



HABITATS REGULATIONS ASSESSMENT – VOLUME 3 – APPENDIX 8

Lower Derwent Valley Habitats and Soil Analysis

Drax Bioenergy with Carbon Capture and Storage

The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations, 2009
– Regulation 5(2)(g)

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INTRODUCTION

1.1. INTRODUCTION

- 1.1.1. WSP UK Ltd (WSP) was commissioned by Drax Power Limited (the 'Applicant') to review Natural England (NE) vegetation monitoring data in order to inform a Habitats Regulations Assessment (HRA) (REP2-101) which was prepared for the Drax Bioenergy Carbon Capture and Storage (BECCS) 'Proposed Scheme' (as it will be hereafter referred). The Proposed Scheme is a Nationally Significant Infrastructure Project (NSIP). A Development Consent Order (DCO) application was submitted to the Secretary of State (SoS) in May 2022 and accepted for examination in June 2022.
- 1.1.2. This Technical Note reviews soil and habitat monitoring data for the Brighton Meadows Site of Special Scientific Interest (SSSI) and Lower Derwent Valley (LDV) Special Area of Conservation (SAC) and Ramsar site provided by Natural England (NE). The Brighton Meadows SSSI component of the LDV SAC and Ramsar experiences the greatest air quality impacts, both alone and in-combination, of any component SSSI of the SAC¹ as a result of the Proposed Scheme.
- 1.1.3. The purpose of this review is to examine soil pH and vegetation monitoring data to confirm the grassland type present and its relative sensitivity to acid deposition. This information will be used to decide which Air Pollution Information System (APIS) critical load² values to use in the assessment of possible air quality impacts on the SAC/SSSI. APIS offers a choice of two options: those applicable to acid grassland or those applicable to calcareous grassland.

1.2. PROPOSED SCHEME

- 1.2.1. The Proposed Scheme will involve the installation of Carbon Capture and Storage (CCS) technology to up to two existing power station units at Drax. When the CCS is fitted to the two units, this will change the thermal and chemical characteristics of the emissions from Drax's Main Stack. The two units that will have CCS fitted to them are also expected to run for an increased number of hours, with 8750 hrs of operation instead of the 4000 hrs of operation assumed for baseline 'without scheme' purposes.
- 1.2.2. As a consequence of the change in the exhaust emissions from the Proposed Scheme, increased rates of acid deposition and nitrogen deposition would occur within ~15 km of the Main Stack. Other pollutants also increase, but do not trigger potential for likely significant effects so are not discussed here. There are several sites of international and national importance within 15 km of the Main Stack that would be subject to these increased deposition/concentrations.

¹ The part of the LDV subject to the greatest air quality impacts coincides with the Brighton Meadows SSSI.

² Critical loads are defined as 'a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge' Source:

1.3. BACKGROUND

- 1.3.1. The LDV SAC is within 15 km of the Main Stack. This SAC is designated for the 6510 Lowland Hay Meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*), 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) and 1355 Otter *Lutra lutra*.
- 1.3.2. Air quality modelling has been undertaken for the Proposed Scheme. Part of the modelling has been used to assess the impacts of the Proposed Scheme and the resulting effects on relevant European sites and sites of national importance. APIS publishes habitat-specific critical loads for nitrogen and acid deposition. Comparing the air quality model output of the Proposed Scheme against the relevant critical loads supports assessment and understanding of potential air quality effects on designated sites.
- 1.3.3. The assessment was made with regard to ‘critical loads’ of relevant habitat types within designated sites. Critical loads are typically assigned against EUNIS (European Union Nature Information System) habitat classes, although where no suitable EUNIS class exists they may be classified against the Annex 1 habitat type(s) for which a site has been designated. Different critical loads are available on the APIS website for the qualifying interest grassland habitats of these sites, depending on whether the ‘acid grassland’ or ‘calcareous grassland’ habitat class is used. On a precautionary basis, the air quality modelling has been based on the ‘acid grassland’ habitat class, as this is more sensitive to acidification effects than the ‘calcareous grassland’ habitat class (Air Pollution Information System, 2022).
- 1.3.4. The part of the LDV subject to the greatest air quality impacts coincides with the Brighton Meadows SSSI. This SSSI is a 37.43 ha site notified for its nationally and internationally important alluvial flood meadow plant community and its outstanding assemblage of breeding birds associated with lowland damp grasslands. However, birds are not part of the LDV SAC designation. Furthermore, bird qualifying interest features of the overlapping LDV Special Protection Area (SPA) are not considered sensitive to the effects of acid deposition, as set out in Appendix 5 of the HRA Report (APP-193).

1.4. PURPOSE OF THIS NOTE

- 1.4.1. The purpose of this Technical Note is to explore which critical load class is most appropriate to use for the assessment of acid deposition impacts on the Brighton Meadows SSSI: acid grassland or calcareous grassland.

2. METHODOLOGY

2.1. APPROACH

- 2.1.1. NE vegetation monitoring data for the Brighton Meadows SSSI was analysed for pH and vegetation, including habitats present and vascular plant species recorded. This information was used to determine which grassland habitat is present and its sensitivity to acid deposition.
- 2.1.2. NE analysed habitat data to the latest version of Modular Analysis of Vegetation Information System (MAVIS). This contained additional National Vegetation Classification (NVC) communities added since British Plant Communities was published^{3,4}.
- 2.1.3. The data collected, including the plant species recorded by NE, was compared to the published account of NVC communities documented in British Plant Communities to confirm that classification was broadly correct.
- 2.1.4. The most recent NE vegetation monitoring data is from June 2020 and included monitoring 50 plots within the SSSI. Each of the plots was 2m x 2m and divided into 25 individual cells. In each cell the height of the vegetation, vascular plant species, main bryophytes, litter/bare rock/bare soil presence and percentage cover of each plant species throughout the plot was recorded⁵.

2.2. NOTES AND LIMITATIONS

- 2.2.1. WSP ecologists have not completed their own detailed botanical assessments of the Brighton Meadows SSSI. It is evident that the NE data was collected by a competent botanist from NE, although this could not be directly verified.
- 2.2.2. The most recent NE monitoring data for the Brighton Meadows SSSI was from 2020. This was the data used during pH and vegetation analysis.
- 2.2.3. APIS provides limited guidance on how to define acid grassland and calcareous grassland so the NVC definitions of these grassland types have been used as proxies.
- 2.2.4. There is no neutral grassland category in the APIS system. Thus, dispersion (air quality) modelling must be assessed against either acid or calcareous grassland critical loads, in the absence of a potentially more appropriate critical load for neutral grassland being available.

³Wallace H and Prosser M (2017) A review of the National Vegetation Classification for the *Calthion* group of plant communities in England and Wales. Ecological Surveys (Bangor): Floodplain Meadows Partnership. Source:

⁴ Source:

⁵ Long Term Monitoring Network Vegetation Protocol (LTMN001). Source:

3. RESULTS

3.1. PH DATA

3.1.1. Soil pH describes how acidic or alkaline the soil is, and the following pH ranges correspond to specific soil descriptions⁶.

Table 3.1 - pH ranges and description of soil provided by Plantlife

pH range	Description of Soil
< 5	Acid
5 – 5.4	Acid – Neutral
5.5 – 6.5	Neutral
> 6.5	Calcareous

3.1.1. The pH values of the 50 plots were monitored in 2020 and ranged from pH 4.7 to pH 7.

3.1.2. The Brighton Meadows SSSI consisted of two plots that had acid soil (4%), two plots that had acid – neutral soil (4%), 20 plots that had calcareous soil (40%) and 26 plots that had neutral soil (52%).

3.2. VEGETATION MONITORING DATA

3.2.1. According to the NE monitoring data for Brighton Meadows SSSI, neutral grassland is the most abundant Biodiversity Action Plan (BAP) Broad Habitat Type, with 47 plots of neutral grassland (94%)⁷. NE recorded only three plots that they regarded to meet the broad habitat type Fen, Marsh and Swamp habitat (6%).

3.2.2. The suite of habitats of principal importance for conservation of biodiversity (formerly Priority Habitats) nest into the defined Broad Habitat Types. In the Brighton Meadows SSSI, NE recorded 34 plots which they consider to be Coastal and Floodplain Grazing Marsh Priority Habitat (68%), 13 plots which they regard as Lowland Meadows Priority Habitat (26%) and three plots which they regard as Lowland Fens Priority Habitat (6%).

3.2.3. Having reviewed the data, WSP agrees with the Broad and Priority Habitats identified by NE.

3.2.4. The plots in the Brighton Meadows SSSI were also categorised into different NVC classes by NE.

⁶ [REDACTED]
⁷ [REDACTED]

MG16

- 3.2.5. 24 plots were categorised by NE as NVC community MG16 *Agrostis stolonifera*-*Eleocharis palustris* inundation grassland. The constant species are creeping bent *Agrostis stolonifera*, common spike-rush *Eleocharis palustris* and amphibious bistort *Persicaria amphibia*. All three of these species were recorded in the MG16 plots by NE. Marsh foxtail *Alopecurus geniculatus*, rough meadow-grass *Poa trivialis* and creeping buttercup *Ranunculus repens* are also expected in this NVC class and were recorded by NE.
- 3.2.6. MG16 grassland is regarded as being a neutral grassland and part of Coastal and Floodplain Grazing Marsh priority habitat.

MG4D AND MG4C

- 3.2.7. 12 plots were categorised by NE as NVC community MG4d *Alopecurus pratensis*-*Sanguisorba officinalis* grassland - *Agrostis stolonifera* subcommunity.
- 3.2.8. One plot was categorised by NE as MG4c *Alopecurus pratensis*-*Sanguisorba officinalis* grassland - *Holcus lanatus* subcommunity.
- 3.2.9. Both the *Agrostis stolonifera* and *Holcus* subcommunities are considered to share a high frequency and cover of meadow foxtail *Alopecurus pratensis*. NE recorded high frequency and cover of meadow foxtail for MG4d, however meadow foxtail was not recorded in the MG4c plot.
- 3.2.10. MG4d grassland is generally considered as species-rich swards with an abundance of herbaceous dicotyledons, including common sorrel *Rumex acetosa* and red clover *Trifolium pratense* which were both recorded in MG4d plots by NE. NE also recorded three differential plant species of MG4d these were sneezewort *Achillea ptarmica*, small-flowered forget-me-not *Myosotis laxa* and marsh stitchwort *Stellaria palustris*.⁸ These three species were not recorded by NE in the MG4c plot.
- 3.2.11. NE recorded great burnet *Sanguisorba officinalis*, Yorkshire-fog *Holcus lanatus* *Holcus lanatus*, meadow vetchling *Lathyrus pratensis* and sweet vernal grass *Anthoxanthum odoratum* as the species with the highest frequencies in the MG4c plot. Yorkshire-fog and sweet vernal grass are expected to be frequent as creeping bent is not present in the plot and meadowsweet *Filipendula ulmaria* is not dominant. NE also recorded tufted hair-grass *Deschampsia caespitosa* ssp. *Caespitosa* in the MG4c plot which is considered a preferential species for this subcommunity.
- 3.2.12. Both MG4c and MG4d grasslands are regarded as being neutral grasslands and are part of Lowland Meadow priority habitat.

⁸ Floodplain Meadows Partnership (2014) A revision of the *Alopecurus pratensis* - *Sanguisorba officinalis* (MG4) grassland community of the NVC. Source:

MG15A

- 3.2.13. Eight plots were categorised by NE as NVC community MG15a *Alopecurus pratensis-Poa trivialis-Cardamine pratensis* grassland - *Agrostis stolonifera* subcommunity.
- 3.2.14. Meadow foxtail, rough meadow-grass *Poa trivialis*, cuckoo-flower, creeping bent and creeping buttercup are considered constant species of *Alopecurus pratensis-Poa trivialis-Cardamine pratensis* grassland. NE recorded all of these species within the MG15a plots.
- 3.2.15. NE also recorded common couch and marsh foxtail which are species characteristic of the subcommunity.
- 3.2.16. Other plant species recorded by NE and preferential to the subcommunity include curled dock *Rumex crispus*, reed canary-grass *Phalaris arundinacea* and narrow-leaved water-dropwort *Oenanthe silaifolia*. Creeping-Jenny *Lysimachia nummularia*, brown sedge *Carex disticha* and slender tufted-sedge *Carex acuta* were also recorded. These species are commonly associated with *Caltha* meadows (MG8) and also occur occasionally in MG15a.
- 3.2.17. MG15 grassland is regarded as neutral grassland and part of Coastal and Floodplain Grazing Marsh priority habitat.

OTHER NVC CLASSES

- 3.2.18. NE also recorded the following NVC communities, there was only one plot recorded of each type.

Table 3.2 – NVC Communities

NVC Code	NVC Name	BAP Broad Habitat	BAP Priority Habitat
MG9a	<i>Holcus lanatus-Deschampsia cespitosa</i> grassland	Neutral Grassland	Coastal and Floodplain Grazing Marsh
MG13	<i>Agrostis stolonifera-Alopecurus geniculatus inundation</i> grassland	Neutral Grassland	Coastal and Floodplain Grazing Marsh
S19a	<i>Eleocharis palustris</i> swamp - <i>Eleocharis palustris</i> subcommunity	Fen, Marsh and Swamp	Lowland Fens
S28c	<i>Phalaris arundinacea tall-herb fen</i> - <i>Elymus repens-Holcus lanatus</i> sub-community	Fen, Marsh and Swamp	Lowland Fens

NVC Code	NVC Name	BAP Broad Habitat	BAP Priority Habitat
S5	<i>Glyceria maxima</i> swamp	Fen, Marsh and Swamp	Lowland Fens

4. CONCLUSION

- 4.1.1. The soil pH analysis shows that 52% of the NE monitoring plots are in the neutral range and 40% are in the calcareous range. Four percent each of the plots were in the acid-neutral and acid range, respectively. This is in keeping with a grassland system that is flushed with base-rich waters either by periodic fluvial flooding or ground water.
- 4.1.2. No vegetation plots in the Brighton Meadows SSSI fall under 'calcareous grassland'. These communities all fall under the calcareous grassland NVC classification, and these were not represented on the Site. The communities that were recorded by NE were overwhelmingly neutral grassland, this is any plot recorded in the MG NVC classification. There were 12 plots of MG4 NVC classification, these subcommunities tend to be at the calcareous end of the neutral spectrum.
- 4.1.3. The NE data recorded predominantly neutral grassland BAP broad habitat, although three of the NE monitored plots were recorded with fen, marsh and swamp. This is in keeping with a wet grassland habitat which does include small areas dominated by marsh and aquatic plant species. Thus, it is not considered that there is a case for using fen, marsh, and swamp APIS critical loads in relation to the Lower Derwent Valley SAC / Brighton Meadows SSSI.
- 4.1.4. The conclusion is that on balance the Lower Derwent Valley SAC / Brighton Meadows SSSI supports a neutral grassland, albeit a greater number of the plots sampled are in the 'calcareous' rather than 'acid' or 'acid-neutral' pH ranges. APIS has no appropriate critical load range for unimproved neutral grassland, so it is only possible to choose from the acid grassland habitat and the calcareous grassland habitat critical loads. It appears that the calcareous grassland habitat may be the better choice for calculating critical loads, as far as the NE monitoring data shows.