dha environment

Document 3.1- ES Volume 2
Appendix 5.4 Air Quality Assessment of Ecological Impacts

The Kemsley Mill K4 Combined Heat and Power Generating Station Development Consent Order

Planning Act 2008 The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Regulation 5(2)q

April 2018 - Submission Version

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Appendix 5.4: Assessment of Ecological Impacts

European and nationally designated nature conservation sites, within 10 km and 2 km of the Application Site have been identified:

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

Critical Levels

Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations. PCs and PECs of NOx have been calculated for comparison with the 30 $\mu g.m^{-3}$ critical level. Background NO_x 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.

Critical Loads – Nutrient N Deposition

Percentage contributions to nutrient nitrogen deposition have been derived from the results of the ADMS dispersion modelling. 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 0.003 $m.s^{-1}$ for forests.

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 Levels – 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 PC and PEC of NO_x and N/acid deposition have been compared against the relevant EQS for the relevant habitat type/interest feature. As per the Environment Agency's guidelines [3]**,** the following hierarchy of assessment has been followed:

- If PC < 1% (<100% for LNR/NNR) of relevant EQS the emission is considered not significant;
- If PC > 1% but the resulting PEC < 70% (European and SSSI sites) of the relevant EQS, the emission is not considered significant;
- If PC > 1% and PEC > 70% (for European and SSSI sites) the emission is considered to result a potentially significant result and further, more detailed assessment undertaken to determine likely significant effect.

Further, as per EA 2007 [4]: *"Where the concentration within the emission footprint in any part of the European site(s) is less than 1% of the relevant long-term benchmark (EAL, Critical Level or Critical Load), the emission is not likely to have a significant effect alone or in combination, irrespective of the background levels".*

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. See Chapter 10 of the ES for the assessment of ecological effects resulting from the Proposed Development.

Results

The ambient NO_x 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 the nitrogen component for acid deposition have been also obtained from APIS.

The maximum predicted annual-mean NO_x concentrations are compared with the critical level in Table C1. The maximum predicted nutrient N deposition rates are compared with the critical load in Table C2. The maximum predicted acid deposition rates are compared with the critical load function in Table C3.

Table C1 Predicted Annual-Mean NOx Concentrations at Designated Habitat Sites

Habitat Site	CL ($\mu g.m^{-3}$)	PC ($\mu g.m^{-3}$)	PC/CL (%)
The Swale	30	0.7 (0.8)	2 (3)
Medway Estuary and Marshes		0.1 (0.1)	0 (0)
Thames Estuary and Marshes		0.1 (0.1)	0 (0)
Queendown Warren		<0.05 (<0.05)	0 (0)

NOx Critical Level is 30 $\mu g.m^{-3}$ (irrespective of interest feature)

Table C2 Predicted Nutrient N Deposition at Designated Habitat Sites

Habitat Site	Interest Feature	CL ($kgN.ha^{-1}.yr^{-1}$)	AC ($kgN.ha^{-1}.yr^{-1}$)	PC ($kgN.ha^{-1}.yr^{-1}$)	PC/CL (%)
The Swale	Breeding Lapwing	20	14.2	0.1	1
	Ringed plover	20	14.2	0.1	1
	Eurasian reed warbler	15	14.2	0.1	1
	Eurasian curlew	20	14.2	0.1	1
	Reed bunting	15	14.2	0.1	1
	Dark-bellied brent goose	20	14.2	0.1	1
	Common shelduck	20	14.2	0.1	1
	Eurasian teal	20	14.2	0.1	1
	Mallard	Not available	14.2	0.1	-
	Common moorhen	Not available	9.78	0.1	-
	Gadwall	Not available	9.78	0.1	-
	Grey plover	20	14.2	0.1	1
	Dunlin	20	14.2	0.1	1
	Common coot	Not available	9.78	0.1	-
	Common redshank	20	14.2	0.1	1
	Eurasian oystercatcher	20	14.2	0.1	1
Medway Estuary and Marshes	Common tern	8	13.21	0.01	0
	Red-throated diver	Not sensitive	10.83	0.01	-
	Eurasian curlew	20	13.21	0.01	0

	Common greenshank	20	13.21	0.01	0
	Little tern	10	13.21	0.01	0
	Hen harrier	15	13.21	0.01	0
	Merlin	20	13.21	0.01	0
	Ringed plover	20	13.21	0.01	0
	Short-eared owl	Not available	Not available	0.01	-
	Great crested grebe	20	13.21	0.01	0
	Great cormorant	Not available	13.21	0.01	-
	Dark-bellied brent goose	20	13.21	0.01	0
	Eurasian teal	20	13.21	0.01	0
	Mallard	20	13.21	0.01	0
	Northern shoveler	Not available	13.21	0.01	-
	Common shelduck	20	13.21	0.01	0
	Eurasian wigeon	20	13.21	0.01	0
	Northern pintail	20	13.21	0.01	0
	Common pochard	20	13.21	0.01	0
	Eurasian oystercatcher	20	13.21	0.01	0
	Pied avocet	20	13.21	0.01	0
	Grey plover	20	13.21	0.01	0
	Red knot	20	13.21	0.01	0
	Dunlin	20	13.21	0.01	0
	Black-tailed godwit	20	13.21	0.01	0
	Common redshank	20	13.21	0.01	0
	Ruddy turnstone	20	13.21	0.01	0
	Tundra swan	Not sensitive	13.21	0.01	-
	Common kingfisher	Not available	10.83	0.01	-
Thames Estuary and Marshes	Ringed plover	10	12.05	0.01	0
	Hen harrier	10	12.05	0.01	0
	Pied avocet	20	12.05	0.01	0
	Grey plover	20	12.05	0.01	0
	Red knot	20	12.05	0.01	0
	Dunlin	20	12.05	0.01	0

	Black-tailed godwit	20	12.05	0.01	0
	Common redshank	20	12.05	0.01	0
Queendown Warren	Semi-natural dry grasslands and scrubland facies on calcareous substrates	15	15.4	<0.005	0

Table C3 Predicted Acid Deposition at Designated Habitat Sites

Habitat Site	Interest Feature	CLF ClmaxN (keq.ha^{-1}.yr^{-1})	PC (keq.ha^{-1}.yr^{-1})	PC/CLF (%)
The Swale	Breeding Lapwing	4.856	0.01	1
	Eurasian curlew	4.856	0.01	1
	Common redshank	4.856	0.01	1
Medway Estuary and Marshes	Common tern	4.856	0.001	0
	Eurasian curlew	4.856	0.001	0
	Little tern	4.856	0.001	0
Thames Estuary and Marshes	Ringed plover	4.856	0.001	0
Queendown Warren	Semi-natural dry grasslands and scrubland facies on calcareous substrates	4.856	<0.0005	0

Note: CLF = Critical Load Function

The maximum NO_X PC is below 1% of the critical level for all habitat sites except the Swale SPA and the effects can be screened out as insignificant. For The Swale SPA, when the PC for K2, K3 and K4 is added to the ambient concentration of 12.3 $\mu g.m^{-3}$, the PEC is 14.2 $\mu g.m^{-3}$ which is only 47% of the critical level. On that basis the effects at The Swale can also be screened out as insignificant.

The maximum N deposition PC is below 1% of the critical load for all habitat sites and the effects can be screened out as insignificant.

The maximum acid deposition PC is below 1% of the critical load for all habitat sites and the effects can be screened out as insignificant.

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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 Environment Agency (2012a) Operational Instruction 66_12 Simple assessment of the impact of aerial emissions from new or expanding IPPC regulated Industry for impacts on nature conservation. EA.

Environment Agency (2012b) Operational Instruction 67_12 Detailed assessment of the impact of aerial emissions from new and expanding IPPC regulated industry for impacts on nature conservation. EA.

4 Environment Agency, 2007, Stage 1 and 2 Assessment of new PIR permissions under the Habitat Regulations.