1.0   AIR QUALITY ASSESSMENT - ADDENDUM TECHNICAL NOTE

1.1   Background

Resource and Environmental Consultants (REC) Ltd was commissioned by Agrivert Ltd to undertake a Dispersion Modelling Assessment (Ref: AQ100410r2, submitted on 18th February 2016) of potential atmospheric emissions from an Anaerobic Digestion (AD) plant on land at Coursers Farm, St Albans.

Following the submission of the assessment to the Environment Agency (EA), a number of comments have been provided. Further modelling was required following the submission of the original report, in which potential air quality impacts at local ecological receptors were assessed. This Addendum Technical Note details the outcome of this additional modelling and is to be read in conjunction with the original assessment report.

1.2   Methodology

The proposed AD facility may result in emissions to air during normal operations. These were assessed in accordance with the stages described within the original assessment.

1.2.1   Additional Ecological Receptor Locations

The identified ecological receptors are summarised in Table 7 of the original assessment. In addition to those already identified, based on the EA's recommendation, further ecological sites were included within the addendum assessment to quantify potential impacts at these locations, as shown in Table 1. Reference should be made to Figure 1 for a graphical representation of the representative ecological receptor locations for each ecological site.

Table 1   Ecological Receptors

ID	Designation	Site Name	Description
1	SSI	Redwell Wood	Site of Special Scientific Interest (SSSI) is a broadleaved, mixed and yew woodland
2		Waterend Swallow Holes	Semi-natural woodland, scrub and semi-improved grassland
3	Local Nature Reserve	Colney Heath	Non-Mediterranean dry acid and neutral closed grassland
4	Local Wildlife Sites	River Colney by Bowmansgreen Farm	Section of the River Colne with well vegetated banks and good communities of emergent aquatic vegetation
5		Colney Heath Farm Meadows	Unimproved neutral to acid grasslands along the River Colne
6		Cobs Ash	Ancient semi-natural Pedunculate Oak/ Hornbeam coppice woodland
7		Walsingham Wood	Part ancient semi-natural Pedunculate Oak/ Hornbeam woodland
8		Walsingham Wood	Part ancient semi-natural Pedunculate Oak/ Hornbeam woodland
9		Walsingham Wood	Part ancient semi-natural Pedunculate Oak/ Hornbeam woodland
10		Walsingham Wood	Part ancient semi-natural Pedunculate Oak/ Hornbeam woodland
11		Coppice Wood	Ancient semi-natural woodland, dominated by Pedunculate Oak and Hornbeam (Carpinus betulus).

ID	Designation	Site Name	Description
12	Local Wildlife Sites	Knights Wood	Ancient semi-natural woodland of Pedunculate Oak/Ash with Hazel (Coryllus avellana) coppice
13		North Mymms Park Area	Parkland of semi-improved neutral grassland with frequent planted trees
14		North Mymms Park	Parkland of semi-improved neutral grassland with frequent planted trees
15		Bush Wood (Welham Green)	Ancient semi-natural woodland, dominated by Pedunculate Oak and Hornbeam (Carpinus betulus)
16		Shenley Lodge Farm Wood	Ancient semi-natural woodland of Pedunculate Oak/Ash with Hazel (Coryllus avellana) coppice
17		Potwells	Wet acidic grassland and scrub
18		Coursers Road Gravel Pit	Hedgerow and ditch on Coursers farm important for breeding Tree Sparrow (Passer montanus), a Local Biodiversity Action Plan Species
19		Coursers Farm Area	Buildings and environs important for protected species
20		Coursers Farm Area	Buildings and environs important for protected species
21		Coursers Farm Area	Buildings and environs important for protected species
22		Roundwood (S. of North Mymms Park)	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland
23		The New Plantation	Old woodland with Pedunculate Oak and Ash canopy
24		The New Plantation	Old woodland with Pedunculate Oak and Ash canopy
25		The New Plantation	Old woodland with Pedunculate Oak and Ash canopy
26		Scrubby Grassland by Fredericks Wood	Unimproved acid grassland with scattered Hawthorn (Crataegus monogyna) patches
27		Scrubby Grassland by Fredericks Wood	Unimproved acid grassland with scattered Hawthorn (Crataegus monogyna) patches
28		Fredericks Wood	Mosaic site of secondary woodland and remnant heath/acid grassland
29		North Mymms Ice House	Icehouse and environs important for protected species
30		Cangsley Grove	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland
31		River Colney N.E. of Nature Reserve	Section of the River Colne with well vegetated banks and good communities of emergent aquatic vegetation
32		Tyttenhanger Gravel Pits	Sand and gravel pits, many of which have been flooded and are an important area for breeding waders.
33		Sleapshyde Gravel Pit	A gravel pit which has been restored to an amenity/wildlife park and now supports a mosaic of habitats, including open water, wet neutral grassland, tall herb, scattered scrub and plantation
34		North Mymms Churchyard	Churchyard with old neutral grassland and scattered ornamental trees
35		Smallford Pit	An infilled former gravel pit with well developed secondary grassland, areas of standing water, a pond and fishing lake.
36		Colney Heath Common	A mosaic of neutral, acid and marshy grasslands, plus heathland, scrub, and riverine habitats
37		Tollgate Wood	Broadleaved woodland dominated by Pedunculate Oak and Ash (Fraxinus excelsior).
38		St. Marks Churchyard & Graveyard	Churchyard and graveyard supporting unimproved neutral to acid grassland.

ID	Designation	Site Name	Description
39	Ancient Woodland	Redwell/Hawkshead Woods	Site of Special Scientific Interest (SSSI) is a broadleaved, mixed and yew woodland
40		Redwell/Hawkshead Woods	A broadleaved, mixed and yew woodland
41		Cobs Ash/Changsley Grove	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland
42		Cobs Ash/Changsley Grove	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland
43		Cobs Ash/Changsley Grove	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland
44		Bush Wood	Ancient semi-natural woodland, dominated by Pedunculate Oak and Hornbeam (Carpinus betulus)
45		Coppice Wood	Ancient semi-natural woodland, dominated by Pedunculate Oak and Hornbeam (Carpinus betulus).
46		Knights Wood	Ancient semi-natural woodland of Pedunculate Oak/Ash with Hazel (Coryllus avellana) coppice

Identified ecological receptors sensitive to emissions associated with the operation of the proposed AD plan were identified through the APIS website[1] are summarised in Table 2.

Table 2   Sensitive Ecological Receptors

Receptor		NGR (m)	
		X	Y
1	Redwell Wood	521156	202970
3	Colney Heath	520350	205850
4	River Colney by Bowmansgreen Farm	518650	204050
5	Colney Heath Farm Meadows	520750	205550
6	Cobs Ash	521240	203554
7	Walsingham Wood	520949	204292
8	Walsingham Wood	521052	204139
9	Walsingham Wood	521113	204041
10	Walsingham Wood	521203	203898
11	Coppice Wood	518450	204850
12	Knights Wood	518606	205472
13	North Mymms Park	521500	204500
15	Bush Wood (Welham Green)	522356	205426
16	Shenley Lodge Farm Wood	519970	202860
17	Potwells	521528	203216
18	Coursers Road Gravel Pit	520000	204400
22	Roundwood (S. of North Mymms Park)	521074	203255
23	The New Plantation	520156	204636
24	The New Plantation	520076	204575

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[1]   http://www.apis.ac.uk

Receptor		NGR (m)	
		X	Y
25	The New Plantation	520039	204747
26	Scrubby Grassland by Fredericks Wood	520579	204909
27	Scrubby Grassland by Fredericks Wood	520637	204819
28	Fredericks Wood	520750	205150
30	Cangsley Grove	521850	203450
31	River Colney N.E. of Nature Reserve	519410	205624
33	Sleapshyde Gravel Pit	520350	206450
34	North Mymms Churchyard	522150	204450
35	Smallford Pit	519672	206990
36	Colney Heath Common	520350	205850
37	Tollgate Wood	521500	205570
38	St. Marks Churchyard & Graveyard	519750	206150
39	Redwell/Hawkshead Woods	521240	203554
40	Redwell/Hawkshead Woods	521074	203255
41	Cobs Ash/Changsley Grove	520949	204292
42	Cobs Ash/Changsley Grove	521052	204139
43	Cobs Ash/Changsley Grove	521150	204356
44	Bush Wood	522550	205450
45	Coppice Wood	518450	204850
46	Knights Wood	518550	205450

The sensitive ecological receptors identified in Table 2 are considered to be representative of each identified ecological site. However, this is not an exhaustive list and there may be other locations within these sites that may experience impacts as a result of atmospheric emissions from the facility that have not been individually identified above.

1.2.2   Critical Loads

Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the APIS website[1] was undertaken in order to identify the most suitable habitat description and associated critical load for the area of each designation considered within the model. This was undertaken using the 'search by location' and 'habitat/pollutant impacts' functions within APIS. The habitat types within each designation are listed in accordance with the UK Biodiversity Action Plan (BAP) criteria, which are then split further by the European Nature Information System (EUNIS) habitat type. These were reviewed, along with the habitat maps available through MAGIC and the NBRC, to define the relevant classification at each of the receptor locations. It should be noted that separate habitat types are often listed for European and National designations, although the geographical areas covered are the same. When this was the case the most suitable classification for the area of interest was selected based on the site descriptions given in the citation documents. The relevant critical loads are presented in Table 3.

Table 3   Critical Loads

Receptor	APIS Habitat Critical Load Class	Critical Load				
		Nitrogen Critical Load (kgN/ha/yr)		Acid (keq/ha/yr)		
		Low	High	CLmaxS	CLminN	CLmaxN
1	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	3.00
3	Acid Grassland	10	15	0.87	0.22	1.09
4	Fen, Marsh and Swamp	10	15	Not sensitive to acid deposition		
5	Acid Grassland	10	15	0.87	0.22	1.09
6	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	2.99
7	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
8	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
9	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
10	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
11	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76
12	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76
13	Neutral Grassland	20	30	3.91	0.85	4.77
15	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76
16	Broadleaved, Mixed and Yew Woodland	10	20	6.52	0.14	6.66
17	Acid Grassland	10	20	1.64	0.44	2.08
18	Broadleaved deciduous woodland (Hedgerows)	10	20	1.52	0.36	1.87
22	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	2.99
23	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
24	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
25	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
26	Acid grassland	10	15	0.89	0.44	1.33
27	Acid grassland	10	15	0.89	0.44	1.33
28	Broadleaved, Mixed and Yew Woodland	10	20	1.59	0.14	1.73
30	Broadleaved, Mixed and Yew Woodland	10	15	1.52	0.36	1.87
31	Fen, Marsh and Swamp	10	15	Not sensitive to acid deposition		
33	Neutral Grassland	20	30	3.89	0.85	4.75
34	Neutral Grassland	20	30	3.91	0.85	4.77
35	Acid Grassland	10	20	0.88	0.22	1.1
36	Acid Grassland	10	15	0.87	0.22	1.09
37	Broadleaved, Mixed and Yew Woodland	10	20	1.59	0.14	1.73
38	Acid Grassland	10	20	0.88	0.22	1.1
39	Broadleaved, Mixed and Yew Woodland	10	15	2.64	3.00	0.36
40	Broadleaved, Mixed and Yew Woodland	10	15	2.64	3.00	0.36
41	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	2.99

Receptor	APIS Habitat Critical Load Class	Critical Load				
		Nitrogen Critical Load (kgN/ha/yr)		Acid (keq/ha/yr)		
		Low	High	CLmaxS	CLminN	CLmaxN
42	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	2.99
43	Broadleaved, Mixed and Yew Woodland	10	15	2.64	0.36	2.99
44	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76
45	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76
46	Broadleaved, Mixed and Yew Woodland	10	15	1.62	0.14	1.76

It should be noted that the information shown in Table 3 represents the most sensitive habitat within each designation for pollutant deposition.

1.2.3   Background Deposition Rates

Background deposition rates at each ecological receptor location were obtained from the APIS website using the 'search by location' function and are summarised in Table 4.

Table 4   Background Deposition Rates

Receptor	APIS Habitat Critical Load Class	Deposition Rate		
		Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)	
			N	S
1	Broadleaved, Mixed and Yew Woodland	30.24	2.16	0.30
3	Acid Grassland	16.10	1.15	0.24
4	Fen, Marsh and Swamp	17.22	1.23	0.23
5	Acid Grassland	16.38	1.17	0.24
6	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
7	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
8	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
9	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
10	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
11	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27
12	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27
13	Neutral Grassland	17.22	1.23	0.24
15	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27
16	Broadleaved, Mixed and Yew Woodland	28.84	2.06	0.29
17	Acid Grassland	17.22	1.23	0.24
18	Broadleaved deciduous woodland (Hedgerows)	29.12	2.08	0.29
22	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
23	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
24	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29

Receptor	APIS Habitat Critical Load Class	Deposition Rate		
		Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)	
			N	S
25	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
26	Acid grassland	17.22	1.23	0.24
27	Acid grassland	17.22	1.23	0.24
28	Broadleaved, Mixed and Yew Woodland	27.72	1.98	0.29
30	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
31	Fen, Marsh and Swamp	17.08	1.22	0.24
33	Neutral Grassland	16.38	1.17	0.24
34	Neutral Grassland	17.22	1.23	0.24
35	Acid Grassland	17.08	1.22	0.24
36	Acid Grassland	16.38	1.17	0.24
37	Broadleaved, Mixed and Yew Woodland	27.72	1.98	0.29
38	Acid Grassland	17.08	1.22	0.24
39	Broadleaved, Mixed and Yew Woodland	30.24	2.16	0.30
40	Broadleaved, Mixed and Yew Woodland	30.24	2.16	0.30
41	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
42	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
43	Broadleaved, Mixed and Yew Woodland	29.12	2.08	0.29
44	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27
45	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27
46	Broadleaved, Mixed and Yew Woodland	29.54	2.11	0.27

1.3   Predicted Concentrations

Dispersion modelling of potential pollutant emissions was undertaken using the input data specified within the original assessment for the proposed AD plant.

1.3.1   Nitrogen Oxides

Annual Mean

Predicted annual mean NO_x concentrations at the ecological receptors are summarised in Table 5. It should be noted that all concentrations are presented as 5-year maximum average mean results.

Table 5   Predicted Annual Mean NO_x Concentrations

Receptor		Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
1	Redwell Wood	0.20	23.99	0.66	79.96

Receptor		Predicted Annual Mean NO$_x$ Concentration (µg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
3	Colney Heath	0.39	24.18	1.30	80.60
4	River Colney by Bowmansgreen Farm	0.16	23.95	0.53	79.83
5	Colney Heath Farm Meadows	0.67	24.46	2.22	81.52
6	Cobs Ash	0.30	24.09	1.00	80.30
7	Walsingham Wood	0.73	24.52	2.42	81.72
8	Walsingham Wood	0.55	24.34	1.85	81.15
9	Walsingham Wood	0.48	24.27	1.61	80.91
10	Walsingham Wood	0.40	24.19	1.35	80.65
11	Coppice Wood	0.14	23.93	0.48	79.78
12	Knights Wood	0.09	23.88	0.30	79.60
13	North Mymms Park Area	0.48	24.27	1.61	80.91
15	Bush Wood (Welham Green)	0.22	24.01	0.73	80.03
16	Shenley Lodge Farm Wood	0.29	24.08	0.97	80.27
17	Potwells	0.22	24.01	0.74	80.04
18	Coursers Road Gravel Pit	1.79	25.58	5.97	85.27
22	Roundwood (S. of North Mymms Park)	0.25	24.04	0.84	80.14
23	The New Plantation	2.17	25.96	7.24	86.54
24	The New Plantation	2.25	26.04	7.49	86.79
25	The New Plantation	1.21	25.00	4.02	83.32
26	Scrubby Grassland by Fredericks Woods	3.08	26.87	10.28	89.58
27	Scrubby Grassland by Fredericks Woods	3.03	26.82	10.10	89.40
28	Fredericks Wood	1.41	25.20	4.70	84.00
30	Cangsley Grove	0.22	24.01	0.73	80.03
31	River Colney N.E. of Nature Reserve	0.22	24.01	0.74	80.04
33	Sleapshyde Gravel Pit	0.22	24.01	0.73	80.03
34	North Mymms Churchyard	0.27	24.06	0.91	80.21
35	Smallford Pit	0.11	23.90	0.35	79.65
36	Colney Heath Common	0.39	24.18	1.30	80.60
37	Tollgate Wood	0.38	24.17	1.28	80.58
38	St. Marks Churchyard & Graveyard	0.18	23.97	0.60	79.90
39	Redwell/Hawkshead Woods	0.30	24.09	1.00	80.30

Receptor		Predicted Annual Mean NO_x Concentration (μg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
40	Redwell/Hawkshead Woods	0.25	24.04	0.84	80.14
41	Cobs Ash/Changsley Grove	0.73	24.52	2.42	81.72
42	Cobs Ash/Changsley Grove	0.55	24.34	1.85	81.15
43	Cobs Ash/Changsley Grove	0.60	24.39	1.99	81.29
44	Bush Wood	0.20	23.99	0.66	79.96
45	Coppice Wood	0.14	23.93	0.48	79.78
46	Knights Wood	0.09	23.88	0.29	79.59

As indicated in Table 5, predicted annual mean NO_x concentrations were below the relevant EQS at all sensitive receptor locations.

As indicated in Table 5, the PC proportion of the EQS is slightly above 1% at a number of receptors. However, the PEC is less than the EQS at all locations. As such, impacts are not considered to be significant. It should be noted that the assessment assumed that the facility would be emitting the maximum permitted pollutant concentration at all times. As such, predicted concentrations are likely to be a significant overestimation of actual impacts.

24-hour Mean

Predicted 24-hour mean NO_x concentrations at the ecological receptors are summarised in Table 6. It should be noted that all concentrations are presented as 5-year maximum average mean results.

Table 6   Predicted 24-hour Mean NO_x Concentrations

Receptor		Predicted 24-hour Mean NO_x Concentration (μg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
1	Redwell Wood	2.87	50.45	3.83	67.27
3	Colney Heath	4.26	Not Required	5.68	Not Required
4	River Colney by Bowmansgreen Farm	2.23	Not Required	2.97	Not Required
5	Colney Heath Farm Meadows	5.42	Not Required	7.22	Not Required
6	Cobs Ash	3.17	Not Required	4.22	Not Required
7	Walsingham Wood	7.92	Not Required	10.55	Not Required
8	Walsingham Wood	6.44	Not Required	8.59	Not Required
9	Walsingham Wood	5.07	Not Required	6.75	Not Required
10	Walsingham Wood	4.75	Not Required	6.34	Not Required
11	Coppice Wood	3.07	Not Required	4.10	Not Required
12	Knights Wood	1.59	Not Required	2.12	Not Required

Receptor		Predicted 24-hour Mean NO$_x$ Concentration (µg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
13	North Mymms Park Area	4.42	Not Required	5.90	Not Required
15	Bush Wood (Welham Green)	2.04	Not Required	2.73	Not Required
16	Shenley Lodge Farm Wood	4.21	Not Required	5.61	Not Required
17	Potwells	2.43	Not Required	3.24	Not Required
18	Coursers Road Gravel Pit	23.42	Not Required	31.23	Not Required
22	Roundwood (S. of North Mymms Park)	3.79	Not Required	5.06	Not Required
23	The New Plantation	35.89	Not Required	47.85	Not Required
24	The New Plantation	35.41	Not Required	47.21	Not Required
25	The New Plantation	22.82	Not Required	30.43	Not Required
26	Scrubby Grassland by Fredericks Woods	18.32	Not Required	24.43	Not Required
27	Scrubby Grassland by Fredericks Woods	18.34	Not Required	24.46	Not Required
28	Fredericks Wood	8.83	Not Required	11.77	Not Required
30	Cangsley Grove	2.67	Not Required	3.56	Not Required
31	River Colney N.E. of Nature Reserve	2.90	Not Required	3.87	Not Required
33	Sleapshyde Gravel Pit	2.52	Not Required	3.36	Not Required
34	North Mymms Churchyard	2.51	Not Required	3.34	Not Required
35	Smallford Pit	1.50	Not Required	2.00	Not Required
36	Colney Heath Common	4.26	Not Required	5.68	Not Required
37	Tollgate Wood	3.34	Not Required	4.46	Not Required
38	St. Marks Churchyard & Graveyard	3.12	Not Required	4.16	Not Required
39	Redwell/Hawkshead Woods	3.17	50.75	4.22	67.66
40	Redwell/Hawkshead Woods	3.79	51.37	5.06	68.50
41	Cobs Ash/Changsley Grove	7.92	55.50	10.55	73.99
42	Cobs Ash/Changsley Grove	6.44	54.02	8.59	72.03
43	Cobs Ash/Changsley Grove	6.25	53.83	8.33	71.77
44	Bush Wood	2.27	49.85	3.02	66.46
45	Coppice Wood	3.07	50.65	4.10	67.54
46	Knights Wood	1.48	49.06	1.97	65.41

As indicated in Table 6, predicted 24-hour mean NO$_x$ concentrations were below the relevant EQS at all sensitive receptor locations. The short-term PC is less than 100% of the short-term

environmental standard[2] at all locations and therefore, impacts are not considered to be significant. It should be noted that the assessment assumed that the facility would be emitting the maximum permitted pollutant concentration at all times. As such, predicted concentrations are likely to be a significant overestimation of actual impacts.

Predicted Annual mean SO_2 concentrations at the ecological receptors are summarised in Table 7. It should be noted that all concentrations are presented as 5-year maximum average mean results.

Table 7   Predicted Annual Mean SO_2 Concentrations

Receptor		Predicted Annual Mean SO_2 Concentration (µg/m³)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
1	Redwell Wood	0.14	3.81	0.69	19.04
3	Colney Heath	0.27	Not required	1.36	Not required
4	River Colney by Bowmansgreen Farm	0.11	Not required	0.56	Not required
5	Colney Heath Farm Meadows	0.47	Not required	2.33	Not required
6	Cobs Ash	0.21	Not required	1.05	Not required
7	Walsingham Wood	0.51	Not required	2.54	Not required
8	Walsingham Wood	0.39	Not required	1.94	Not required
9	Walsingham Wood	0.34	Not required	1.69	Not required
10	Walsingham Wood	0.28	Not required	1.41	Not required
11	Coppice Wood	0.10	Not required	0.51	Not required
12	Knights Wood	0.06	Not required	0.31	Not required
13	North Mymms Park Area	0.34	Not required	1.69	Not required
15	Bush Wood (Welham Green)	0.15	Not required	0.76	Not required
16	Shenley Lodge Farm Wood	0.20	Not required	1.02	Not required
17	Potwells	0.16	Not required	0.78	Not required
18	Coursers Road Gravel Pit	1.25	Not required	6.27	Not required
22	Roundwood (S. of North Mymms Park)	0.18	Not required	0.88	Not required
23	The New Plantation	1.52	Not required	7.60	Not required
24	The New Plantation	1.57	Not required	7.87	Not required
25	The New Plantation	0.84	Not required	4.22	Not required
26	Scrubby Grassland by Fredericks Woods	2.16	Not required	10.79	Not required
27	Scrubby Grassland by Fredericks Woods	2.12	Not required	10.60	Not required

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[2]   https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas

Receptor		Predicted Annual Mean SO$_2$ Concentration (µg/m^3)		Proportion of the EQS (%)	
ID	Designation	PC	PEC	PC	PEC
28	Fredericks Wood	0.99	Not required	4.93	Not required
30	Cangsley Grove	0.15	Not required	0.77	Not required
31	River Colney N.E. of Nature Reserve	0.16	Not required	0.78	Not required
33	Sleapshyde Gravel Pit	0.15	Not required	0.77	Not required
34	North Mymms Churchyard	0.19	Not required	0.96	Not required
35	Smallford Pit	0.07	Not required	0.37	Not required
36	Colney Heath Common	0.27	Not required	1.36	Not required
37	Tollgate Wood	0.27	Not required	1.34	Not required
38	St. Marks Churchyard & Graveyard	0.13	Not required	0.63	Not required
39	Redwell/Hawkshead Woods	0.21	3.88	1.05	19.40
40	Redwell/Hawkshead Woods	0.18	3.85	0.88	19.23
41	Cobs Ash/Changsley Grove	0.51	4.18	2.54	20.89
42	Cobs Ash/Changsley Grove	0.39	4.06	1.94	20.29
43	Cobs Ash/Changsley Grove	0.42	4.09	2.09	20.44
44	Bush Wood	0.14	3.81	0.69	19.04
45	Coppice Wood	0.10	3.77	0.51	18.86
46	Knights Wood	0.06	3.73	0.30	18.65

As indicated in Table 7, predicted annual mean SO$_2$ concentrations were below the relevant EQS at all sensitive receptor locations. The long-term PC is less than 100% of the long-term environmental standard[2] at all locations and therefore, impacts are not considered to be significant. It should be noted that the assessment assumed that the facility would be emitting the maximum permitted pollutant concentration at all times. As such, predicted concentrations are likely to be a significant overestimation of actual impacts.

1.3.2   Nitrogen Deposition

Predicted annual mean nitrogen deposition rates are summarised in Table 8.

Table 8   Predicted Annual Mean Nitrogen Deposition Rates

Receptor		Predicted Annual Mean Nitrogen Deposition Concentration (kg N/ha/yr)		Proportion of the EQS (%)			
ID	Descriptions			Low EQS		High EQS	
		PC	PEC	PC	PEC	PC	PEC
1	Redwell Wood	0.03	30.27	0.29	302.69	0.19	201.79
3	Colney Heath	0.06	16.16	0.56	161.56	0.37	107.71

Receptor		Predicted Annual Mean Nitrogen Deposition Concentration (kg N/ha/yr)		Proportion of the EQS (%)			
				Low EQS		High EQS	
ID	Descriptions	PC	PEC	PC	PEC	PC	PEC
4	River Colney by Bowmansgreen Farm	0.02	17.24	0.23	172.43	0.15	114.95
5	Colney Heath Farm Meadows	0.10	16.48	0.96	164.76	0.64	109.84
6	Cobs Ash	0.04	29.16	0.43	291.63	0.29	194.42
7	Walsingham Wood	0.10	29.22	1.05	292.25	0.70	194.83
8	Walsingham Wood	0.08	29.20	0.80	292.00	0.53	194.67
9	Walsingham Wood	0.07	29.19	0.69	291.89	0.46	194.60
10	Walsingham Wood	0.06	29.18	0.58	291.78	0.39	194.52
11	Coppice Wood	0.02	29.56	0.21	295.61	0.14	197.07
12	Knights Wood	0.01	29.55	0.13	295.53	0.09	197.02
13	North Mymms Park Area	0.07	17.29	0.35	172.90	0.23	115.26
15	Bush Wood (Welham Green)	0.03	29.57	0.31	295.71	0.21	197.14
16	Shenley Lodge Farm Wood	0.04	28.88	0.42	288.82	0.21	192.55
17	Potwells	0.03	17.25	0.32	172.52	0.16	115.01
18	Coursers Road Gravel Pit	0.26	29.38	2.58	293.78	1.29	195.85
22	Roundwood (S. of North Mymms Park)	0.04	29.16	0.36	291.56	0.24	194.38
23	The New Plantation	0.31	29.43	3.13	294.33	2.09	196.22
24	The New Plantation	0.32	29.44	3.24	294.44	2.16	196.29
25	The New Plantation	0.17	29.29	1.74	292.94	1.16	195.29
26	Scrubby Grassland by Fredericks Woods	0.44	17.66	4.44	176.64	2.96	117.76
27	Scrubby Grassland by Fredericks Woods	0.44	17.66	4.36	176.56	2.91	117.71
28	Fredericks Wood	0.20	27.92	2.03	279.23	1.01	186.15
30	Cangsley Grove	0.03	29.15	0.32	291.52	0.21	194.34
31	River Colney N.E. of Nature Reserve	0.03	17.11	0.32	171.12	0.21	114.08
33	Sleapshyde Gravel Pit	0.03	16.41	0.16	164.12	0.11	109.41
34	North Mymms Churchyard	0.04	17.26	0.20	172.59	0.13	115.06
35	Smallford Pit	0.02	17.10	0.15	170.95	0.08	113.97
36	Colney Heath Common	0.06	16.44	0.56	164.36	0.37	109.57
37	Tollgate Wood	0.06	27.78	0.55	277.75	0.28	185.17
38	St. Marks Churchyard & Graveyard	0.03	17.11	0.26	171.06	0.13	114.04
39	Redwell/Hawkshead Woods	0.04	30.28	0.43	302.83	0.29	201.89
40	Redwell/Hawkshead Woods	0.04	30.28	0.36	302.76	0.24	201.84

Receptor		Predicted Annual Mean Nitrogen Deposition Concentration (kg N/ha/yr)		Proportion of the EQS (%)			
ID	Descriptions			Low EQS		High EQS	
		PC	PEC	PC	PEC	PC	PEC
41	Cobs Ash/Changsley Grove	0.10	29.22	1.05	292.25	0.70	194.83
42	Cobs Ash/Changsley Grove	0.08	29.20	0.80	292.00	0.53	194.67
43	Cobs Ash/Changsley Grove	0.09	29.21	0.86	292.06	0.57	194.71
44	Bush Wood	0.03	29.57	0.28	295.68	0.19	197.12
45	Coppice Wood	0.02	29.56	0.21	295.61	0.14	197.07
46	Knights Wood	0.01	29.55	0.12	295.52	0.08	197.02

As indicated in Table 8, predicted annual mean nitrogen deposition rates were above the relevant EQS at all sensitive receptor locations. This is due to the high background deposition rates, which exceed the EQSs as a base condition.

As indicated in Table 8, the PC proportion of the low EQS is less than 1% at most of the receptor locations. It was marginally exceeded at two locations and exceedances of the 1% criteria were also predicted at closest locations within the Coursers Road Gravel Pit, The New Plantation, the Scrubby Grassland by Fredericks Woods and the Fredericks Wood sites.

The APIS website provides information on the effects and implications of nitrogen deposition on a variety of habitats. Exceedences of the significance criteria were predicted at the Coursers Road Gravel Pit, The New Plantation, the Scrubby Grassland by Fredericks Woods and the Fredericks Wood sites. The main habitat at these locations are comprised of several components each with varying sensitivities to nitrogen deposition. As the current background deposition rates are already in exceedance of the relevant EQS a comparison of the existing deposition rates was undertaken to identify a percentage change associated with the scheme. This indicated that predicted increase as a result of the impacts associated with the operation of installation are not considered to be significant when considered existing deposition rates.

1.3.3   Acid Deposition

Predicted annual mean acid deposition rates are summarised in Table 9.

Table 9   Predicted Annual Mean Acid Deposition Rates

Receptor	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)				Proportion of the EQS (%)	
ID	S	N	Total PC	PEC	PC	PEC
1	0.0164	0.0020	0.0184	2.4784	0.61	82.61
3	0.0322	0.0040	0.0362	1.4262	3.32	130.84
5	0.0551	0.0068	0.0619	1.4719	5.68	135.04
6	0.0247	0.0031	0.0278	2.3978	0.93	80.19
7	0.0602	0.0075	0.0676	2.4376	3.62	130.36
8	0.0459	0.0057	0.0516	2.4216	2.76	129.50

Receptor	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)				Proportion of the EQS (%)	
ID	S	N	Total PC	PEC	PC	PEC
9	0.0399	0.0050	0.0448	2.4148	2.40	129.14
10	0.0334	0.0042	0.0376	2.4076	2.01	128.75
11	0.0119	0.0015	0.0134	2.3934	0.76	135.99
12	0.0074	0.0009	0.0083	2.3883	0.47	135.70
13	0.0400	0.0050	0.0450	1.5150	0.94	31.76
15	0.0180	0.0022	0.0203	2.4003	1.15	136.38
16	0.0240	0.0030	0.0270	2.3770	0.41	35.69
17	0.0184	0.0023	0.0207	1.4907	0.99	71.67
18	0.1482	0.0184	0.1667	2.5367	8.91	135.65
22	0.0208	0.0026	0.0234	2.3934	0.78	80.05
23	0.1798	0.0223	0.2022	2.5722	10.81	137.55
24	0.1861	0.0231	0.2092	2.5792	11.19	137.93
25	0.0997	0.0124	0.1121	2.4821	6.00	132.73
26	0.2553	0.0317	0.2870	1.7570	21.58	132.11
27	0.2507	0.0312	0.2819	1.7519	21.19	131.72
28	0.1166	0.0145	0.1311	2.4011	7.58	138.79
30	0.0182	0.0023	0.0205	2.3905	1.09	127.83
33	0.0182	0.0023	0.0205	1.4305	0.43	30.12
34	0.0226	0.0028	0.0254	1.4954	0.53	31.35
35	0.0087	0.0011	0.0098	1.4698	0.89	133.62
36	0.0322	0.0040	0.0362	1.4462	3.32	132.68
37	0.0317	0.0039	0.0357	2.3057	2.06	133.28
38	0.0149	0.0019	0.0168	1.4768	1.53	134.25
39	0.0247	0.0031	0.0278	2.4878	7.72	691.06
40	0.0208	0.0026	0.0234	2.4834	6.51	689.84
41	0.0602	0.0075	0.0676	2.4376	2.26	81.53
42	0.0459	0.0057	0.0516	2.4216	1.73	80.99
43	0.0494	0.0061	0.0555	2.4255	1.86	81.12
44	0.0163	0.0020	0.0183	2.3983	1.04	136.27
45	0.0119	0.0015	0.0134	2.3934	0.76	135.99
46	0.0071	0.0009	0.0080	2.3880	0.45	135.68

As indicated in Table 9, predicted annual mean acid deposition rates were above the relevant EQS at most sensitive receptor locations. This is due to the high background deposition rates, which exceed the EQSs as a base condition.

As indicated in Table 10, the PC proportion of the EQS is less than 1% at the majority of the receptor locations. Given the criteria for not significant impact was not met at all sensitive ecological location the Critical Load Function Tool from the APIS website[3] was utilised in order to identify likely exceedances of the Critical Load (CL).

Table 10   Predicted Annual Mean Acid Deposition Rates

ID	Acid Deposition Rate (keq/ha/yr)		Acid (keq/ha/yr)			Background (keq/ha/yr)		% of CL Function			Exceedance of the CL function
	S	N	CLmax S	CLmin N	CLmax N	N	S	PC	BGND	PEC	
5	0.05510	0.00685	0.87	0.22	1.09	1.17	0.24	5.5	129.4	134.9	No exceedance of CL function
7	0.06016	0.00748	1.52	0.36	1.87	2.08	0.29	3.7	126.7	130.5	No exceedance of CL function
8	0.04589	0.00570	1.52	0.36	1.87	2.08	0.29	2.7	126.7	129.4	No exceedance of CL function
9	0.03988	0.00496	1.52	0.36	1.87	2.08	0.29	2.1	126.7	128.9	No exceedance of CL function
10	0.03342	0.00415	1.52	0.36	1.87	2.08	0.29	2.1	126.7	128.9	No exceedance of CL function
15	0.01801	0.00224	1.62	0.14	1.76	2.11	0.27	1.1	135.2	136.4	No exceedance of CL function
18	0.14825	0.01842	1.52	0.36	1.87	2.08	0.29	9.1	126.7	135.8	No exceedance of CL function
23	0.17983	0.02235	1.52	0.36	1.87	2.08	0.29	10.7	126.7	137.4	No exceedance of CL function
24	0.18607	0.02313	1.52	0.36	1.87	2.08	0.29	11.2	126.7	138.0	No exceedance of CL function
25	0.09974	0.01240	1.52	0.36	1.87	2.08	0.29	5.9	126.7	132.6	No exceedance of CL function
26	0.25530	0.03173	0.89	0.44	1.33	1.23	0.24	21.8	110.5	132.3	No exceedance of CL function
27	0.25070	0.03116	0.89	0.44	1.33	1.23	0.24	21.1	110.5	131.6	No exceedance of CL function
28	0.11665	0.01450	1.59	0.14	1.73	1.98	0.29	7.5	131.2	138.7	No exceedance of CL function
30	0.01820	0.00226	1.52	0.36	1.87	2.08	0.29	1.1	126.7	127.8	No exceedance of CL function

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3   http://www.apis.ac.uk/critical-load-function-tool

ID	Acid Deposition Rate (keq/ha/yr)		Acid (keq/ha/yr)			Background (keq/ha/yr)		% of CL Function			Exceedance of the CL function
	S	N	CLmax S	CLmin N	CLmax N	N	S	PC	BGND	PEC	
36	0.03218	0.00400	0.87	0.22	1.09	1.17	0.24	3.7	129.4	133.0	No exceedance of CL function
37	0.03175	0.00395	1.59	0.14	1.73	1.98	0.29	2.3	131.2	133.5	No exceedance of CL function
38	0.01495	0.00186	0.88	0.22	1.10	1.22	0.24	1.8	132.7	134.5	No exceedance of CL function
41	0.06016	0.00748	2.64	0.36	2.99	2.08	0.29	3.7	126.7	130.5	No exceedance of CL function
42	0.04589	0.00570	2.64	0.36	2.99	2.08	0.29	2.7	126.7	129.4	No exceedance of CL function
43	0.04937	0.00614	2.64	0.36	2.99	2.08	0.29	2.0	79.3	81.3	No exceedance of CL function
44	0.01629	0.00202	1.62	0.14	1.76	2.11	0.27	1.1	135.2	136.4	No exceedance of CL function

As indicated in Table 10, CL function was not exceeded at any of the sensitive ecological receptor locations and as such, the impacts are not considered to be significant. It should be noted that the assessment assumed that the facility would be emitting the maximum permitted pollutant concentration at all times. As such, predicted concentrations are likely to be a significant overestimation of actual impacts.
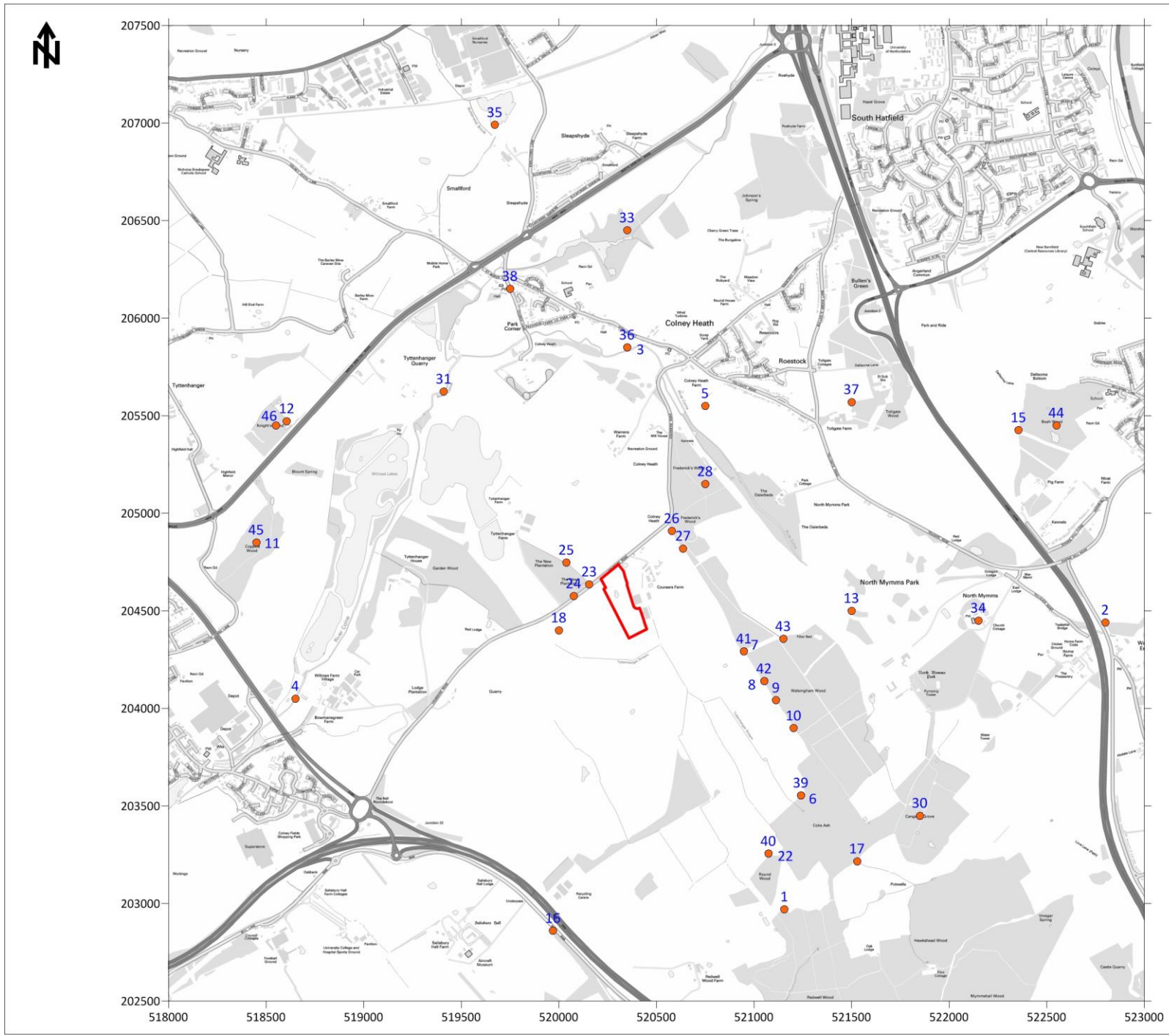
1.4   Summary

Impacts on existing pollutant concentrations were not predicted to be significant at any location within the assessment extents in accordance with the EA criteria.

Nitrogen and acid gas deposition rates were also predicted at the relevant ecological sites. Results indicated that emissions from the installation would not significantly affect existing conditions at any designation.

Impacts were predicted based on a worst-case assessment scenario of the facility constantly emitting the maximum permitted concentration of each pollutant throughout an entire year. As such, predicted concentrations and deposition rates are likely to overestimate actual impacts

Note prepared by Gabor Antony, Principal Air Quality Consultant at REC Ltd, on 14th June 2016