	21.42

Table 3-4
Acid Critical Load Functions and Current Loads

Site	Habitat (most sensitive to acid deposition)	Critical Level (k _{eq} /ha/yr)			Current Load (k _{eq} /ha/yr)	
		CLmaxS	CLminN	CLmaxN	N	S
ER1 (AW)	Broadleafed/Coniferous unmanaged wood	0.639	0.357	0.996	2.33	0.17
ER2(LWS)	Broadleafed/Coniferous unmanaged wood	2.379	0.357	2.736	2.33	0.17
ER3 (SPA)	Bogs	0.206	0.321	0.527	1.53	0.14
ER4 (SAC)	Bogs	0.254	0.321	0.575	1.42	0.16
ER5 (SAC)	Acid grassland	0.41	0.223	0.633	1.53	0.14
ER6 (SAC)	No acid critical load functions on APIS for the SAC features and habitats present					

4.0 SCREENING RESULTS

The inputs and results of the screening assessment are provided in Table 4-1.

Table 4-1
AERA Air Quality Screening Results

Pollutant ($\mu\text{g}/\text{m}^3$)	SO ₂				NO ₂		NOx		CO		PM ₁₀		PM _{2.5}
	Averaging Period	15-min	1-hr	24-hr	Annual (Eco)	1-hr	Annual	Annual	24-hr	1hr	8-hr	24-hr	Annual
Total Process Contribution (PC)	731.6	546.0	322.1	2.8	195.0	2.0	2.0	230.1	156.0	109.2	31.0	1.6	0.3
EAL (Limit Value)	266	350	125	20	200	40	30	75	30000	10000	50	40	25
PC (as %age of EAL)	276%	156%	258%	14%	97%	5%	7%	307%	1%	1%	62%	4%	1%
PC Insignificant?	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
Background Concentration ⁽²⁾ (B)	2.2	2.2	1.1		9.0	4.5	12.5	25.0			10.4	10.4	6.8
B+PC	-	-	-	2.8	-	6.5	14.5	-	-	-	-	12.0	7.1
B+PC (as %age of LT EAL)	-	-	-	14%	-	16%	48%	-	-	-	-	30%	28%
ST EAL – BG ^(a) (headroom)	262.8	347.8	123.9		191.0	-	-	50.0	-	-	39.6	-	-
PC as % of (ST EAL - BG)	278%	157%	260%		102%	-	-	460%	-	-	78.4%	-	-
Indicative of modelling requirement?	YES	YES	YES	NO	YES	NO	NO	YES	-	-	YES	NO	NO

Table note: a) Following Defra LAQM.TG16 guidance the PM₁₀ annual mean has been applied as the 24-hour mean background.

4.1.1 Impacts on Critical Loads

The results of the assessment are presented in Table 4-2 and Table 4-3 below.

Table 4-2
Impact on Nitrogen Critical Load

Site	Applied C _{Lo}	Annual mean PC (kg N/ha/yr)	PC as % of C _{Lo}	Annual mean PEC (kg N/ha/yr)	PEC as % of C _{Lo}
ER1 (AW)	10	0.576	5.8%	33.2	221%
ER2(LWS)	10	0.576	5.8%	33.2	221%
ER3 (SPA)	5	0.288	5.8%	21.7	217%
ER4 (SAC)	5	0.288	5.8%	20.2	202%
ER5 (SAC)	8	0.288	3.6%	21.7	217%
ER6 (SAC)	3	0.288	9.6%	21.7	217%

Table 4-3
Impact on Acid Critical Load

Site	Annual mean N PC (kg _{eq} /ha/yr)	Annual mean S PC (kg _{eq} /ha/yr)	PC as % of Critical Load	Annual mean N PEC (kg _{eq} /ha/yr)	Annual mean S PEC (kg _{eq} /ha/yr)
ER1 (AW)	0.041	0.290	33.2%	2.371	0.460
ER2(LWS)	0.041	0.290	12.1%	2.371	0.460
ER3 (SPA)	0.021	0.290	58.9%	1.551	0.430
ER4 (SAC)	0.021	0.290	54.0%	1.441	0.450
ER5 (SAC)	0.021	0.290	49.1%	1.551	0.430
ER6 (SAC)	No comparable Critical Loads				

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