



Ricardo
Energy & Environment



Proposed Aire Valley Clean Energy Facility

Environmental Permit Application – Air Quality Impact Assessment
ADDENDUM

Report for Endless Energy Ltd

Customer:

Endless Energy Ltd

Customer reference:

Endless Energy Ltd

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22 October 2018

Ricardo Energy & Environment reference:

Ref: ED10527101- Issue Number 1

Executive summary

This addendum report provides additional information in support of permit application reference EPR/ZP3537AT/A001. The additional information comprises an amended air quality risk assessment including the following:

- Prediction of the impacts of polycyclic biphenyls (PCBs)
- Assessment of impacts at Marley Bog local wildlife site and Transfield Wood – local wildlife site and ancient woodland.

Further assessment was carried out to assess the risk of air quality impacts taking account of these issues.

In accordance with the relevant Environment Agency guidance, it was concluded that emissions of PCBs can be screened out as posing no significant risk, and no further assessment of PCBs is required.

In accordance with the relevant Environment Agency guidance, it was concluded that the risk of significant impacts at Marley Bog and Transfield Wood Local Wildlife Sites can be screened out as insignificant, and no further assessment of potential impacts at these sites is required.

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1 Update to Air Quality Impact Assessment

1.1 Information identified by the Environment Agency

This addendum report provides additional information identified in an email from the Environment Agency to Wardell Armstrong dated 16 October 2018, referenced as follows:

Application reference: EPR/ZP3537AT/A001

Operator: Endless Energy Limited

Facility: Endless Energy Facility

The information identified was as follows:

1. *Provide an amended air quality risk assessment to include the following:*
 - i. *Impacts at Marley Bog – local wildlife site*
 - ii. *Impacts at Transfield Wood – local wildlife site and ancient woodland.*
 - iii. *Prediction of the impacts of PCBs compared to the Environmental Standards as set out in our web guide on air emissions risk assessment. The guide can be found at <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.*

[Emissions of PCBs should be based on expected emissions from your plant. There is data on expected concentrations in the current BREF]

This document provides the required information.

- Section 1.2 below provides an update to the air quality risk assessment conclusions in respect of Marley Bog and Transfield Wood Local Wildlife Sites and the assessment of impacts of emissions of polychlorinated biphenyls (PCBs).
- Section 2 below provides the detailed information in respect of Marley Bog and Transfield Wood Local Wildlife Sites and the assessment of impacts of emissions of PCBs. This information is provided in the form of updated tables from the Air Quality Impact Assessment report (Ricardo Energy and Environment report ref. ED10527 Issue Number 3 dated 25/07/2017) submitted with the permit application ref. EPR/ZP3537AT/A001, with new information clearly highlighted in **red text**.

1.2 Risk assessment conclusions

1.2.1 Polychlorinated biphenyls

Environment Agency guidance¹ identifies the following steps to be taken when carrying out a risk assessment for emissions to air.

- Calculate the environmental concentration of each substance you release into the air – known as the process contribution (PC).
- Identify PCs with insignificant environmental impact so that they can be ‘screened out’ – this means that you don’t have to assess them any further.

For PCBs, the maximum modelled process contributions set out in Table 12A below were less than 1% of the long-term mean critical level, and less than 10% of the short-term mean critical level.

¹ Environment Agency web guide on air emissions risk assessment <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>

On this basis, and in accordance with the Environment Agency guidance, it was concluded that emissions of PCBs can be screened out as posing no significant risk, and no further assessment of PCBs is required.

1.2.2 Local wildlife sites

The maximum modelled process contributions at Marley Bog and Transfield Wood Local Wildlife Sites to airborne concentrations and deposition rates set out in tables 16A to 21A below were below 1% of the applicable long-term average critical levels and critical load values, and below 10% of the applicable short-term critical levels.

On this basis, and in accordance with the Environment Agency guidance, it was concluded that the risk of significant impacts at Marley Bog and Transfield Wood Local Wildlife Sites can be screened out as insignificant, and no further assessment of potential impacts at these sites is required.

2 Detailed information

This section provides the information to support the updated risk assessment conclusions, in the form of updated tables from the Air Quality Impact Assessment report (Ricardo Energy and Environment report ref. ED10527 Issue Number 3 dated 25/07/2017) submitted with the permit application ref. EPR/ZP3537AT/A001. Table numbering has been retained, with the letter A appended to each table number.

New information relevant to the two Local Wildlife Sites and emissions of PCBs is highlighted in each table in **red text**.

The information in this section should be read in conjunction with the July 2017 Air Quality Impact Assessment report.

Table 1A: Concentrations of released substances

Substance	EfW Facility	
	Emission concentration for averaging periods ≥ 24 hours	Emission concentration for averaging periods < 24 hours
Particulate matter	10 mg/Nm ³	n/a
Volatile organic compounds	10 mg/Nm ³	20 mg/Nm ³
Hydrogen chloride	10 mg/Nm ³	60 mg/Nm ³
Hydrogen fluoride	1 mg/Nm ³	4 mg/Nm ³
Carbon monoxide	n/a	150 mg/Nm ³
Sulphur dioxide	18 mg/Nm ³	200 mg/Nm ³
Oxides of nitrogen	150 mg/Nm ³	400 mg/Nm ³
Metals group 1: Cadmium and Thallium	0.05 mg/Nm ³	
Metals group 2: Mercury	0.05 mg/Nm ³	
Metals group 3: Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel, Vanadium	0.5 mg/Nm ³	
Dioxins and furans	0.1 ng/Nm ³	
Polycyclic aromatic hydrocarbons as benz(a)pyrene	0.001 mg/Nm ³	
Ammonia	5 mg/Nm ³	
Polycyclic biphenyls	0.005 mg/Nm³	

Note: "n/a" – not applicable (no short-term air quality standard with averaging period < 24 hours for particulate matter and no short-term air quality standard with averaging period ≥ 24 hours for carbon monoxide); **emission concentration for PCBs taken from BREF Note² Table 3.8**

Table 2A: Designated habitat sites in the vicinity of the proposed facility

Site	Designation	X(m)	Y(m)	Approx. distance from stack (km)
H1		407930	443851	2.40
H2		408434	443875	2.46
H3	South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Ilkley Moor section	409010	444045	2.78
H4		410168	443857	3.24
H5		410265	443754	3.24
H6		410350	443584	3.18
H7		410478	443499	3.22
H8		410775	442893	3.14

² European Commission, "Integrated Pollution Prevention and Control Reference Document on the Best Available Techniques for Waste Incineration," August 2006

Site	Designation	X(m)	Y(m)	Approx. distance from stack (km)	
H9		410920	442189	3.02	
H10		411727	442250	3.82	
H11		411109	446499	5.93	
H12		411935	446400	6.33	
H13		412440	446637	6.83	
H14		412684	446758	7.08	
H15		399548	442268	8.48	
H16		399869	441922	8.13	
H17		400070	441201	7.92	
H18		400355	440273	7.72	
H19		400634	439605	7.58	
H20		400725	439363	7.56	
H21	South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Keighley Moor section	400355	438501	8.18	
H22		SSSI / SAC / SPA	401628	436524	8.05
H23		401847	436088	8.15	
H24		402817	433819	9.22	
H25		403357	433328	9.35	
H26		404776	433407	8.66	
H27		405540	432661	9.13	
H28		405995	432121	9.54	
H29		406511	431848	9.72	
H30		398767	436860	10.3	
H31	Bingley South Bog	SSSI	411442	438744	4.39
H32	Trench Meadows	SSSI	413031	438859	5.67
H33	Beechcliffe Ings	SEGI	406100	442500	2.16
H34	Coppice Bog and Pond	SEGI	408700	439000	2.56
H35	Leeds-Liverpool Canal (part Leeds)	SEGI	408000	442400	0.95
H36	Sunnydale, East Morton	SEGI	410200	442800	2.59
H37	Hainworth Wood	LWS	405900	439700	2.73
H38	Harden Moor and Deepcliffe Wood	LWS	408100	439400	2.06
H39	How Beck Wood Riddlesden	LWS	408500	442200	0.90
H40	Beechcliffe Ox-Bow Lake	BWA	406200	442700	2.18
H41	Castlefields Marsh	BWA	409400	441100	1.46
H42	Deepcliffe Wood, Harden	BWA	407700	439100	2.37
H43	East Morton Sewage Works	BWA	408600	441800	0.70
H44	Elam Wood, Keighley	BWA	406000	442800	2.40
H45	Hollin Plantation, Bingley	BWA	408006	440400	1.06
H46	Low Wood, Keighley	BWA	405800	443600	3.06
H47	North Beck, Keighley	BWA	405500	440900	2.55
H48	Park Wood, Keighley	BWA	407600	441200	0.46
H49	Rivock Edge Plantation	BWA	407300	444100	2.73
H50	Spring Bank, Keighley	BWA	405800	439700	2.80
H51	St Ives Estate	BWA	408100	439800	1.66

Site	Designation	X(m)	Y(m)	Approx. distance from stack (km)	
H52	Stockbridge Nature Reserve	BWA	407400	442200	0.95
H53	Transfield Wood	LWS	408713	440467	1.23
H53	Marley Bog	LWS	408513	440639	0.97

Table 3A: Air quality standards and guidelines

Substance	Averaging time	Standard value ($\mu\text{g}/\text{m}^3$)
Particulate matter (PM ₁₀)	Annual mean	40
Particulate matter (PM ₁₀)	90.4 th percentile of 24 hour means	50
Particulate matter (PM _{2.5}) (target)	Annual mean	20
Volatile organic compounds (assessed against standard for benzene)	Annual mean	3.25
Hydrogen chloride	Maximum hourly mean	750
Hydrogen fluoride	Annual mean	16
Hydrogen fluoride	Maximum hourly mean	160
Hydrogen fluoride (vegetation)	Maximum 24 hour mean	5
Carbon monoxide	Maximum 8 hour mean	10,000
Sulphur dioxide	99.9 th percentile of 15 minute means	266
Sulphur dioxide	99.7 th percentile of hourly means	350
Sulphur dioxide	99.2 nd percentile of 24 hour means	125
Sulphur dioxide (vegetation)	Annual mean	20
Sulphur dioxide (vegetation)	Winter mean	20
Nitrogen dioxide	Annual mean	40
Nitrogen dioxide	99.79 th percentile of hourly means	200
Oxides of nitrogen (vegetation)	Annual mean	30
Oxides of nitrogen (vegetation)	Maximum 24 hour mean	75
Ammonia	Annual mean	180
Ammonia	Maximum hourly mean	2,500
Ammonia (vegetation)	Annual mean	1 or 3
Cadmium	Annual mean	0.005
Thallium	Annual mean	No standard
Thallium	Maximum hourly mean	No standard
Mercury	Annual mean	0.25
Mercury	Maximum hourly mean	7.5
Antimony	Annual mean	5
Antimony	Maximum hourly mean	150
Arsenic	Annual mean	0.003
Lead	Annual mean	0.25
Chromium	Annual mean	5
Chromium	Maximum hourly mean	150
Chromium VI	Annual mean	0.0002
Cobalt	Annual mean	No standard
Cobalt	Maximum hourly mean	No standard
Copper	Annual mean	10

Substance	Averaging time	Standard value (µg/m ³)
Copper	Maximum hourly mean	200
Manganese	Annual mean	150
Manganese	Maximum hourly mean	1,500
Nickel	Annual mean	0.02
Vanadium	Annual mean	5
Vanadium	Maximum 24 hour mean	1
Dioxins and furans ITEQ	Annual mean	No standard
PAHs as benzo(a)pyrene	Annual mean	0.00025
Polycyclic biphenyls	Annual mean	0.2
Polycyclic biphenyls	Maximum hourly mean	6

Table 4A: Maximum modelled air concentrations of released substances

Substance	Averaging time	AQ Standard/ Guideline ($\mu\text{g}/\text{m}^3$)	Baseline ($\mu\text{g}/\text{m}^3$)	Process contribution ($\mu\text{g}/\text{m}^3$)	PC/ AQSG	Combined process + baseline ($\mu\text{g}/\text{m}^3$)	Combined/ AQSG
Particulate matter (PM ₁₀)	Annual mean	40	17	0.43	1.08%	17	44%
Particulate matter (PM ₁₀)	90.4th percentile of 24 hour means	50	34	0.99	1.98%	35	70%
Particulate matter (PM _{2.5})	Annual mean	25	17	0.43	1.73%	17	70%
VOCs (assessed as benzene)	Annual mean	3.25	0.71	0.21	6.39%	0.92	28%
Hydrogen chloride	Maximum hourly mean	750	2.02	27	3.66%	29	3.93%
Hydrogen fluoride	Annual mean	16	2.46	0.021	0.13%	2.48	16%
Hydrogen fluoride	Maximum hourly mean	160	4.92	1.83	1.14%	6.75	4.22%
Carbon monoxide	Maximum 8 hour mean	10000	519	27	0.27%	546	5.46%
Sulphur dioxide	99.9th percentile of 15 minute means	266	87	43	16%	130	49%
Sulphur dioxide	99.7th percentile of hourly means	350	34	30	9%	64	18%
Sulphur dioxide	99.2nd percentile of 24 hour means	125	14	1.93	1.54%	16	12%
Nitrogen dioxide	Annual mean	40	29	2.18	5.45%	31	78%
Nitrogen dioxide	99.79th percentile of hourly means	200	58	21	11%	79	40%
Ammonia	Annual mean	180	1.16	0.10	0.06%	1.26	0.70%
Ammonia	Maximum hourly mean	2500	2.32	9.15	0.37%	11	0.46%
Cadmium	Annual mean	0.005	0.00012	0.0010	21%	0.0012	23%
Thallium	Annual mean	No AQSG	No data	0.0010	n/a	n/a	n/a
Thallium	Maximum hourly mean	No AQSG	No data	0.023	n/a	n/a	n/a
Mercury	Annual mean	0.25	0.0021	0.0010	0.42%	0.0031	1.26%
Mercury	Maximum hourly mean	7.5	0.0042	0.023	0.30%	0.027	0.36%
Antimony	Annual mean	5	0.00084	0.0012	0.023%	n/a	n/a
Antimony	Maximum hourly mean	150	0.0017	0.025	0.017%	n/a	n/a
Arsenic	Annual mean	0.003	0.00073	0.0012	38%	0.0019	63%

Substance	Averaging time	AQ Standard/ Guideline (µg/m³)	Baseline (µg/m³)	Process contribution (µg/m³)	PC/ AQSG	Combined process + baseline (µg/m³)	Combined/ AQSG
Lead	Annual mean	0.25	0.0062	0.0012	0.46%	0.0073	2.93%
Chromium	Annual mean	5	0.0045	0.0012	0.023%	0.0057	0.11%
Chromium	Maximum hourly mean	150	0.00902	0.025	0.017%	0.034	0.023%
Chromium VI	Annual mean	0.0002	0.00090	0.00023 (see Section Error! Reference source not found.)	115%	0.0011	566% (See Section Error! Reference source not found.)
Cobalt	Annual mean	No AQSG	0.00016	0.0012	n/a	n/a	n/a
Cobalt	Maximum hourly mean	No AQSG	0.00032	0.025	n/a	n/a	n/a
Copper	Annual mean	10	0.043	0.0012	0.012%	0.044	0.44%
Copper	Maximum hourly mean	200	0.086	0.025	0.013%	0.11	0.056%
Manganese	Annual mean	150	0.011	0.0012	0.00077%	0.012	0.0083%
Manganese	Maximum hourly mean	1500	0.023	0.025	0.0017%	0.048	0.0032%
Nickel	Annual mean	0.02	0.0014	0.0012	5.77%	0.0026	13%
Vanadium	Annual mean	5	0.0012	0.0012	0.023%	0.0023	0.046%
Vanadium	Maximum 24 hour mean	1	0.0023	0.0071	0.71%	0.009	0.94%
Dioxins and furans ITEQ	Annual mean	No AQSG	5.50E-08	2.08 x10 ⁻⁹	n/a	5.71 x10 ⁻⁸	n/a
PAHs as benzo(a)pyrene	Annual mean	0.00025	0.00014	0.000021	8%	0.00016	66%
Polychlorinated biphenyls	Annual mean	0.2	Not assessed	0.000105	0.053%	Not assessed	Not assessed
Polychlorinated biphenyls	Maximum hourly mean	6	Not assessed	0.0023	0.038%	Not assessed	Not assessed

Notes. PC: process contribution; AQSG: air quality standard or guideline
The data for the group of nine metals in Table 4 are on the basis that each metal accounts for 11% of the emissions limit for the group as a whole. The data for chromium VI is on the basis that chromium VI accounts for 20% of the total chromium concentration. Environment Agency research confirms that this is a conservative approach. See Section **Error! Reference source not found.** for further details on the assessment of metals.

Table 5A: Modelled process contributions at designated habitat sites

Designated site	Airborne concentrations ($\mu\text{g}/\text{m}^3$)				
	Annual mean NO_x	Annual mean SO_2	Annual mean NH_3	Max. 24 hour mean NO_x	Max. 24 hour mean HF
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section	0.12	0.014	0.0040	1.44	0.0096
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section	0.026	0.0030	0.0010	0.70	0.0047
Bingley South Bog	0.093	0.011	0.0031	1.52	0.010
Trench Meadows	0.055	0.0065	0.0018	0.67	0.0045
Beechcliffe Ings	0.17	0.020	0.0055	2.35	0.016
Coppice Bog and Pond	0.028	0.0034	0.00095	0.72	0.0048
Leeds-Liverpool Canal (part Leeds)	0.27	0.032	0.0089	4.35	0.029
Sunnydale, East Morton	0.16	0.019	0.0052	1.21	0.0081
Hainworth Wood	0.060	0.0072	0.0020	1.08	0.0072
Harden Moor and Deepcliffe Wood	0.035	0.0042	0.0012	1.12	0.0075
How Beck Wood Riddlesden	0.58	0.069	0.019	4.05	0.027
Beechcliffe Ox-Bow Lake	0.16	0.020	0.0054	2.04	0.014
Castlefields Marsh	0.57	0.068	0.019	3.17	0.021
Deepcliffe Wood, Harden	0.039	0.0047	0.0013	1.34	0.0089
East Morton Sewage Works	1.16	0.14	0.039	6.87	0.046
Elam Wood, Keighley	0.15	0.018	0.0050	1.89	0.013
Hollin Plantation, Bingley	0.082	0.010	0.0027	2.81	0.019
Low Wood, Keighley	0.071	0.0085	0.0024	1.14	0.0076
North Beck, Keighley	0.10	0.012	0.0033	1.62	0.011
Park Wood, Keighley	0.47	0.057	0.016	8.78	0.059
Rivock Edge Plantation	0.033	0.0039	0.0011	1.02	0.0068
Spring Bank, Keighley	0.058	0.0070	0.0019	1.06	0.0070
St Ives Estate	0.044	0.0053	0.0015	1.43	0.010
Stockbridge Nature Reserve	0.23	0.028	0.0078	4.56	0.030
Transfield Wood	0.11	0.013	0.0037	2.98	0.020
Marley Bog	0.14	0.016	0.0045	4.50	0.030

Table 6A: Assessment of modelled process contributions at designated habitat sites against critical levels

Designated site	Annual mean NO_x	Annual mean SO_2	Annual mean NH_3	Max. 24 hour mean NO_x	Max. 24 hour mean HF
Critical level ($\mu\text{g}/\text{m}^3$)	30	20	1	75	5
Modelled concentration as % of air quality standard/guideline					
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section	0.40%	0.072%	0.40%	1.92%	0.19%
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section	0.085%	0.015%	0.085%	0.93%	0.093%
Bingley South Bog	0.31%	0.056%	0.31%	2.02%	0.20%
Trench Meadows	0.18%	0.033%	0.18%	0.89%	0.089%
Beechcliffe Ings	0.55%	0.10%	0.55%	3.14%	0.31%
Coppice Bog and Pond	0.095%	0.017%	0.095%	0.96%	0.10%

Leeds-Liverpool Canal (part Leeds)	0.89%	0.16%	0.89%	5.80%	0.58%
Sunnydale, East Morton	0.52%	0.093%	0.52%	1.62%	0.16%
Hainworth Wood	0.20%	0.036%	0.20%	1.44%	0.14%
Harden Moor and Deepcliffe Wood	0.12%	0.021%	0.12%	1.50%	0.15%
How Beck Wood Riddlesden	1.92%	0.35%	1.92%	5.40%	0.54%
Beechcliffe Ox-Bow Lake	0.54%	0.10%	0.54%	2.72%	0.27%
Castlefields Marsh	1.90%	0.34%	1.90%	4.23%	0.42%
Deepcliffe Wood, Harden	0.13%	0.023%	0.13%	1.78%	0.18%
East Morton Sewage Works	3.88%	0.70%	3.88%	9.15%	0.92%
Elam Wood, Keighley	0.50%	0.090%	0.50%	2.52%	0.25%
Hollin Plantation, Bingley	0.27%	0.049%	0.27%	3.74%	0.37%
Low Wood, Keighley	0.24%	0.042%	0.24%	1.52%	0.15%
North Beck, Keighley	0.33%	0.060%	0.33%	2.16%	0.22%
Park Wood, Keighley	1.57%	0.28%	1.57%	11.71%	1.17%
Rivock Edge Plantation	0.109%	0.020%	0.11%	1.36%	0.14%
Spring Bank, Keighley	0.19%	0.035%	0.19%	1.41%	0.14%
St Ives Estate	0.15%	0.027%	0.15%	1.91%	0.19%
Stockbridge Nature Reserve	0.78%	0.14%	0.78%	6.08%	0.61%
Transfield Wood	0.37%	0.07%	0.37%	3.98%	0.40%
Marley Bog	0.45%	0.08%	0.45%	6.01%	0.60%

Table 7A: Modelled deposition rates at designated habitat sites

Designated site	Modelled substance deposition rate (kg/ha/year)			Modelled nitrogen/acid deposition rate		
	NO _x	SO ₂	NH ₃	Nutrient nitrogen* (kgN/ha/year)	Nitrogen-derived acid* (kEq/ha/year)	Sulphur-derived acid (kEq/ha/year)
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for grassland)	0.057	0.054	0.025	0.033	0.0027	0.0019
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for woodland*)	0.043	0.041	0.014	0.021	0.0017	0.0014
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for grassland)	0.012	0.012	0.0054	0.0070	0.00057	0.00040
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for woodland*)	0.016	0.015	0.0053	0.0077	0.00062	0.00052
Bingley South Bog	0.044	0.042	0.020	0.026	0.0021	0.0015
Trench Meadows	0.026	0.025	0.011	0.015	0.0012	0.00088
Beechcliffe Ings	0.078	0.075	0.035	0.045	0.0037	0.0027
Coppice Bog and Pond	0.013	0.013	0.0060	0.0078	0.00063	0.00045

Designated site	Modelled substance deposition rate (kg/ha/year)			Modelled nitrogen/acid deposition rate		
	NO _x	SO ₂	NH ₃	Nutrient nitrogen* (kgN/ha/year)	Nitrogen-derived acid* (kEq/ha/year)	Sulphur-derived acid (kEq/ha/year)
Leeds-Liverpool Canal (part Leeds)	0.13	0.12	0.056	0.073	0.0059	0.0042
Sunnydale, East Morton	0.073	0.070	0.033	0.042	0.0034	0.0024
Hainworth Wood	0.057	0.055	0.019	0.028	0.0022	0.0019
Harden Moor and Deepcliffe Wood	0.033	0.032	0.011	0.016	0.0013	0.0011
How Beck Wood Riddlesden	0.55	0.52	0.18	0.27	0.021	0.018
Beechcliffe Ox-Bow Lake	0.077	0.074	0.034	0.045	0.0036	0.0026
Castlefields Marsh	0.27	0.26	0.12	0.16	0.013	0.0090
Deepcliffe Wood, Harden	0.037	0.035	0.012	0.018	0.0014	0.0012
East Morton Sewage Works	0.55	0.53	0.24	0.32	0.026	0.018
Elam Wood, Keighley	0.14	0.14	0.047	0.069	0.0055	0.0047
Hollin Plantation, Bingley	0.077	0.074	0.026	0.038	0.0030	0.0026
Low Wood, Keighley	0.067	0.064	0.022	0.033	0.0026	0.0022
North Beck, Keighley	0.047	0.046	0.021	0.027	0.0022	0.0016
Park Wood, Keighley	0.45	0.43	0.15	0.22	0.017	0.015
Rivock Edge Plantation	0.031	0.030	0.010	0.015	0.0012	0.0010
Spring Bank, Keighley	0.028	0.027	0.012	0.016	0.0013	0.00094
St Ives Estate	0.021	0.020	0.0093	0.012	0.0010	0.00071
Stockbridge Nature Reserve	0.11	0.11	0.049	0.064	0.0052	0.0037
Transfield Wood	0.106	0.102	0.035	0.061	0.0044	0.0032
Marley Bog	0.064	0.062	0.029	0.043	0.0031	0.0019

* The South Pennine Moors consists of approximately 99 % inland water bodies, bogs, marshes, fens, heath, scrub and grassland, with the remaining consisting of mixed and broad-leaved deciduous woodland³. Deposition velocities for woodland were applied at areas of woodland identified within the South Pennine Moors SPA/SAC, using Defra's Magic Map application⁴ (Ref. H11, H12, H13, H14 & H30).

Table 8A: Critical levels for designated sites in the vicinity of the proposed facility

Designated site	Habitat type	Minimum critical load for nitrogen deposition (kgN/ha/year)	Minimum critical load for acid deposition (MinCLMaxN) (kEqH ⁺ /ha/year)
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for grassland)	Blanket bogs/Transition mires and quaking bogs	5	0.569
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for woodland)	Old Sessile Oak Woods	10	0.713
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for grassland)	Blanket bogs/Transition mires and quaking bogs	5	0.569

³ Joint Nature Conservation Committee, South Pennine Moors, available via <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCODE=UK0030280> [accessed June 2017]

⁴ Defra – Magic Map via <http://magic.defra.gov.uk/home.htm> [accessed June 2017]

Designated site	Habitat type	Minimum critical load for nitrogen deposition (kgN/ha/year)	Minimum critical load for acid deposition (MinCLMaxN) (kEqH ⁺ /ha/year)
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for woodland)	Old Sessile Oak Woods	10	0.713
Bingley South Bog	Variety of fenland habitats	15	2.38
Trench Meadows	Variety of fenland habitats	20	2.38
Beechcliffe Ings	Variety of fenland habitats	10	2.038
Coppice Bog and Pond	Variety of fenland habitats	10	2.038
Leeds-Liverpool Canal (part Leeds)	Variety of fenland habitats	10	2.038
Sunnydale, East Morton	Bogs	10	0.62
Hainworth Wood	Woodland	10	3.24
Harden Moor and Deepcliffe Wood	Woodland	10	3.24
How Beck Wood Riddlesden	Woodland	10	3.24
Beechcliffe Ox-Bow Lake	Variety of fenland habitats	10	2.038
Castlefields Marsh	Marshland	10	Not sensitive
Deepcliffe Wood, Harden	Woodland	10	3.24
East Morton Sewage Works	Ornithological interest, grey heron	N/A	Not sensitive
Elam Wood, Keighley	Woodland	10	3.24
Hollin Plantation, Bingley	Woodland	10	3.24
Low Wood, Keighley	Woodland	10	3.24
North Beck, Keighley	Ornithological interest; watercourse	N/A	Not sensitive
Park Wood, Keighley	Woodland	10	3.24
Rivock Edge Plantation	No information available	No information	No CL
Spring Bank, Keighley	Semi-improved grassland	No comparable habitat	Not sensitive
St Ives Estate	Bogs	10	0.62
Stockbridge Nature Reserve	Ornithological interest; watercourse	N/A	Not sensitive
Transfield Wood	Deciduous woodland	10	1.987
Marley Bog	Lowland dry acid grassland	10	1.061

Table 9A: Assessment of modelled process contributions to acid and nitrogen deposition at designated habitat sites against critical loads

Designated site	Process contribution to nitrogen deposition as % of critical load	Process contribution to acid deposition as % of critical load
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for grassland)	0.53%	0.80%
South Pennine Moors SSSI/SAC/ SPA: Ilkley Moor section (Using deposition velocities for woodland)	0.17%	0.43%
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for grassland)	0.11%	0.17%
South Pennine Moors SSSI/SAC/ SPA: Keighley Moor section (Using deposition velocities for woodland)	0.06%	0.16%
Bingley South Bog	0.14%	0.15%
Trench Meadows	0.061%	0.088%
Beechcliffe Ings	0.37%	0.31%
Coppice Bog and Pond	0.063%	0.053%
Leeds-Liverpool Canal (part Leeds)	0.59%	0.50%
Sunnydale, East Morton	0.34%	0.95%
Hainworth Wood	0.23%	0.13%
Harden Moor and Deepcliffe Wood	0.13%	0.07%
How Beck Wood Riddlesden	2.21%	1.22%
Beechcliffe Ox-Bow Lake	0.36%	0.31%
Castlefields Marsh	1.26%	Not sensitive
Deepcliffe Wood, Harden	0.15%	0.082%
East Morton Sewage Works	N/A	Not sensitive
Elam Wood, Keighley	0.57%	0.32%
Hollin Plantation, Bingley	0.31%	0.17%
Low Wood, Keighley	0.27%	0.15%
North Beck, Keighley	N/A	Not sensitive
Park Wood, Keighley	1.81%	1.00%
Rivock Edge Plantation	No information	No CL
Spring Bank, Keighley	No comparable habitat	Not sensitive
St Ives Estate	0.10%	0.27%
Stockbridge Nature Reserve	N/A	Not sensitive
Transfield Wood	0.61%	0.38%
Marley Bog	0.43%	0.47%



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