Appendix 5.4: Assessment of Ecological Impacts

The following European designated nature conservation sites, within 10 km of the Application Site, have been identified:

- The Swale Special Protection Area (SPA);
- The Swale Ramsar;
- Medway Estuary and Marshes SPA;
- Medway Estuary and Marshes Ramsar;
- Thames Estuary and Marshes SPA;
- Thames Estuary and Marshes Ramsar;
- Queensdown Warren Special Area of Conservation (SAC); and
- Outer Thames Estuary SPA.

The following nationally designated sites, within 2 km of the Application Site, have also been identified:

- The Swale Site of Special Scientific Interest (SSSI);
- Milton Creek Local Wildlife Site (LWS); and.
- Elmley National Nature Reserve (NNR).

For information, the Medway Estuary and Marshes SSSI is 2.9 km from the Application Site (i.e. more than 2 km away) and has been excluded from the assessment. The Swale Marine Conservation Zone (MCZ) has also been excluded as there is no requirement to assess air quality impacts at waterbodies/MCZs.

Approach

This approach to this assessment considers the IAQM '*A guide to the assessment of air quality impacts on designated nature conservation sites'.* Concentrations of NOx, SO_2 and ammonia have been predicted using the same model as used in the assessment of impacts at human-health receptors. Modelling has been undertaken for a grid of receptor points, with a grid spacing of 200 m, across each identified nature conservation site. The receptor grid points have been modelled at ground level. To ensure that the assessment is conservative, the maximum PC for WKN and K3 (0 – 75MW) the K3 Proposed Development at each site and for all the meteorological datasets has been identified and is presented in this Appendix.

Critical Levels

Critical level are the concentrations of an air pollutant above which adverse effects on ecosystems may occur based on present knowledge. They are specified within relevant European air quality directives and corresponding UK air quality regulations. PCs and, where appropriate, PECs of NOx, SO_2 and NH_3 have been calculated for comparison with the relevant critical level. Background concentrations at each designated site have been derived from the UK Air Pollution Information System (APIS) database [1].

Critical Loads

Critical loads refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Nutrient nitrogen deposition and acid deposition are considered in this Appendix.

Critical Loads – Nutrient N Deposition

Percentage contributions to nutrient nitrogen deposition have been derived from the modelled NOx concentrations. Deposition rates have been calculated using empirical methods recommended by the Environment Agency, as follows:

1. The dry deposition flux ($\mu g.m^{-2}.s^{-1}$) has been calculated by multiplying the ground level NO_2 concentrations ($\mu g.m^{-3}$) by the deposition velocity of 0.003 $m.s^{-1}$ for forests/tall habitats and 0.0015 $m.s^{-1}$ for grassland/short habitats.

2. Units of $\mu g.m^{-2}.s^{-1}$ have been converted to units of $kg.ha^{-1}.year^{-1}$ by multiplying the dry deposition flux by the standard conversion factor of 96 for NOx.

3. Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range for the habitat types associated with the designated site. These have been derived from the APIS database.

Critical Loads – Acidification

The acid deposition rate, in equivalents $keq.ha^{-1}.year^{-1}$, has been calculated by multiplying the dry deposition flux ($kg.ha^{-1}.year^{-1}$) by a conversion factor of 0.071428 for N. This takes into account the degree to which a chemical species is acidifying, calculated as the proportion of N within the molecule.

Wet deposition in the near field is not significant compared with dry deposition for N [2] and therefore for the purposes of this assessment, wet deposition has not been considered.

Predicted contributions to acid deposition have been calculated and compared with the minimum critical load function for the habitat types associated with the designated site as derived from the APIS database.

Significance Criteria

Maximum PCs and PECs of NO_x, SO_2, NH_3 and N/acid deposition have been compared against the relevant critical levels/loads for the relevant habitat type/interest feature. The Environment Agency on-line risk guidance [3] provides a step-wise approach to assessing the significance of effects at nature conservation sites. It states that:

"If emissions that affect SPAs, SACs, Ramsar sites or SSSIs meet both of the following criteria, they're insignificant - you don't need to assess them any further:

- *the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas*
- *the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas*

If you don't meet these requirements you need to calculate the PEC and check the PEC against the standard for protected conservation areas.

You don't need to calculate PEC for short-term targets.

If your short-term PC exceeds the screening criteria, you need to do detailed modelling.

If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you don't need to assess them any further.

If your PEC is greater than 70% of the long-term environmental standard, you need to do detailed modelling."

The IAQM's '*A guide to the assessment of air quality impacts on designated nature conservation sites'* states that *"The Environment Agency risk assessment guidance states that if the PEC is less than 70% of the long-term criterion it can be deemed to be insignificant, regardless of the PC. For some pollutants (nitrogen deposition, in particular) background values are high over much of the UK and it is unlikely there will be many occasions where the PEC is less than 70%. Also, this was intended to be a trigger for detailed dispersion modelling. It is not intended to be a damage threshold."*

The Environment Agency on-line risk guidance continues by stating that:

"At the detailed modelling stage there are no criteria to determine whether:

- *PCs are significant*
- *PECs are insignificant or significant*

You must explain how you judged significance and base this on the site specific circumstances"

This Appendix presents the results of detailed modelling at each of the sites. In this case, the emission is considered not significant if the PC does not exceed 1% of relevant critical level/load (or 100% at local designations). With reference to the definition of critical levels and critical loads above, the emission is considered not significant if the PEC does not exceed 100% of the relevant critical level/load. Otherwise, the impact is considered *potentially* significant. Where *potentially* significant impacts have been identified, the impacts have been passed to the project's ecologist to allow the significance of the likely effect to be determined.

Results

The ambient NO_x, SO_2 and NH_3 concentrations and existing deposition rates have been obtained from APIS. The highest deposition rates have been obtained taking into account the various habitats across the sites. The lowest critical loads for nitrogen deposition and acid deposition have been also obtained from APIS [4].

The maximum predicted annual-mean NO_x, SO_2 and NH_3 concentrations are compared with the critical level in Tables 5.4.1, 5.4.2 and 5.4.3. The maximum predicted nutrient N deposition rates are compared with the critical load in Table 5.4.4. The maximum predicted acid deposition rates are compared with the critical load

function in Table 5.4.5. Only Queendown Warren is sensitive to acid deposition and the other designated sites have not been presented in this table.

For the Outer Thames Estuary SPA, APIS describes the habitat as *inshore sublittoral sediment*, which provides wintering for the red-throated diver. APIS states that this habitat is not sensitive to increases in NOx, SO_2 or NH_3 concentrations, nitrogen deposition or acid deposition. As such, this site has not been considered further in the assessment.

Table 5.4.1 Predicted Annual-Mean NOx Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC as % of CL ($\mu g.m^{-3}$)
The Swale SPA/Ramsar/SSSI	30	12.3	4.0	13	16.3	54
Medway Estuary and Marshes SPA/Ramsar		24.4	0.4	1	24.8	83
Thames Estuary and Marshes SPA/Ramsar		18.3	0.1	0	18.4	61
Queendown Warren SAC		18.7	0.2	1	18.9	63
Elmley NNR		12.3	4.0	13	16.3	54
Milton Creek LWS		12.3	1.6	5	13.9	46

Table 5.4.2 Predicted Annual-Mean SO_2 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC as % of CL ($\mu g.m^{-3}$)
The Swale SPA/Ramsar/SSSI	20	0.29	1.00	5	1.29	6
Medway Estuary and Marshes SPA/Ramsar		0.36	0.10	0	0.46	2
Thames Estuary and Marshes SPA/Ramsar		0.32	0.03	0	0.35	2
Queendown Warren SAC		0.34	0.04	0	0.38	2
Elmley NNR		0.29	1.00	5	1.29	6
Milton Creek LWS		0.29	0.40	2	0.69	3

Table 5.4.3 Predicted Annual-Mean NH_3 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC	WKN + K3 PC ($\mu g.m^{-3}$)	WKN + K3 PC/CL (%)	WKN + K3 PEC ($\mu g.m^{-3}$)	WKN + K3 PEC/CL (%)
The Swale SPA/Ramsar/SSSI	3	0.88	0.100	3	0.98	33
Medway Estuary and Marshes SPA/Ramsar		0.77	0.010	0	0.78	26

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Thames Estuary and Marshes SPA/Ramsar		0.76	0.003	0	0.76	25
Queendown Warren SAC		1.01	0.004	0	1.01	34
Elmley NNR		0.88	0.100	3	0.98	33
Milton Creek LWS		0.88	0.040	1	0.92	31

Notes:
The Swale SPA, Medway Estuary and Marshes SPA and Thames Estuary and Marshes SPA all cover the same geographical areas as the corresponding Ramsar and SSSI designations. Therefore, the values set out in Tables 5.4.1 to 5.4.3 represent the pollutant concentrations at all of these sites. Elmley NNR is within The Swale SPA/Ramsar/SSSI. APIS does not provide data for NNRs so the ambient concentrations and critical levels/loads have been assumed to be the same as The Swale SPA. Milton Creek LWS is an extension of the Swale SPA and the project's ecologist has advised that the same habitats, ambient concentrations and critical levels/loads apply.
Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5], the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.4 Predicted Nutrient N Deposition at Designated Sites

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC/CL (%)	WKN + K3 PEC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PEC/CL (%)
The Swale SPA	Breeding Lapwing	20	14.2	1.09	5	15.29	76
	Ringed plover	20	14.2	1.09	5	15.29	76
	Eurasian reed warbler	30	14.2	1.09	4	15.29	51
	Eurasian curlew	20	14.2	1.09	5	15.29	76
	Reed bunting	30	14.2	1.09	4	15.29	51
	Dark-bellied brent goose	20	14.2	1.09	5	15.29	76
	Common shelduck	20	14.2	1.09	5	15.29	76
	Eurasian teal	20	14.2	1.09	5	15.29	76
	Mallard	Not available	14.2	1.09	-	15.29	-
	Common moorhen	Not available	9.8	1.09	-	10.87	-
	Gadwall	Not available	9.8	1.09	-	10.87	-
	Grey plover	20	14.2	1.09	5	15.29	76
	Dunlin	20	14.2	1.09	5	15.29	76
	Common coot	Not available	9.8	1.09	-	10.87	-
	Common redshank	20	14.2	1.09	5	15.29	76
	Eurasian oystercatcher	20	14.2	1.09	5	15.29	76

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC/CL (%)	WKN + K3 PEC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PEC/CL (%)
Medway Estuary and Marshes SPA	Common tern	30	13.2	0.11	0	13.32	44
	Red-throated diver	Not sensitive	10.8	0.11	-	10.94	-
	Eurasian curlew	20	13.2	0.11	1	13.32	67
	Common greenshank	20	13.2	0.11	1	13.32	67
	Little tern	30	13.2	0.11	0	13.32	44
	Hen harrier	30	13.2	0.11	0	13.32	44
	Merlin	30	13.2	0.11	0	13.32	44
	Ringed plover	20	13.2	0.11	1	13.32	67
	Short-eared owl	10	Not available	0.11	1	-	-
	Great crested grebe	20	13.2	0.11	1	13.32	67
	Great cormorant	Not available	13.2	0.11	-	13.32	-
	Dark-bellied brent goose	20	13.2	0.11	1	13.32	67
	Eurasian teal	20	13.2	0.11	1	13.32	67
	Mallard	20	13.2	0.11	1	13.32	67
	Northern shoveler	Not available	13.2	0.11	-	13.32	-
	Common shelduck	20	13.2	0.11	1	13.32	67
	Eurasian wigeon	20	13.2	0.11	1	13.32	67
	Northern pintail	20	13.2	0.11	1	13.32	67
	Common pochard	20	13.2	0.11	1	13.32	67
	Eurasian oystercatcher	20	13.2	0.11	1	13.32	67
	Pied avocet	20	13.2	0.11	1	13.32	67
	Grey plover	20	13.2	0.11	1	13.32	67
	Red knot	20	13.2	0.11	1	13.32	67
	Dunlin	20	13.2	0.11	1	13.32	67
	Black-tailed godwit	20	13.2	0.11	1	13.32	67
	Common redshank	20	13.2	0.11	1	13.32	67
	Ruddy turnstone	20	13.2	0.11	1	13.32	67
	Tundra swan	Not sensitive	13.2	0.11	-	13.32	-
	Common kingfisher	Not available	10.8	0.11	-	10.94	-

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC/CL (%)	WKN + K3 PEC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PEC/CL (%)
Thames Estuary and Marshes SPA	Ringed plover	8	12.1	0.03	0	12.08	151
	Hen harrier	30	12.1	0.03	0	12.08	40
	Pied avocet	20	12.1	0.03	0	12.08	60
	Grey plover	20	12.1	0.03	0	12.08	60
	Red knot	20	12.1	0.03	0	12.08	60
	Dunlin	20	12.1	0.03	0	12.08	60
	Black-tailed godwit	20	12.1	0.03	0	12.08	60
	Common redshank	20	12.1	0.03	0	12.08	60
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates	15	15.4	0.04	0	15.44	103
The Swale Ramsar/SSSI	Intertidal habitats (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Saltmarsh (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Shingle & sea cliff (dunes, shingle & machair)	10	14.2	1.09	11	15.29	153
	Arable (horticultural & arable)	Not sensitive	-	-	-	-	-
	Standing water (standing open water)	No CL	-	-	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	-	-	-	-
Medway Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
	Saltmarsh (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
	Shingle & sea cliff (dunes, shingle & machair)	10	13.2	0.11	1	13.32	133
	Wet grassland (grazing marsh)	20	13.2	0.11	1	13.32	67
	Dry grassland (grazing marsh)	20	13.2	0.11	1	13.32	67
	Bogs, marshes, fens (fen, marsh & swamp)	30	13.2	0.11	0	13.32	44
	Standing water (standing open water)	No CL	-	0.05	-	-	-
	Intertidal habitats (coastal saltmarsh)	20	13.2	0.11	1	13.32	67
Thames Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	12.1	0.03	0	12.08	60
	Saltmarsh (coastal saltmarsh)	20	12.1	0.03	0	12.08	60
	Shingle & sea cliff (dunes, shingle & machair)	10	12.1	0.03	0	12.08	121
	Wet grassland (grazing marsh)	20	12.1	0.03	0	12.08	60
	Dry grassland (grazing marsh)	20	12.1	0.03	0	12.08	60

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC/CL (%)	WKN + K3 PEC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PEC/CL (%)
	Bogs, marshes, fens (fen, marsh & swamp)	30	12.1	0.03	0	12.08	40
	Standing water (standing open water)	No CL	-	0.02	-	-	-
Elmley NNR	Breeding Lapwing	20	14.2	1.09	5	15.29	76
	Ringed plover	20	14.2	1.09	5	15.29	76
	Eurasian reed warbler	30	14.2	1.09	4	15.29	51
	Eurasian curlew	20	14.2	1.09	5	15.29	76
	Reed bunting	30	14.2	1.09	4	15.29	51
	Dark-bellied brent goose	20	14.2	1.09	5	15.29	76
	Common shelduck	20	14.2	1.09	5	15.29	76
	Eurasian teal	20	14.2	1.09	5	15.29	76
	Mallard	Not available	14.2	1.09	-	15.29	-
	Common moorhen	Not available	9.8	1.09	-	10.87	-
	Gadwall	Not available	9.8	1.09	-	10.87	-
	Grey plover	20	14.2	1.09	5	15.29	76
	Dunlin	20	14.2	1.09	5	15.29	76
	Common coot	Not available	9.8	1.09	-	10.87	-
	Common redshank	20	14.2	1.09	5	15.29	76
	Eurasian oystercatcher	20	14.2	1.09	5	15.29	76
	Intertidal habitats (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Saltmarsh (coastal saltmarsh)	20	14.2	1.09	5	15.29	76
	Arable (horticultural & arable)	Not sensitive	-	1.09	-	-	-
	Standing water (standing open water)	No CL	-	1.09	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	1.09	-	-	-
Milton Creek LWS	Breeding Lapwing	20	14.2	0.44	2	14.64	73
	Ringed plover	20	14.2	0.44	2	14.64	73
	Eurasian reed warbler	30	14.2	0.44	1	14.64	49
	Eurasian curlew	20	14.2	0.44	2	14.64	73
	Reed bunting	30	14.2	0.44	1	14.64	49
	Dark-bellied brent goose	20	14.2	0.44	2	14.64	73

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PC/CL (%)	WKN + K3 PEC (kgN.ha^{-1}.yr^{-1})	WKN + K3 PEC/CL (%)
	Common shelduck	20	14.2	0.44	2	14.64	73
	Eurasian teal	20	14.2	0.44	2	14.64	73
	Mallard	Not available	14.2	0.44	-	14.64	-
	Common moorhen	Not available	9.8	0.44	-	10.22	-
	Gadwall	Not available	9.8	0.44	-	10.22	-
	Grey plover	20	14.2	0.44	2	14.64	73
	Dunlin	20	14.2	0.44	2	14.64	73
	Common coot	Not available	9.8	0.44	-	10.22	-
	Common redshank	20	14.2	0.44	2	14.64	73
	Eurasian oystercatcher	20	14.2	0.44	2	14.64	73
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.44	2	14.64	73
	Saltmarsh (coastal saltmarsh)	20	14.2	0.44	2	14.64	73
	Arable (horticultural & arable)	Not sensitive	-	0.44	-	-	-
	Standing water (standing open water)	No CL	-	0.44	-	-	-
	Waste land, industrial (no corresponding APIS	Not sensitive	-	0.44	-	-	-

Note:

Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment.

Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5]., the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.5 Predicted Acid Deposition at Designated Sites

Designated Site	Interest Feature	Critical Loads (keq.ha^{-1}.yr^{-1})			WKN + K3 PC (keq.ha^{-1}.yr^{-1})		WKN + K3 PC/CLF (%)
		Min N	Max N	Max S	N	S	
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates.	0.856	4.856	4	0.003	0.004	0

Notes:
CLF = Critical Load Function.
Consistent with the Institute of Air Quality Management's *"A guide to the assessment of air quality impacts on designated nature conservation sites"* [5], the PC as a % of the CL has been rounded to the nearest integer.

Annual-mean NOx

The maximum annual-mean NO_X WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar, Elmley NNR; the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR, the WKN + K3 PC is 13% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 54% of the critical level of 30 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean SO_2

The maximum annual-mean SO_2 WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR, the WKN + K3 PC is 5% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 6% of the critical level of 20 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean NH_3

The maximum annual-mean NH_3 WKN + K3 PCs only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the WKN + K3 PCs are 3% of the critical level and based on the PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the PECs are only 33% of the critical level of 3 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Nutrient N Deposition

The maximum nitrogen deposition PC exceeds 1% of the critical load at several interest features however when the AC is added to the PC, the PECs are below the critical loads for all but one interest feature and the impacts can be screened out as insignificant.. For Shingle & sea cliff (dunes, shingle & machair), the PEC is 153% of the critical load and the impacts can't be screened out. The results have been passed to the projects' ecologist to assess the effects.

For Milton Creek LWS, the WKN + K3 PC is less than 100% of the critical load and the impacts can be screened out as insignificant.

Acid Deposition

The maximum acid deposition PC is less than 1% of the critical load and the impacts can be screened out as insignificant.

Cumulative Impacts

Section 5.13 of Chapter 5: Air Quality sets outs the cumulative developments considered for this assessment. There are four developments where there was sufficient detail to allow a PC to be added to give a cumulative PEC for ecological receptors:

- Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))
- Kemsley AD (SW/11/1291)
- Reserve Power Plant PC (18/500393/FULL)
- Garden of England Energy Facility (15/500348/COUNTY)

The PCs for each of these four developments are outlined in the table below. This has been added to the maximum PEC to give a Cumulative PEC.

Table 5.4.6 Predicted Annual-Mean NO_x Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN PC ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ ADJ))	Kemsley AD (SW/11/1 291)	Reserve Power Plant PC (18/500393/ FULL)	Garden of England Energy Facility (15/500348/ COUNTY)	Cumulative PC	Cumulative PC as % of CL	Cumulative PEC	Cumulative PEC as % of CL
The Swale SPA/Ramsar/SSSI	30	12.3	2.0	2.0	0.8	1.38	2.23	1.33	9.7	32	22.0	73
Medway Estuary and Marshes SPA/Ramsar		24.4	0.2	0.2	0.1	0.05	-	0.11	0.6	2	25.1	84
Thames Estuary and Marshes SPA/Ramsar		18.3	0.1	0.1	0.1	0.01	-	0.02	0.3	1	18.5	62
Queendown Warren SAC		18.7	0.1	0.1	0.1	0.01	-	0.02	0.2	1	19.0	63
Elmley NNR		12.3	2.0	2.0	0.8	1.38	2.23	1.33	9.7	32	22.0	73
Milton Creek LWS		12.3	0.9	0.7	0.8	1.38	2.23	1.33	7.3	24	19.7	66

Table 5.4.7 Predicted Annual-Mean SO_2 Concentrations at Designated Sites

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Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN PC ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923 /ADJ))	Kemsley AD (SW/11/ 1291)	Reserve Power Plant PC (18/500393 /FULL)	Garden of England Energy Facility (15/500348/C OUNTY)	Cumulative PC	Cumulative PC as % of CL	Cumulative PEC	Cumulative PEC as % of CL
The Swale SPA/Ramsar/SSSI	20	0.29	0.50	0.50	-	-	-	0.066	1.06	5	1.35	7
Medway Estuary and Marshes SPA/Ramsar		0.36	0.04	0.05	-	-	-	0.0053	0.10	1	0.46	2
Thames Estuary and Marshes SPA/Ramsar		0.32	0.01	0.02	-	-	-	0.001	0.03	0	0.35	2
Queendown Warren SAC		0.34	0.02	0.02	-	-	-	0.001	0.04	0	0.38	2
Elmley NNR		0.29	0.50	0.50	-	-	-	0.066	1.06	5	1.35	7
Milton Creek LWS		0.29	0.23	0.17	-	-	-	0.066	0.47	2	0.76	4

Table 5.4.8 Predicted Annual-Mean NH_3 Concentrations at Designated Sites

Designated Site	CL ($\mu g.m^{-3}$)	AC ($\mu g.m^{-3}$)	Proposed K3 PC ($\mu g.m^{-3}$)	WKN ($\mu g.m^{-3}$)	Kemsley K4 CHP PC (EN010090 (18/501923 /ADJ))	Kemsley AD (SW/11/ 1291)	Reserve Power Plant PC (18/500393/ FULL)	Garden of England Energy Facility (15/500348/C OUNTY)	Cumulative PC	Cumulative PC as % of CL	Cumulative PEC	Cumulative PEC as % of CL
The Swale SPA/Ramsar/SSSI	3	0.88	0.05	0.050	-	-	-	0.33	0.430	14	1.31	44
Medway Estuary and Marshes SPA/Ramsar		0.77	<0.005	0.005	-	-	-	0.026	0.036	1	0.81	27
Thames Estuary and Marshes SPA/Ramsar		0.76	<0.005	0.002	-	-	-	0.005	0.008	0	0.77	26
Queendown Warren SAC		1.01	<0.005	0.002	-	-	-	0.005	0.009	0	1.02	34

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Elmley NNR		0.88	0.05	0.050	-	-	-	0.33	0.430	14	1.31	44
Milton Creek LWS		0.88	0.02	0.017	-	-	-	0.33	0.370	12	1.25	42

Notes:
The Swale SPA, Medway Estuary and Marshes SPA and Thames Estuary and Marshes SPA all cover the same geographical areas as the corresponding Ramsar and SSSI designations. Therefore, the values set out in Table 5.4.6, 5.4.7 and 5.4.8 represent the concentrations at all of these sites. Elmley NNR is within The Swale SPA/Ramsar/SSSI. APIS does not provide data for NNRs so the ambient concentrations and critical levels/loads have been assumed to be the same as The Swale SPA.
Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.9 Predicted Nutrient N Deposition at Designated Sites

Designated Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	Proposed K3 PC ($kgN.ha^{-1}.yr^{-1}$)	WKN PC ($kgN.ha^{-1}.yr^{-1}$)	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC ($kgN.ha^{-1}.yr^{-1}$)	Cumulative PC/CL (%)	Cumulative PEC ($kgN.ha^{-1}.yr^{-1}$)	Cumulative PEC/CL (%)
The Swale SPA	Breeding Lapwing	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Ringed plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian reed warbler	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	17	19.2	64
	Eurasian curlew	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Reed bunting	15	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	17	19.2	64
	Dark-bellied brent goose	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Common shelduck	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian teal	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Mallard	Not available	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	19.2	-

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Common moorhen	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Gadwall	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Grey plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Dunlin	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Common coot	Not available	9.8	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	-	14.8	-
	Common redshank	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
	Eurasian oystercatcher	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.9	5.0	25	19.2	96
Medway Estuary and Marshes SPA	Common tern	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Red-throated diver	Not sensitive	10.8	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	11.1	-
	Eurasian curlew	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common greenshank	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Little tern	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Hen harrier	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45
	Merlin	30	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	1	13.5	45

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Ringed plover	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Short-eared owl	10	Not available	0.05	0.06	0.01	0.0005	-	0.19	0.3	3	-	-
	Great crested grebe	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Great cormorant	Not available	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Dark-bellied brent goose	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian teal	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Mallard	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Northern shoveler	Not available	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Common shelduck	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian wigeon	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Northern pintail	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common pochard	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Eurasian oystercatcher	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Pied avocet	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Grey plover	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Red knot	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Dunlin	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Black-tailed godwit	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Common redshank	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Ruddy turnstone	20	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	2	13.5	68
	Tundra swan	Not sensitive	13.2	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	13.5	-
	Common kingfisher	Not available	10.8	0.05	0.06	0.01	0.0005	-	0.19	0.3	-	11.1	-
Thames Estuary and Marshes SPA	Ringed plover	8	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	1	12.1	152
	Hen harrier	30	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	40
	Pied avocet	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Grey plover	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Red knot	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Dunlin	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Black-tailed godwit	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
	Common redshank	20	12.1	0.02	0.02	0.01	0.0001	-	0.03	0.1	0	12.1	61
Queendown	Semi-natural dry grasslands and	15	15.4	0.02	0.02	0.01	0.0001	-	0.03	0.1	1	15.5	103

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
Warren SAC	scrubland facies on calcareous substrates												
The Swale Ramsar/ SSSI	Intertidal habitats (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Saltmarsh (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Shingle & sea cliff (dunes, shingle & machair)	10	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	50	19.2	192
	Arable (horticultural & arable)	Not sensitive	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
	Standing water (standing open water)	No CL	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	3.9	-	3.9	-
Medway Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Saltmarsh (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Shingle & sea cliff (dunes, shingle & machair)	10	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	3	13.5	135
	Wet grassland (grazing marsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Dry grassland (grazing marsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
	Bogs, marshes, fens (fen, marsh & swamp)	30	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	1	13.5	45
	Standing water (standing open water)	No CL	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.2	-	0.2	-
	Intertidal habitats (coastal saltmarsh)	20	13.2	0.05	0.06	0.01	0.0007	-	0.19	0.3	2	13.5	68
Thames Estuary and Marshes Ramsar	Intertidal habitats (coastal saltmarsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Saltmarsh (coastal saltmarsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Shingle & sea cliff (dunes, shingle & machair)	10	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	1	12.1	121
	Wet grassland (grazing marsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Dry grassland (grazing marsh)	20	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	61
	Bogs, marshes, fens (fen, marsh & swamp)	30	12.1	0.02	0.02	0.01	0.0002	-	0.03	0.1	0	12.1	40
	Standing water (standing open water)	No CL	12.1	0.02	0.02	0.01	0.002	-	0.03	0.1	-	0.1	-
Elmley NNR	Breeding Lapwing	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Ringed plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian reed warbler	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	17	19.2	64

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Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Eurasian curlew	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Reed bunting	30	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	17	19.2	64
	Dark-bellied brent goose	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Common shelduck	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian teal	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Mallard	Not available	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	19.2	-
	Common moorhen	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Gadwall	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Grey plover	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Dunlin	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Common coot	Not available	9.78	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	-	14.8	-
	Common redshank	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Eurasian oystercatcher	20	14.2	0.55	0.55	0.1	0.0142	1.92	1.87	5.0	25	19.2	96
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Saltmarsh (coastal saltmarsh)	20	14.2	0.55	0.55	0.1	0.0174	1.92	1.87	5.0	25	19.2	96
	Arable (horticultural & arable)	Not sensitive	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
	Standing water (standing open water)	No CL	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	0	0.55	0.55	0.1	-	1.92	1.87	5.0	-	5.0	-
Milton Creek LWS	Breeding Lapwing	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Ringed plover	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian reed warbler	30	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	14	18.5	62
	Eurasian curlew	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Reed bunting	30	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	14	18.5	62
	Dark-bellied brent goose	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Common shelduck	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian teal	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Mallard	Not available	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	18.5	-

Designated Site	Interest Feature	CL (kgN.ha^{-1}.yr^{-1})	AC (kgN.ha^{-1}.yr^{-1})	Proposed K3 PC (kgN.ha^{-1}.yr^{-1})	WKN PC (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PC (kgN.ha^{-1}.yr^{-1})	Cumulative PC/CL (%)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC/CL (%)
	Common moorhen	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Gadwall	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Grey plover	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Dunlin	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Common coot	Not available	9.78	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	-	14.1	-
	Common redshank	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Eurasian oystercatcher	20	14.2	0.25	0.19	0.1	0.0142	1.92	1.87	4.3	22	18.5	93
	Intertidal habitats (coastal saltmarsh)	20	14.2	0.25	0.19	0.1	0.0174	1.92	1.87	4.3	22	18.5	93
	Saltmarsh (coastal saltmarsh)	20	14.2	0.25	0.19	0.1	0.0174	1.92	1.87	4.3	22	18.5	93
	Arable (horticultural & arable)	Not sensitive	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-
	Standing water (standing open water)	No CL	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-
	Waste land, industrial (no corresponding APIS habitat)	Not sensitive	14.2	0.25	0.19	0.1	-	1.92	1.87	4.3	-	18.5	-

Note:

Critical loads (CLs) for nutrient nitrogen deposition are provided as a range. In this case, the lower limit of the CL range has been used in the assessment unless advised otherwise by the project's ecologist.

Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

Table 5.4.10 Predicted Acid Deposition at Designated Sites

Designated Site	Interest Feature	Critical Loads (keq.ha^{-1}.yr^{-1})			Proposed K3 PC (keq.ha^{-1}.yr^{-1})		WKN PC (keq.ha^{-1}.yr^{-1})		Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))		Kemsley AD (SW/11/1291)		Reserve Power Plant PC (18/500393/FULL)		Garden of England Energy Facility (15/500348/COUNTY)		Cumulative PC		PC as % of CLF (%)
		Min N	Max N	Max S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	
Queendown Warren SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates.	0.856	4.856	4	0.001	0.002	0.002	0.002	0.0005	-	0.0001	-	-	-	0.001	-	0.0005	0.004	0

Notes:

CLF = Critical Load Function.

Kemsley K4, Kemsley AD and the Reserve Power Plant do not emit SO_2 and so do not have PCs for S. For the Garden of England Energy Facility the breakdown of PC between N and S was not provided so has been assumed to be all S.

Consistent with the Institute of Air Quality Management's *"A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites"*, the PC as a % of the CL has been rounded to the nearest integer.

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Annual-mean NOx

The maximum annual-mean NO_X cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar, the Medway Estuary & Marshes SPA/Ramsar and Elmley NNR; the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar & Elmley NNR and the Medway Estuary & Marshes SPA/Ramsar the cumulative PC is 32 and 2% of the critical level and based on the cumulative PCs alone the impact is potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 73 and 84% of the critical level of 30 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean SO_2

The maximum annual-mean SO_2 cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the cumulative PCs are 5% of the critical level and based on the cumulative PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 7% of the critical level of 20 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Annual-mean NH_3

The maximum annual-mean NH_3 cumulative PC only exceeds 1% of the critical level at the Swale SPA/SSSI/Ramsar and Elmley NNR and the effects can be screened out as insignificant at the other sites. At the Swale SPA/SSSI/Ramsar and Elmley NNR the cumulative PCs are 14% of the critical level and based on the cumulative PCs alone the impacts are potentially significant; however, when the AC is added to the PCs, the cumulative PECs are only 44% of the critical level of 3 $\mu g.m^{-3}$ and the impacts can be screened out as insignificant.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Nutrient N Deposition

The maximum nitrogen deposition cumulative PC does not exceed 1% of the critical load for a number of interest features and the effects can be screened out as insignificant. Where the cumulative PC

exceeds 1% of the critical load, the impact is potentially significant; however if the cumulative PEC is less than the CL, the impacts can be screened out as insignificant. For Shingle & sea cliff (dunes, shingle & machair) at The Swale SSSI/Ramsar, the cumulative PC exceeds 1% of the CL and the cumulative PEC exceeds the CL and the impacts are potentially significant. The results have been passed to the projects' ecologist to assess the effects in Chapter 11.

For Milton Creek LWS, the cumulative PC is less than 100% of the critical level and the impacts can be screened out as insignificant.

Acid Deposition

The maximum acid deposition cumulative PC does not exceed 1% of the critical load at Queendown Warren SAC and the impacts can be screened out as insignificant.

Cumulative Impacts at Sensitive Receptors

The above assessment does not consider the impacts of cumulative traffic as the areas of maximum impact will be different for stack and traffic emissions. Traffic emissions have been modelled at a selection of discrete receptor points at the closest point of the habitat site to a road adjacent to roads affected by the WKN and K3 proposed development. Only the Swale SPA/SSSI/Ramsar and the Medway Estuary and Marshes SPA/Ramsar are within 200 m of a road affected by the WKN and K3 proposed development.

The A249 passes through the Medway Estuary and Marshes SPA/Ramsar so receptors were selected at the roadside.

Cumulative traffic data for the WKN and K3 Proposed Development in the opening year of WKN, 2024 was modelled. The PC from the WKN and K3 stack emissions at each of the sensitive receptors was added to the road contribution to give a 'WKN + K3' PC that considers both stack and traffic emissions. To calculate the cumulative PEC, the maximum PCs for the developments in Table 5.4.5 were added to the highest AC for each habitat site and the WKN + K3 PC. These were compared with the lowest CL for each habitat site. The results are presented in Table 5.5.13 and 5.5.14.

Table 5.4.13 Cumulative NOx Predicted Environmental Concentrations – Sensitive Receptors

Habitat Site	WKN + K3 Proposed Development + Other cumulative developments Road Contribution (µg.m^{-3})	WKN + K3 PC (stack emissions) (µg.m^{-3})	WKN + K3 Proposed Development + Other cumulative developments PC as % of CL	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PEC (µg.m^{-3})	Cumulative PEC as % of CL
The Swale SPA/SSSI/Ramsar	3.23	0.84	14	0.80	1.69	2.23	1.33	22.41	75
Medway Estuary and Marshes SPA/Ramsar	1.03	0.37	5	0.10	0.07	0.00	0.11	26.08	87

*Critical level is 30 µg.m^{-3}

Table 5.4.14 Cumulative N Deposition Predicted Process Contributions – Sensitive Receptors

Habitat Site	WKN + K3 PC (Traffic and Stack Emissions) (kgN.ha^{-1}.yr^{-1})	Minimum CL	WKN + K3 PC as % of CL (Traffic and Stack Emissions) (kgN.ha^{-1}.yr^{-1})	Kemsley K4 CHP PC (EN010090 (18/501923/ADJ))	Kemsley AD (SW/11/1291)	Reserve Power Plant PC (18/500393/FULL)	Garden of England Energy Facility (15/500348/COUNTY)	Cumulative PEC (kgN.ha^{-1}.yr^{-1})	Cumulative PEC as % of CL
The Swale SPA/SSSI/Ramsar	0.41	15	3	0.1	0.0174	1.92	1.87	18.52	123
Medway Estuary and Marshes SPA/Ramsar	0.14	8	2	0.01	0.0007	-	0.19	13.55	169

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For NOx, the cumulative PC as % of the CL exceeds 1% but, the PEC is less than the CL. On that basis, the cumulative effects are considered insignificant.

For N deposition the cumulative PC as % of the CL exceed 1% and the PEC is greater than CL and the impacts are potentially significant. The results have been passed to the projects' ecologist to assess the effects.

The cumulative PECs presented in Tables 5.4.13 and 5.4.14 can be considered highly conservative as the PCs from the other developments are the maximum impacts across a grid and are unlikely to occur at the same location as the maximum road contribution.

1 Air Pollution Information Systems, www.apis.ac.uk

2 Approaches to modelling local nitrogen deposition and concentrations in the context of Natura 2000 - Topic 4

3 Air emissions risk assessment for your environmental permit

4 Data downloaded from APIS December 2017

5 IAQM *A guide to the assessment of air quality impacts on designated nature conservation sites*