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Air Quality Assessment Addendum – Impact of Conversion of Uskmouth Power Station on Ecologically Sensitive Areas

- 1.1 This note has been prepared for Uskmouth Power Station, Newport for the Application to vary the existing Environmental Permit from the current coal-firing to be fuelled post conversion by a waste-derived fuel pellet product.
- 1.2 An air quality assessment to accompany the permit has been submitted to Natural Resources Wales. That report considered the air quality effects at several nature conservation sites. Natural Resources Wales has requested additional assessment of the air quality impacts at the following additional habitat sites within 2 km of the site:
- Julian's Gout Land Site of Importance for Nature Conservation (SINC);
 - Alpha Steel SINC;
 - Solutia SINC;
 - Marshalls SINC;
 - Afon Ebbw SINC;
 - Gwent Wetland Reserve SINC; and
 - Ancient Woodland at Pye Corner.

- 1.3 The Afon Ebbw SINC is made up of two parts. For this assessment, they have been considered together and the maximum predicted concentration/deposition rates across both parts of the site are presented.
- 1.4 The Gwent Wetland Reserve SINC is within the Newport Wetlands Site of Special Scientific Interest (SSSI) which was assessed in the original assessment report. The results have been reproduced in this addendum for the Gwent Wetland Reserve SINC.
- 1.5 Modelling has been undertaken for the existing 122 m stack, as described in the original assessment report. Concentrations and deposition rates have been predicted for several points within each habitat site and the maximum concentration/deposition rate is presented in this addendum.

Critical Levels

- 1.6 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. Process Contributions (PCs) and Predicted Environmental Concentrations (PECs) of NO_x, SO₂ and NH₃ have been calculated for comparison with the relevant annual-mean critical level.

Critical Loads

- 1.7 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 Nitrogen Deposition

- 1.8 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 (EA), as follows:
 - The deposition flux ($\mu\text{g}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) has been calculated by multiplying the ground level NO₂ and NH₃ concentrations ($\mu\text{g}\cdot\text{m}^{-3}$) by the deposition velocity. The EA guidance provides deposition velocities of 0.0015 m.s⁻¹ for short habitats and 0.003 m.s⁻¹ for forests for NO₂ and 0.02 m.s⁻¹ for short habitats and 0.03 m.s⁻¹ for forests for NH₃.
 - Units of $\mu\text{g}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ 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 NO_x and the wet deposition flux by 259.7 for NH₃.

- Predicted contributions to nitrogen deposition have been calculated and compared with the relevant critical load range provided by the project's ecologist for the habitat types associated with the designated site.

Critical Loads – Acidification

- 1.9 The habitat sites assessed in this addendum are not sensitive to acid deposition, so this has not been considered further.

Significance Criteria

- 1.10 The PCs and PECs have been compared against the relevant critical level/load for the relevant habitat type/interest feature. Based on current Environment Agency guidelines [i] and the Institute of Air Quality Management *A guide to the assessment of air quality impacts on designated nature conservation sites* [ii], If the PC does not exceed 100% of relevant critical level/load, the emission is considered to be insignificant.

Results

- 1.11 The predicted annual-mean concentrations for NO_x, SO₂ and NH₃ are compared with the relevant critical levels in Table 1, Table 2 and Table 3. The predicted nutrient N deposition rate is compared with the critical load in Table 4 and the predicted daily-mean concentrations for NO_x are compared with the relevant critical levels in Table 5.

Table 1: Predicted Annual-mean NOx Concentrations at Designated Habitat Sites

Habitat Site	Critical Level (µg.m ⁻³)	PC (µg.m ⁻³)	PC/Critical Level (%)
Julian's Gout Land SINC	30	0.66	2
Alpha Steel SINC		2.29	8
Solutia SINC		0.67	2
Marshalls SINC		0.47	2
Afon Ebbw SINC		0.67	2
Gwent Wetland Reserve SINC		1.56	5
Ancient Woodland at Pye Corner		0.73	2

Table 2: Predicted Annual-mean SO₂ Concentrations at Designated Habitat Sites

Habitat Site	Critical Level (µg.m ⁻³)	PC (µg.m ⁻³)	PC/Critical Level (%)
Julian's Gout Land SINC	20	0.18	1
Alpha Steel SINC		0.61	3
Solutia SINC		0.18	1
Marshalls SINC		0.12	1
Afon Ebbw SINC		0.18	1
Gwent Wetland Reserve SINC		0.42	2
Ancient Woodland at Pye Corner		0.19	1

Table 3: Predicted Annual-mean NH₃ Concentrations at Designated Habitat Sites

Habitat Site	Critical Level (µg.m ⁻³)	PC (µg.m ⁻³)	PC/Critical Level (%)
Julian's Gout Land SINC	3	0.15	5
Alpha Steel SINC		0.53	18
Solutia SINC		0.16	5
Marshalls SINC		0.11	4
Afon Ebbw SINC		0.15	5
Gwent Wetland Reserve SINC		0.36	12
Ancient Woodland at Pye Corner		0.17	6

Table 4: Predicted N Deposition at Designated Habitat Sites

Habitat Site	Minimum Critical Load (kgN.ha ⁻¹ .yr ⁻¹)	PC (kgN.ha ⁻¹ .yr ⁻¹)	PC as % of Critical Load
Julian's Gout Land SINC	10	0.66	7
Alpha Steel SINC	10	2.28	23
Solutia SINC	10	0.43	4
Marshalls SINC	Not sensitive		
Afon Ebbw SINC	10	0.67	7
Gwent Wetland Reserve SINC	20	1.55	8
Ancient Woodland at Pye Corner	10	0.73	7

Table 5: Predicted Daily-Mean NO_x Concentrations at Designated Habitat Sites

Habitat Site	Critical Level ($\mu\text{g.m}^{-3}$)	PC ($\mu\text{g.m}^{-3}$)	PC/Critical Level (%)
Julian's Gout Land SINC	75	9.94	13
Alpha Steel SINC		16.37	22
Solutia SINC		11.84	16
Marshalls SINC		13.77	18
Afon Ebbw SINC		12.51	17
Gwent Wetland Reserve SINC		14.44	19
Ancient Woodland at Pye Corner		10.90	15

Interpretation of Results

Annual-mean NO_x

1.12 The maximum annual-mean NO_x PC is less than 100% of the critical level at all habitat sites and the impacts can be screened out as insignificant.

Annual-mean SO₂

1.13 The maximum annual-mean SO₂ PC is less than 100% of the critical level at all habitat sites and the impacts can be screened out as insignificant.

Annual-mean NH₃

1.14 The maximum annual-mean NH₃ PC is less than 100% of the critical level at all habitat sites and the impacts can be screened out as insignificant.

Nutrient N Deposition

1.15 The maximum nitrogen deposition PC is less than 100% of the critical load at all habitat sites and the impacts can be screened out as insignificant.

Daily-mean NO_x

1.16 The maximum daily-mean NO_x PC is less than 100% of the critical level at all habitat sites and the impacts can be screened out as insignificant.

References

- i <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas>
- ii IAQM (2019) A guide to the assessment of air quality impacts on designated nature conservation sites