

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 1 and Additional Provision 1 Environmental Statement

Volume 5: Appendix EC-016-00009

Ecology and biodiversity

Document to inform a Habitats Regulations Assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss)

MA01: Hough to Walley's Green

MA02: Wimboldsley to Lostock Gralam

MA03: Pickmere to Agden and Hulseheath

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Department for Transport

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1 Introduction

1.1 Purpose of report

- 1.1.1 There are certain ecological sites that are designated for their international importance and to which special considerations attach under the Conservation of Species and Habitats Regulations 2017 ('the Habitats Regulations')¹, either through operation of law or government policy.
- 1.1.2 These sites include Special Areas of Conservation (SAC) that have been designated to protect certain species and habitats; Special Protection Areas (SPA), designated to protect certain species of wild birds; and Ramsar sites designated to protect internationally important wetland areas.
- 1.1.3 These sites are subject to special legal protection that imposes restrictions on a 'competent authority' from granting consent permission or authorisations for any plan or project that may affect the conservation status and integrity of these designations. In the case of the hybrid Bill, the responsible competent authority is Parliament as it is the enactment of the Bill as legislation that grants consent for the hybrid Bill scheme to be undertaken.
- 1.1.4 The Habitats Regulations require the competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on these designated sites (either alone or in combination with other plans or projects) to make an appropriate assessment of the implications of the plan or project for potentially affected sites in view of those sites' conservation objectives.
- 1.1.5 There are normally two stages in the process of discharging the duties imposed by the Habitats Regulations. The first is to undertake a 'screening' exercise to determine whether there is no reasonable scientific doubt that the plan or project will be likely to have a significant effect on the site's conservation objectives. If no such likelihood is identified, the competent authority may proceed to grant consent for the plan or project in question. If, on the other hand, there remains a reasonable scientific doubt as to its effects on the integrity of the site at this stage, the competent authority must move to a second stage and undertake a more detailed assessment, commonly referred to as an 'appropriate assessment' to determine whether, having regard to any mitigation measures that are proposed to be adopted in the delivery of the scheme, there will be an adverse effect on the integrity of the site.

¹ *The Conservation of Habitats and Species Regulations 2017 (2017/1012)*, as amended by *The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (2019/579)*. Her Majesty's Stationery Office, London.

- 1.1.6 If the appropriate assessment does not identify an adverse effect on the integrity of the site, the competent authority may proceed to grant the consent. If an adverse effect cannot be ruled out, consent can only be granted on the basis that there are: no alternative solutions; there are imperative reasons of overriding public importance for the plan or project to proceed; and appropriate compensatory measures have been secured.
- 1.1.7 It is Parliament as legislator (and not HS2 Ltd as the prospective developer) that is the competent authority and the body which is required to comply with the requirements of the Habitats Regulations. The purpose of this Habitats Regulations Assessment (HRA) report is, however, to provide information to Parliament, based on HS2 Ltd's assessment of the hybrid Bill scheme, in order to inform and assist Parliament in complying with its obligations under the Habitats Regulations.

1.2 Background

- 1.2.1 This report is an updated version of the document to inform an HRA for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss) which accompanied the High Speed Rail (Crewe – Manchester) Environmental Statement published in 2022 (the main ES)². The updated report takes into account proposed changes to the scheme since publication of the main ES.
- 1.2.2 In order to differentiate between the original scheme and the subsequent changes, the following terms are used:
- the 'original scheme' – the Bill scheme submitted to Parliament in January 2022, which was assessed in the main ES; and
 - 'the AP1 revised scheme' – the original scheme as amended by the SES1 changes and AP1 amendments.
- 1.2.3 Both this report and the version that accompanied the main ES update the HRA Screening Report for The Midlands Meres and Mosses Phase 1 Ramsar site³, prepared in 2012. At this stage the 2012 HRA explored ten potential route options and, although it identified potential impacts on the surface water hydrological regime of Wybunbury Moss, likely significant effects were ruled out. This outcome is still valid.
- 1.2.4 Traffic and air quality assessments completed to inform the main ES identified that changes in traffic flows are primarily a consequence of the general growth in traffic volumes over time and the redistribution of vehicles in the area caused by construction of the AP1 revised

² High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement*. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

³ Temple-ERM (2012), *HRA Screening Report for Midland Meres and Mosses Phase 1 Ramsar Site*.

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scheme. The assessments concluded that air pollution will increase where the B5071 runs alongside Wybunbury Moss as a result of the AP1 revised scheme.

- 1.2.5 Traffic re-distributed across the network by construction of the AP1 revised scheme will still make use of the B5071 (Stock Lane) which lies 150m west of Wybunbury Moss Site of Special Scientific Interest (SSSI) and National Nature Reserve (NNR), which is situated approximately 1.8km south-west of land required for the construction of the AP1 revised scheme. It is one of 16 component SSSI of the Midland Meres and Mosses Phase 1 Ramsar site, distributed across Cheshire, Shropshire and beyond (Figure 1). It is also designated as one of four components of the West Midland Mosses SAC³.
- 1.2.6 In addition, the potential effects of air pollution arising from the AP1 revised scheme has required review of the assessments carried out for one other component of the Phase 1 Ramsar site: The Mere, Mere SSSI (see SES1 and AP1 ES Volume 5, Appendix: EC-016-00003). None of the other three components of the West Midland Mosses SAC were affected.
- 1.2.7 This report has been prepared to provide all the necessary information for the competent authority to carry out an HRA under Regulation 63 of the Conservation of Habitats and Species Regulations 2017, as amended by the Conservation of Habitats and Species (amendment) (EU Exit) Regulations 2019⁴. It is informed by contemporary Department for Environment, Food and Rural Affairs (Defra)⁵, and Department for Levelling Up, Housing and Communities guidance⁶ and best practice guidance. Where relevant, it takes full account of case law including the *People Over Wind*⁷ and *Wealden*⁸ judgements amongst others. It forms part of the supporting information that accompanies the High Speed Rail (Crewe – Manchester) Supplementary Environmental Statement 1 (SES1) and Additional Provision 1 Environmental Statement (AP1 ES).

⁴ The amending regulations generally seek to retain the requirements of the 2017 Regulations but with adjustments for the UK's exit from the European Union. See Regulation 4, which also confirms that the interpretation of these Regulations as they had effect, or any guidance as it applied, before exit day, shall continue to do so.

⁵ Department for Environment, Food and Rural Affairs (2021), *Habitats regulations assessments: protecting a European site*. Available online at: <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>.

⁶ Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (2019), *Planning Practice Guidance*. Available online at: <https://www.gov.uk/guidance/appropriate-assessment>.

⁷ *People Over Wind and Peter Sweetman v Coillte Teoranta* (2018), High Court (Ireland), Case C-323/17 (also referred to as the *Sweetman II* judgement).

⁸ *Wealden District Council v SS Communities and Local Government, Lewes District Council and South Downs National Park Authority* (2016), High Court of Justice, Case CO/3943/2016 No EWHC 351.

2 Context

2.1 Description of the AP1 revised scheme

- 2.1.1 The AP1 revised scheme comprises the construction and operation of a new high speed railway between Crewe and Manchester with a connection onto the West Coast Main Line (WCML) north of Crewe. The connection to the WCML near Golborne, proposed in the original scheme, will be removed. Wybunbury Moss is situated approximately 1.8km south-west of land required for the construction of the AP1 revised scheme in the Hough to Walley's Green area (MA01). Here, the route of the AP1 revised scheme will be approximately 10.8km long, extending from its southern connection with HS2 Phase 2a northwards in tunnel beneath Crewe and on to the Wimboldsley to Lostock Gralam area (MA02). The route of the AP1 revised scheme will consist of 813m of cutting, 3.5km of embankments and 6.5km of tunnel (including portals).
- 2.1.2 The AP1 revised scheme will result in a change to traffic flows, and associated emissions, along the B5071 (Stock Lane) which lies approximately 150m to the west of Wybunbury Moss. The B5071 (both Main Road and Stock Lane) is not a planned construction traffic route and the change in traffic flows is primarily a consequence of the general growth in traffic volumes over time and the redistribution of vehicles in the area caused by construction of the AP1 revised scheme, rather than use of the roads by construction vehicles.

2.2 Site description and conservation objectives

The Midland Meres and Mosses Phase 1 Ramsar site

- 2.2.1 The Midland Meres and Mosses Phase 1 Ramsar site extends over 510.88ha across 16 discrete sites distributed throughout the North-West Midlands, over a land area that extends 80km from north to south and 75km from west to east. Figure 1 shows the extent of the Ramsar site and the location of Wybunbury Moss and other constituent SSSI relevant to the AP1 revised scheme.
- 2.2.2 The Ramsar Information Sheet⁹ identifies that Wybunbury Moss qualifies for Ramsar status under criteria (1) and (2) on account of the presence of 'a diverse range of habitats from open water to raised bog' and the presence of a number of rare plants and invertebrates. Elsewhere, it describes the entire Ramsar site as comprising open water (meres) and their associated fringing habitats (for example, reed swamps, fen, carr and damp pasture) and a

⁹ Joint Nature Conservation Committee (1994), *Ramsar Information Sheet (RIS): Midland Meres and Mosses Phase 1*. Available online at: <https://jncc.gov.uk/jncc-assets/RIS/UK11043.pdf>.

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smaller number of nutrient poor peat bogs (mosses). However, not all features are present on all sites. Although the Ramsar qualifying features are quite broadly described, together they encompass a distinctive group of water bodies with characteristic hydrological regimes, water chemistry and animal and plant communities. However, the Ramsar Information Sheet confirms its primary interest remains the 'wide range of lowland wetland types and successional stages within a distinct biogeographical area.'

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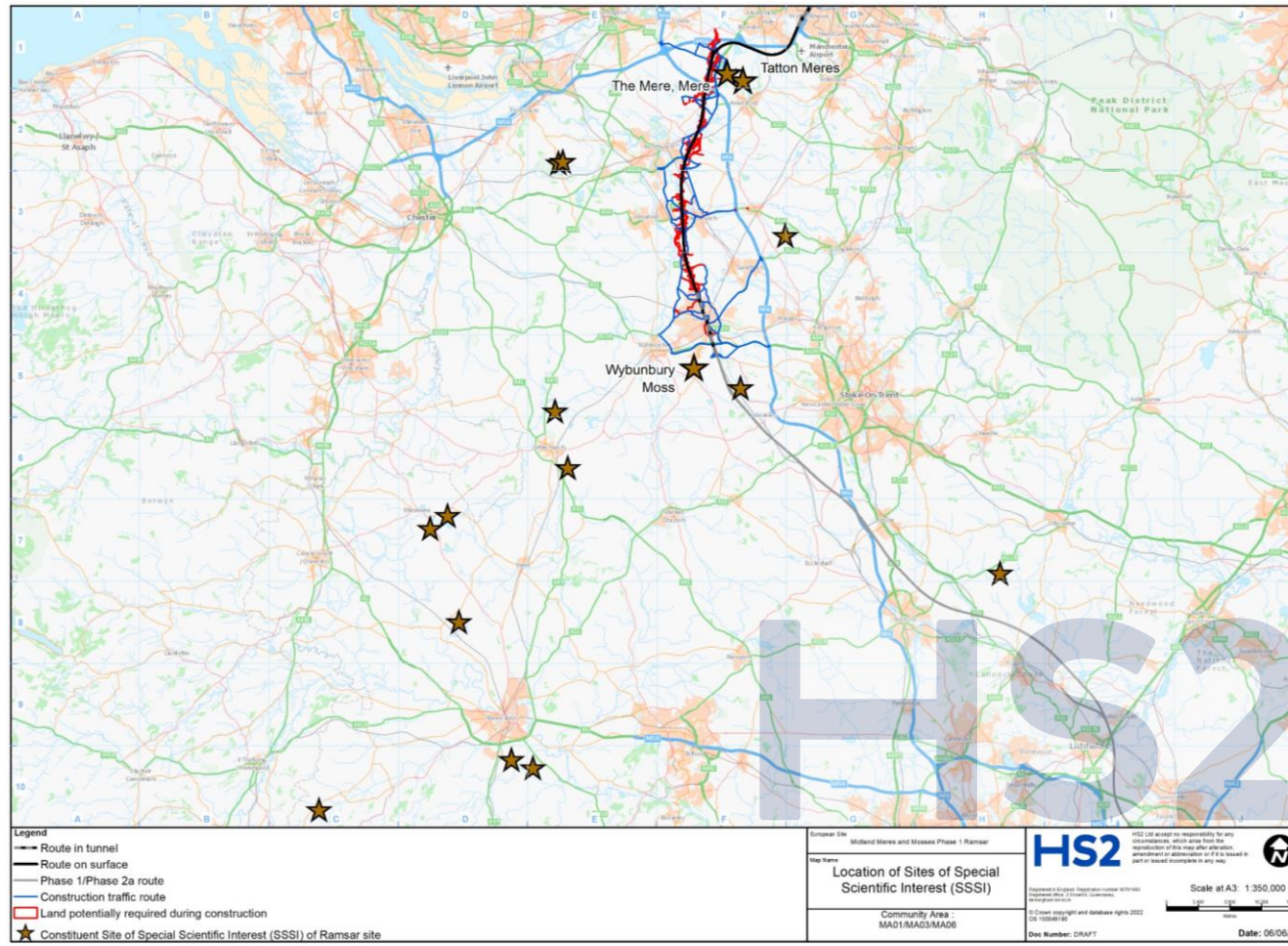
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Figure 1: Location of the constituent sites of the Midland Meres and Mosses Phase 1 Ramsar site



West Midland Mosses SAC

- 2.2.3 The SAC citation¹⁰ and Supplementary advice¹¹ describe all four components (Abbots Moss SSSI, Chartley Moss SSSI, Clarepool Moss SSSI and Wybunbury Moss SSSI, all shown on Figure 2) as supporting examples of quaking bogs or Schwingmoors within large basin mires, with various types of mire in associated hollows and pools. Each supports a diverse fauna and flora of international significance. Not all features are present at each site; for instance, the examples of dystrophic water bodies are confined to Abbots Moss and Clarepool Moss. The qualifying features are listed as follows:
- H3160. Natural dystrophic lakes and ponds; and
 - H7140. Transition mires and quaking bogs.
- 2.2.4 Further information is provided in the NNR Management Plan¹² and Favourable Condition Tables (FCT)¹³ for Wybunbury Moss. However, it should be noted that given its sole focus on Wybunbury, it only lists the transition mire and quaking bog community as a qualifying feature which it describes as ‘... one of the finest examples of Schwingmoor in the country’. Table 1 of the FCT does confirm though that this community is considered to accommodate all the relevant features of the Ramsar site. Appendix 1 of the FCT also provides a range of habitat and other maps.

¹⁰ Department for Environment, Food and Rural Affairs (2005), *Citation for Special Area of Conservation West Midland Mosses*. Available online at: <http://publications.naturalengland.org.uk/file/4581355488804864>.

¹¹ Natural England (2018), *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. West Midland Mosses Special Area of Conservation*. Available online at: <http://publications.naturalengland.org.uk/file/4787304831123456>.

¹² Natural England (undated), *Wybunbury Moss NNR Management Plan*.

¹³ Natural England (2008), *Conservation Objectives and Definitions of Favourable Condition for Designated Features of Interest. Wybunbury Moss*. Available online at: <https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001468&SiteName=Wybunbury%20Moss&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=>.

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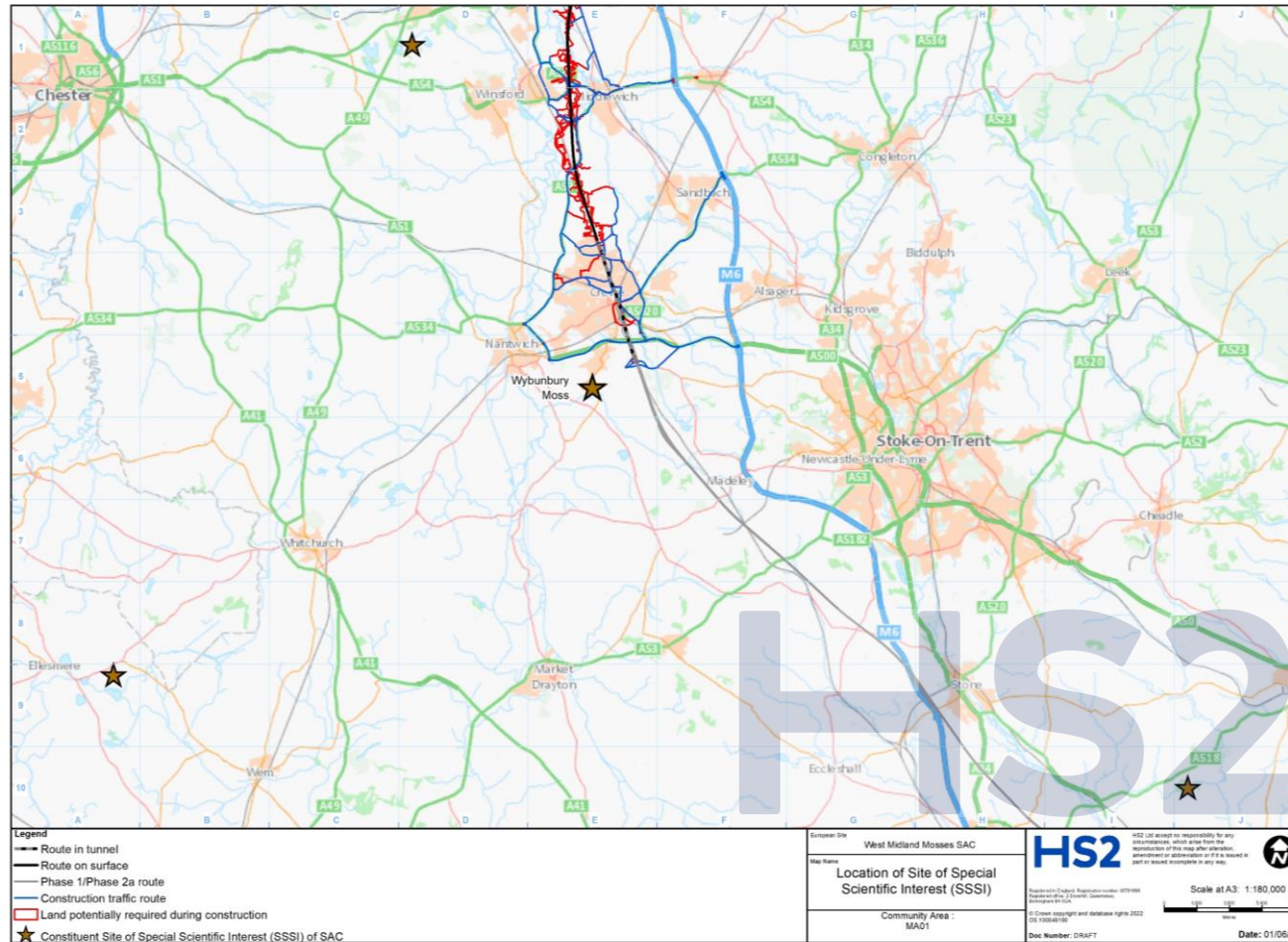
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Figure 2: Location of the constituent sites of the West Midland Mosses SAC



Conservation objectives

2.2.5 The conservation objectives¹⁴ for the West Midland Mosses SAC state:

‘Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats;
- the structure and function (including typical species) of qualifying natural habitats; and
- the supporting processes on which qualifying natural habitats rely’.

2.2.6 These are given greater expression in the associated ‘Supplementary advice’ and Site Improvement Plan (SIP)¹⁵. Both identify ‘air pollution’ as negative factors and note that the critical loads for nitrogen deposition are already being exceeded. In addressing air pollution, the supplementary advice aims to:

‘Restore as necessary the concentrations and deposition of air pollutants at or below the site-relevant Critical Load or Level values ...’. It provides other objectives relating to water quality and acidity for both qualifying features.

2.2.7 Given that Natural England does not produce conservation objectives for Ramsar sites, reliance on those provided for the SAC habitats is regarded as a reasonable surrogate. This is confirmed in Table 1 of the FCT which shows all Ramsar features are accommodated within those of the SAC. This includes the rare fauna and flora highlighted in the Ramsar description which are considered to be embraced by the ‘typical species’ of the SAC even though Table 1 of the FCT does not appear to include this feature for either the Ramsar site or SAC. Consequently, this HRA will rely solely on the SAC objectives.

Wybunbury Moss SSSI

Condition assessment

2.2.8 The most recent formal condition monitoring assessment of Wybunbury SSSI was carried out by Natural England in 2014¹⁶. However, this only covered the single central unit which

¹⁴ Natural England (2018), *European Site Conservation Objectives for West Midland Mosses Special Area of Conservation. Version 3*. Available online at:

<http://publications.naturalengland.org.uk/file/6061488964108288>.

¹⁵ Natural England (2014), *Site Improvement Plan: West Midlands Mosses (SIP261). Version 1.0*. Available online at: <http://publications.naturalengland.org.uk/file/5747088459563008>.

¹⁶ Natural England (2014), *Condition of SSSI Units for Site Wybunbury Moss SSSI*. Available online at: <https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1001468&ReportTitle=Wybunbury%20Moss%20SSSI>.

comprises the transition mire, quaking bog and associated features such as the lagg fen. The remaining nine units, last assessed in 2012, comprised the surrounding grassland. It is understood the latter was included within the boundary to safeguard the more fragile features at the centre by, for example, reducing diffuse pollution. The Meres and Mosses Conservation Plan¹⁷ for Wybunbury Moss notes that the majority of the surrounding fields within the boundary are improved or semi-improved. As such, the surrounding pasture does not support any qualifying features.

- 2.2.9 This found that overall, the SSSI was meeting its objectives with approximately 37% (i.e. the central wetland area) in 'unfavourable recovering' condition and the remaining 63% (i.e. the surrounding pasture) in 'favourable' condition¹⁸. In slight contrast, however, in terms of the specific SAC qualifying features, the transition mire and quaking bog were assessed, in an undated Natural England report, as favourable¹⁹. It is noted though, that all the assessments pre-dated, and so would not have taken account of, the current objectives.
- 2.2.10 While this assessment was carried out eight years ago or more, there is little to suggest circumstances have changed and, overall, it is assumed that Wybunbury Moss is meeting its objectives given that it is owned and managed by Natural England. Despite this, as the critical loads for nitrogen deposition are already being exceeded, the objectives must shift from 'maintain' to 'restore' for the purposes of the air quality assessment.

2.3 Case law

- 2.3.1 In recent years, there have been a number of important rulings made by both domestic and European courts which could influence this HRA. The most relevant are described below.

People Over Wind judgement

- 2.3.2 The People Over Wind judgement drew a distinction between incorporated mitigation measures which are represented by the essential characteristics of a scheme and those added specifically to avoid or reduce an impact on qualifying features. The former, such as the general alignment of the AP1 revised scheme, can be considered at screening whereas the latter are reserved for consideration in an appropriate assessment.

¹⁷ Environmental Consultancy University of Sheffield (2001), *Meres and Mosses Conservation Plans. Wybunbury Moss*.

¹⁸ Natural England (2014), *SSSI Condition Summary: Wybunbury Moss SSSI*. Available online at: <https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteCode=S1001468&ReportTitle=Wybunbury%20Moss%20SSSI>.

¹⁹ Natural England (2021), *General Site Detail: West Midlands Mosses SAC*. Available online at: <https://designatedsites.naturalengland.org.uk/SiteSACFeaturesMatrix.aspx?SiteCode=UK0013595&SiteName=West%20Midlands%20Mosses%20SAC>.

Wealden judgement

- 2.3.3 The Wealden judgement clarifies a limitation on the use of thresholds when used to rule out the likelihood of significant effects alone or in combination with other plans or projects, specifically the use of Annual Average Daily Traffic (AADT) figures. The Court concluded that where the likely effect of an individual plan or project does not itself exceed the threshold of 1,000 AADT, its impact must still be considered alongside the similar effects of other plans and projects to assess whether the combined effect could be significant. Where the in-combination effect is greater than this threshold, an appropriate assessment is typically required. In line with Regulation 63(1), the need to consider in-combination assessment, is also carried through into the appropriate assessment if one is necessary.

Dutch Nitrogen case

- 2.3.4 Here, the Court of Justice of the European Union (CJEU)²⁰ confirmed that an appropriate assessment is not to take into account the future benefits of mitigation measures if those benefits are uncertain, including where the procedures needed to accomplish them have not yet been carried out or because the level of scientific knowledge does not allow them to be identified or quantified with certainty.

Compton case

- 2.3.5 This case²¹ explored how exceedances of the critical loads should be assessed. The Court ruled that when considering what approach is required in order to conclude no adverse effect on the integrity of a site:

‘That could not be answered, one way or the other, by simply considering whether there were exceedances of critical loads or levels, albeit rather lower than currently. What was required was an assessment of the significance of the exceedances for the SPA birds and their habitats ...’.

²⁰ Coöperatie Mobilisation for the Environment UA, Vereniging Leefmilieu v College van gedeputeerde staten van Limburg, College van gedeputeerde staten van Gelderland (2019), European Court of Justice (C 293/17, C 294/17) [2019], Env. L.R. 27 at paragraph 30.

²¹ Compton Parish Council, Julian Cranwell and Ockham Parish Council v Guildford Borough Council, SoS for Housing, Communities and Local Government (2019), High Court of Justice, EWHC 3242 (Admin) CO/2173,2174,2175/2019.

3 Likely significant effects

3.1 The likely significant effects test

3.1.1 Regulation 63(1) identifies whether a proposed development will result in a 'likely significant effect ... (either alone or in-combination)' on a European site. An 'in-combination' assessment is only required where an impact is identified which would not result in a significant effect on its own but where significant effects may arise when combined with other plans or projects. The screening test is seen only as a 'trigger'²² and identifies whether the greater scrutiny of an 'appropriate assessment' is necessary. Case law informs how Regulation 63(1) should be interpreted, as follows:

- 'significant' means 'any effect that would undermine the conservation objectives of a European site'²³;
- 'likely' is a low threshold and simply means that there is a 'risk' or 'doubt' regarding such an effect that 'cannot be excluded on the basis of objective information'²⁴; and
- [it] '... is not that significant effects are probable, a risk is sufficient ...' and there must be 'credible evidence that there was a real, rather than a hypothetical, risk'²⁵.

3.2 Potential impacts on Wybunbury Moss

3.2.1 Wybunbury Moss lies 1.8km away from any construction work associated with the AP1 revised scheme. It is located within a different catchment to the AP1 revised scheme (Checkley Brook – Lower). Making the reasonable assumption that groundwater flow in the glaciofluvial deposits/glaciofluvial sheet deposits which underlie the peat in this area follows topography, there would be no hydraulic connection between Wybunbury Moss and the AP1 revised scheme. Therefore, the only credible risk results from air pollution associated with the changes in vehicle movements brought about by the redistribution of traffic as a consequence of the construction of the AP1 revised scheme allied with general growth in the area.

²² Bagmoor Wind Limited v The Scottish Ministers (2012), Court of Session, CSIH 93.

²³ Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij (2004), European Court of Justice, C-127/02 (referred to as the Waddenzee judgement) at paragraphs 44, 47 and 48.

²⁴ Waddenzee at paragraphs 44 and 45.

²⁵ Peter Charles Boggis and Easton Bavants Conservation v Natural England and Waveney District Council (2009), High Court of Justice Court of Appeal case. C1/2009/0041/QBACF.

3.3 Screening test on Wybunbury Moss

Methodology

- 3.3.1 Natural or semi-natural habitats can be harmed by airborne pollution from cars and heavy vehicles through two intimately linked pathways: via the concentration of gaseous nitrogen oxides (collectively referred to as NO_x), and the subsequent deposition of nitrogen and acid. The assessment of the impact of air pollution therefore comprises the analysis of these compounds.
- 3.3.2 Harm can arise in two ways. Firstly, in sufficient concentrations, airborne NO_x can result in direct toxic effects on vegetation and secondly, the deposition of nitrogen compounds can lead to the acidification and nutrient enrichment of land and water. Over time, this may not only hinder the growth, abundance and distribution of plants, and especially, bryophytes and lichens, but can also prompt the growth of ruderal species or algal blooms which can lead to changes in the structure and function of qualifying or supporting habitats. Whilst certain species and communities are less susceptible to harm than others, increases in the airborne concentration of pollutants or the rate of their deposition can also exacerbate the effects of other factors such as climate change or pathogens leading to negative, synergistic effects.
- 3.3.3 The assessment of air pollution is influenced by established best practice guidance provided by National Highways (the Design Manual for Roads and Bridges (DMRB))²⁶, Natural England²⁷ and the Institute for Air Quality Management (IAQM)²⁸.
- 3.3.4 Importantly, all affirm that impacts are only possible where a European site lies within 200m of a road. This is because the rate of deposition of airborne pollution falls quickly in the first few metres from the roadside before gradually levelling out; beyond 200m, and frequently across shorter distances, the rate of deposition becomes difficult to distinguish from background levels. A similar pattern can be found with the concentration of airborne NO_x though the decline can be less pronounced. Therefore, it is clear that impacts at 10m, 50m or more can be very different from those at the roadside. Beyond 200m, significant effects can be ruled out.

²⁶ Highways Agency (2019), *Design Manual for Roads and Bridges (DMRB), Sustainability and Environmental Appraisal, LA 105 Air Quality*, Highways Agency, London. Available online at: <https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90>.

²⁷ Natural England (2018), *Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations*. Available online at: <http://publications.naturalengland.org.uk/publication/4720542048845824>.

²⁸ Institute of Air Quality Management (2020), *A guide to the assessment of air quality impacts on designated nature conservation sites, v1.1*. Available online at: <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>.

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- 3.3.5 Where a European site lies within 200m of a road, established guidance recommends that detailed assessment should take place where one or more of the following criteria are met:
- change in road alignment by 5m or more;
 - change in daily traffic flows of all vehicles by 1,000 (average annual daily traffic or AADT) or more;
 - change in daily flows of Heavy Duty Vehicles (HDV)²⁹ by 200 AADT or more;
 - change in daily average speed by 10kph or more; or
 - change in peak hour speed by 20kph or more.
- 3.3.6 As no changes in road alignments or speed is proposed, the only criterion that could possibly apply would be the change in daily traffic flows brought about by the construction or operation of the AP1 revised scheme.
- 3.3.7 It can be seen, therefore, that an increase in the airborne concentration of NO_x and/or nitrogen and acid deposition is only likely to be significant where marked increases in traffic flows are expected on a road within 200m of a European site. Should these circumstances be met, best practice guidance recommends that the ecological characteristics of the European site should be explored and, if necessary, traffic and/or air quality assessments carried out to evaluate any impacts during construction or operation as necessary.
- 3.3.8 The ecological characteristics of Wybunbury Moss, presented in Section 2.2, are derived from the formal citations, condition assessments, conservation objectives, FCT, SIP, supplementary advice and any other surveys and management plans where available.
- 3.3.9 Traffic flows are assessed by calculating AADT figures using established models. Should increases in traffic (alone and in-combination) be less than 1,000 AADT³⁰ or 200 HDV, the risk of a significant effect can be ruled out and no further assessment is required. Should flows exceed these values, air quality analysis is required. Here, impacts are assessed by calculating the relative contribution of the plan or project in relation to the relevant critical level for NO_x and the critical loads for the deposition of nitrogen and acid. The air quality analysis typically models any changes at fixed points on a 200m transect extending from the roadside.
- 3.3.10 The critical level for NO_x is fixed and is expressed as a concentration: 30µg/m³. It is a precautionary threshold below which there is confidence that harmful effects on vegetation communities will not arise, and further assessment may not be necessary. If exceeded, the assessment of nitrogen and acid deposition is required. The critical loads for nitrogen deposition vary and are specific to each qualifying feature. These are presented as a range

²⁹ HDV are defined as those with an unladen weight of greater than 3.5 tonnes, including large vans; medium goods vehicles (rigid and artic); heavy goods vehicles (rigid and artic) and buses/coaches.

³⁰ These values are utilised as there is evidence to show that these equate approximately to a 1% change in critical loads (see paragraph 3.3.13).

of values (expressed as a rate, e.g. 10kg N/ha/yr - 20kg N/ha/yr) and typically, as a precautionary approach, only the lowest value is used (unless there are compelling reasons to do otherwise) as this will emphasise any negative outcomes.

- 3.3.11 Acid deposition is also assessed via critical loads though measured in keq/ha/yr. As it shares a direct, linear relationship with nitrogen deposition, acidity is not always assessed as its impact can be assumed. However, following feedback by Natural England, this was also evaluated.
- 3.3.12 For NO_x and nitrogen deposition, where background values prior to development lie below the critical levels or loads, significant effects can be ruled out for any increases in pollution brought about by a new plan or project provided they do not lead to an exceedance of the critical level (NO_x) or the lower critical load (nitrogen deposition).
- 3.3.13 However, it is important to recognise that these thresholds do not represent the points where harm will arise. Consequently, exceedance of these thresholds does not necessarily mean that harm will occur. Indeed, in circumstances where background values already exceed the critical values or loads, which is typically the case across much of lowland England, an increase of less than 1% of the critical level or the lower critical load also allows significant effects to be ruled out though each case should be assessed on the particular circumstances. This is because the 1% threshold, at two orders of magnitude below the critical level or load, is set at a level where measurable impacts would be difficult to detect. It is, therefore, considered to be highly precautionary.
- 3.3.14 In contrast, should increases in pollution from a new plan or project be greater than 1% of the critical level or lower critical load, the risk of a significant effect cannot be ruled out and an appropriate assessment will be required. Again, however, an exceedance of the 1% threshold does not necessarily mean that an adverse effect on the integrity of a European site will automatically occur. Indeed, this emphasises that assessment is not about establishing a simple mathematical relationship. Account must be taken of the type of qualifying feature (some are more resilient than others), their location (as not all will be distributed evenly across sites, and other factors that may be at play).
- 3.3.15 The assessment of acid deposition differs because if the total concentration is predicted to be less than the lower critical load, then the effect is considered to be not significant. If the change in concentration is more than the 1% of the maximum critical load and the total for acid deposition is greater than the maximum critical load, then an appropriate assessment will be required.
- 3.3.16 Natural England adds that where the existing background levels of NO_x or rates of deposition already exceed these values prior to implementation of a plan or project, the conservation objectives shift from seeking to maintain the qualifying features to securing their restoration to a favourable conservation status. This reflects the greater challenge of restoring a site that could already be suffering harm from air pollution. It also makes clear that the impact assessment should focus on those objectives related to the structure and

function of a site; those objectives most relevant to the impacts that could arise from air pollution are provided in paragraph 2.2.5 above.

- 3.3.17 Whilst assessment should, in the first instance, evaluate the plan or project in isolation, the Wealden decision makes clear that should insignificant outcomes arise alone, the outcomes should also be assessed in combination with other plans or projects. This test is also carried through to the appropriate assessment (if one is required). As Wybunbury Moss also forms one of the 16 discrete components of the Midland Meres and Mosses Phase 1 Ramsar site (which, in straightforward terms, is regarded as the sum of its parts), there is a separate need to assesses the impact of air pollution on all other components as well.
- 3.3.18 To determine whether a formal screening exercise is required, this document to inform the HRA firstly assesses the preliminary criteria: proximity of the European site to a road and the volume of anticipated traffic. If necessary, it then screens the construction and/or operational phase either alone or in-combination. An appropriate assessment follows subsequently, if required. An assessment of any impacts on the entire Midland Meres and Mosses Phase 1 Ramsar site and West Midland Mosses SAC concludes the assessment.

Initial assessment

Background

- 3.3.19 Annex A summarises key information from the associated air quality analysis. The following assessment draws on best practice guidance (from Natural England, DMRB and IAQM (see Section 3.3.3) and utilises selected information from Annex A, though reference to the latter is encouraged. Whilst not explicitly following the five tests laid out in the Natural England Guidance, all the information required is provided so that the steps are followed sequentially, and the conclusions drawn are consistent with that advice.

Proximity

- 3.3.20 At its closest, the B5071 runs within approximately 150m of the western boundary of Wybunbury Moss, well within the 200m threshold. Consequently, a traffic assessment is required.

Traffic assessment

- 3.3.21 The air quality assessment of traffic flows at Wybunbury Moss has been undertaken in accordance with the Volume 5, Appendix: CT-001-00001, Environmental Impact Assessment Scope and Methodology Report (SMR)³¹ of the main ES and is summarised in Annex A.
- 3.3.22 The AP1 revised scheme will result in a change to traffic flows, and associated emissions, along the B5071 which lies to the west of Wybunbury Moss. The B5071 is not a planned construction travel route and so any changes in traffic flows are primarily a consequence of the general growth in traffic volumes over time and the redistribution of vehicles in the area caused by construction of the AP1 revised scheme, rather than use of the roads by construction vehicles.
- 3.3.23 Table A2 of Annex A confirms that the AP1 revised scheme will result in traffic flows that exceed the screening thresholds (of 200 HDV or 1,000 for all vehicles) only during the construction phase and only when assessed in combination with other plans or projects. Consequently, it is considered that likely significant effects cannot be ruled out. Accordingly, the evidence to inform the air quality assessment and subsequent screening assessment is provided in Section 3.4 below.
- 3.3.24 Importantly, the same Annex confirms that no other roads in the area would exceed the screening thresholds during either construction alone, or during operation both alone and in-combination. Consequently, these scenarios have been ruled out of any further assessment. No other criteria (see paragraph 3.3.5 above) are triggered.

3.4 Screening assessment (construction) in-combination on Wybunbury Moss

Rationale

- 3.4.1 Although likely significant effects during construction alone, and during operation both alone and in-combination, were ruled out above, an assessment of the AP1 revised scheme during construction in combination with other plans or projects is also required. As the Directive³² makes clear, the in-combination test seeks to identify cumulative effects, and consequently they are limited to those that can affect the same feature. Therefore, the in-combination assessment was limited to those plans or projects that had the potential to increase nitrogen deposition on the qualifying features of Wybunbury Moss; all other potential impacts were

³¹ High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report*, Volume 5, Appendix CT-001-00001. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

³² Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna (1992).

ruled out. The range and scope of in-combination assessments has been addressed in various settings; relevant examples include:

- Regulation 63(2) states:

[the developer] ‘must provide such information as the competent authority may reasonably require for the purposes of such an assessment.’

- Furthermore, on 22 April 2005, the European Commission stated, in response to a parliamentary question (P-0917/05):

‘The [in-] combination provision must be applied in a manner that is proportionate...’

- In Foster and Langton³³, the Court stated:

‘There is no basis to carry out an assessment of the in-combination effects when there are no effects to take into account.’ (paragraph 36).

- 3.4.2 This evidence has determined the need for and scope of any in-combination assessment required for this European site as explained in paragraph 3.4.24.

Methodology

- 3.4.3 In-combination effects are taken into account in the traffic data used for the assessment which incorporates likely changes brought about by other proposed and committed developments. The approach to this assessment, which has been agreed with Natural England, is provided in Section 2 of Annex A. A separate review identified other non-traffic related sources of air pollution (e.g. intensive livestock units) which, where relevant, were added into the air quality modelling.
- 3.4.4 In order to comply with the Wealden decision, the scope of the in-combination assessment has been limited to those plans or projects that could contribute to a cumulative increase in air pollution at Wybunbury Moss. Annex A details how development that could cause traffic emission related in-combination effects have been accounted for within the traffic data used in the air quality assessment of traffic flows. Searches were also carried out for the following non-traffic related emission sources (which are also included in the air quality model) within a 5km radius:
- combustion and energy > 1MW;
 - farming, livestock and poultry (any);
 - waste, e.g. landfill gas (any); and
 - minerals activities.

³³ R (Foster and Langton) v Forest of Dean DC and Homes and Communities Agency (2015), High Court of Justice, EWHC 2684.

- 3.4.5 This is considered reasonable and proportionate, and meets the expectations laid down in Section 4.48 of Natural England's guidance²⁷.

Air quality assessment of traffic flows

- 3.4.6 The only road that triggered the AADT thresholds under this scenario was the B5071 where it lies to the west of Wybunbury Moss. Given the orientation of Wybunbury Moss and the road, only one (200m) air quality modelling transect (represented by yellow dots) was employed. However, rather than being located to the west, where the traffic threshold was triggered, it has been located to the south of Wybunbury Moss where the potential impacts are considered to be greater (Figure 3). This is considered to be a precautionary measure. Even so, the transect only enters Wybunbury Moss at a distance of approximately 70m, remaining within it to the full extent of the 200m transect.
- 3.4.7 Drawing on the type and distribution of habitats provided in the conservation objectives, NNR management plan, Favourable Condition Tables and evidence derived from the Air Pollution Information System (APIS)³⁴, the habitat types found along the southern transect within 200m of the road comprise (in order from the road): improved agricultural grassland; before encountering a narrow band of woodland at approximately 170m and, subsequently, the basin mire communities which continue to the fullest extent of the transect and beyond.
- 3.4.8 Neither the grassland nor woodland communities represent qualifying features of Wybunbury Moss and so both are considered to represent 'site fabric'³⁵, where the conservation objectives do not apply. However, to make the assessment more meaningful, conservative thresholds have been applied for the grassland by using generic values for a grassland community more representative of a high quality neutral grassland than the improved sward it resembles. Given its proximity to the basin mire community, the woodland has been assessed as part of the basin mire.
- 3.4.9 For the basin mire community, conflicting values are provided by APIS by the values for the 'transition mires and quaking bogs' of the SAC and the 'M2' and 'M18' bogs of the SSSI though they ultimately refer to the same habitat. Given that the SSSI communities provided lower, more conservative values, and because they provide greater specificity to Wybunbury Moss than those provided by SAC which seek to describe the features of its four component sites, the SSSI values were chosen to inform this assessment. These also capture the communities described in the Ramsar citation.

³⁴ UK Centre for Ecology and Hydrology (2021), *Air Pollution Information System*. Available online at: <http://www.apis.ac.uk>.

³⁵ Site fabric is defined in Natural England (2018) as '... land and or permanent structures present within a designated site boundary which are not and never have been, part of the special interest of the site, nor do they contribute towards supporting a special interest feature in any way, but which have been unavoidably included within a boundary for convenience or practical reasons. Areas of site fabric ... will not be expected to make a contribution to the achievement of conservation objectives.'

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- 3.4.10 Consequently, the air quality analysis has adopted the following critical loads:
- grassland (20kg N/ha/yr – 30kg N/ha/yr); and
 - basin mire (5kg N/ha/yr – 10kg N/ha/yr).
- 3.4.11 In terms of acid deposition, values were taken from APIS for the mire communities (0.3 – 0.3 when rounded). No reasonable surrogate was found to apply or considered necessary for the grassland community given its status as site fabric.
- 3.4.12 Key outputs are summarised below and in Annex A.

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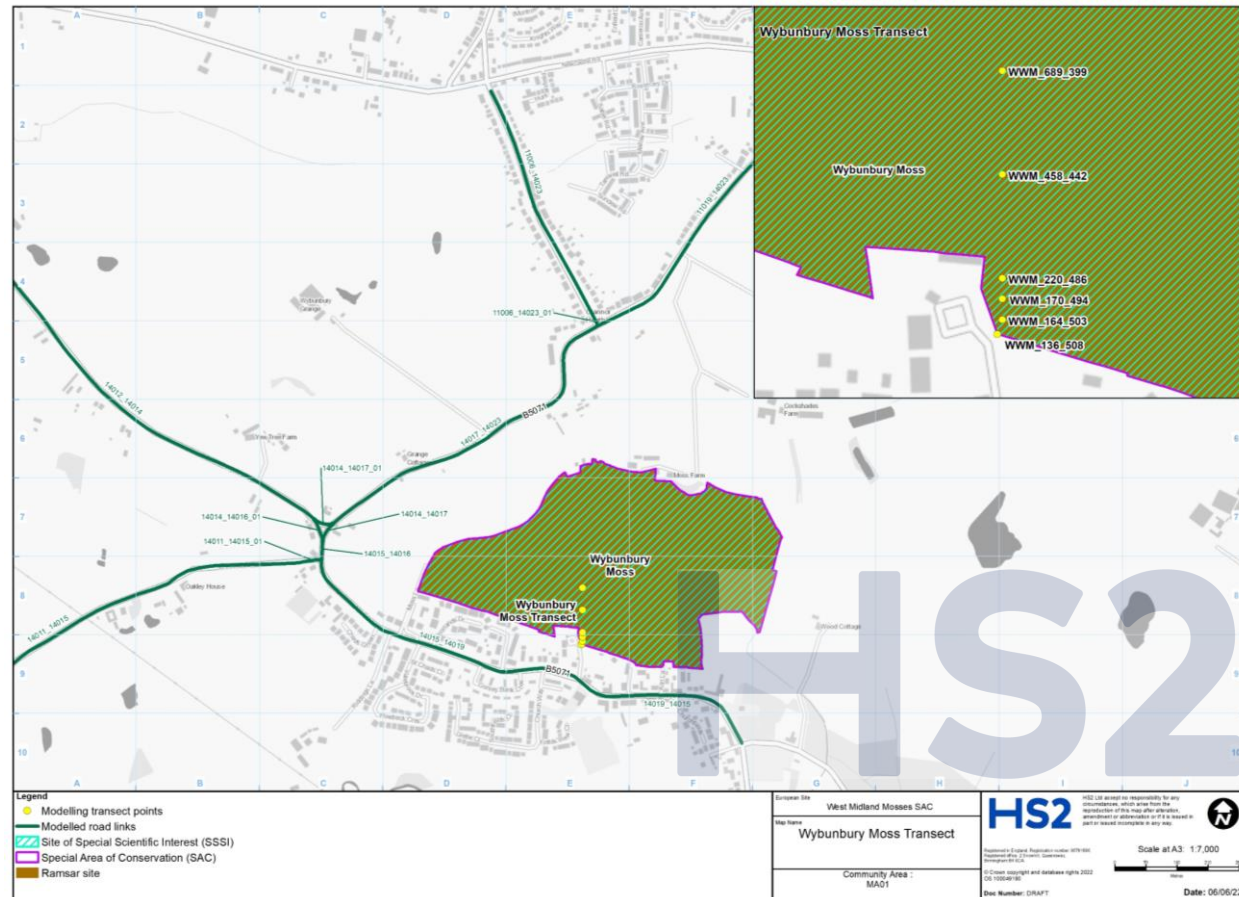
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Figure 3: Location of Wybunbury Moss, the B5071 and the modelled transect



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- 3.4.13 The air pollution assessment used traffic data based on an estimate of the average daily flows in the peak year during the construction period and adopts vehicle emission rates and background pollutant concentrations from the first year of construction. It should be noted that the air quality model takes a conservative approach and assumes that the highest flows in any one year are applied to the entire construction period. In reality, there will be considerable periods, perhaps years, where traffic flows and hence air pollution is less than this. However, the approach adopted meets the precautionary principle embedded in the Habitats Regulations.
- 3.4.14 Table A5 of Annex A describes the change in NO_x concentrations brought about by the AP1 revised scheme during construction in-combination. It shows that the background concentration of NO_x (from 150m to 200m) prior to construction was considerably below the 30µg/m³ critical level and remained so throughout the construction period. Whilst Table A5 is not shown here, its outcomes are described in the Annex:
- ‘Annual mean NO_x concentrations at Wybunbury Moss are predicted to be within the air quality standard at all locations in all scenarios. The changes in NO_x concentrations between the 2025 do nothing scenario and with the AP1 revised scheme in-combination scenario are greater than 1% of the air quality standard. Potentially significant effects are therefore predicted.’
- 3.4.15 This evidence shows that the predicted change in NO_x brought about by the AP1 revised scheme is modest but does lead to an increase in the airborne concentration by more than 1% of the critical level (or air quality standard) of 30µg/m³. However, at no time does this increase exceed the actual critical level at any point along the transect. This means that likely significant effects can be ruled out for NO_x for construction impacts in-combination. Despite the possibility that this positive outcome could be taken to preclude the need for further analysis, an assessment of nitrogen deposition was also made (see Table A6 of Annex A) and repeated below in Table 1³⁶.

Table 1: Nitrogen deposition at Wybunbury Moss (AP1 revised scheme, construction, in-combination)

Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent change in relation to lower critical load
	2018 baseline	2025 do nothing	2025 with the AP1 revised scheme			
70	0.39	0.20	0.23	0.03	20	0.2%
80	0.37	0.18	0.22	0.04	20	0.2%
100	0.33	0.16	0.20	0.04	20	0.2%
150	0.28	0.14	0.16	0.02	20	0.1%

³⁶ Note that all tables in this HRA are drawn from Annex A. Whilst minor changes have been made to the layout and naming of columns, the data remains unchanged.

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Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent change in relation to lower critical load
	2018 baseline	2025 do nothing	2025 with the AP1 revised scheme			
200	32.25	32.12	32.15	0.03	5	0.6%

3.4.16 Table 1 and Table A6 describe the change in nitrogen deposition brought about by construction of the AP1 revised scheme in-combination. They show that background rates of nitrogen deposition exceeded the lower critical load at all points along the transect prior to and throughout the construction phase although, reflecting anticipated improvements in air quality, the exceedance was slightly less during construction than at present. With reference to this data, Annex A states:

‘Nitrogen deposition rates are predicted to be above the lower critical load at all modelled receptors in the baseline and future scenarios with or without the AP1 revised scheme. The change in nitrogen deposition due to the AP1 revised scheme is predicted to be lower than 1% of the lower critical load at all modelled receptors. No potentially significant in-combination effects are therefore predicted’.

3.4.17 Up to a distance of 150m, the transect crossed land outside the SSSI boundary. From 150m to 200m, the evidence shows clearly that the rate of nitrogen deposition brought about by the AP1 revised scheme in combination with other plans or projects is modest, and less than 0.04kg N/ha/yr or at most 0.6% of the relevant critical load.

3.4.18 Best practice guidance is clear that with such modest increases, likely significant effects can be ruled out in-combination because even though background rates of nitrogen deposition exceed the lower critical load, the predicted increase falls below the 1% threshold. As this assessment has been carried on in combination with other plans or projects, there is no need for any further assessment of nitrogen deposition during the construction phase.

3.4.19 The impact of the AP1 revised scheme on acid deposition was also assessed. Table A7 (repeated below as Table 2) describes the change in acid deposition brought about by construction of the AP1 revised scheme.

3.4.20 Table 2 and Table A7 describe the change in acid deposition brought about during the construction phase of the AP1 revised scheme. They show that where data and thresholds were available, background rates of acid deposition exceeded the lower critical load at the final point of the transect prior to and during the construction phase. With reference to this data, Annex A states:

‘Acid deposition rates are predicted to be above the lower critical load at relevant modelled receptors in all scenarios with or without the AP1 revised scheme. The changes in acid deposition between the 2025 do nothing Scenario and with the AP1 revised scheme in-

combination scenario are less than 1% of the maximum critical load. No potentially significant effects are therefore predicted.'

- 3.4.21 Firstly, in contrast to the assessment of NO_x and nitrogen deposition, no critical load for acid deposition is provided on APIS for the grassland. Therefore, reliance is placed on its status as site fabric, and it is considered not sensitive to acid deposition as there is no credible risk that harm to the European site could arise.
- 3.4.22 Secondly, within the designated site the background rate of acid deposition is extremely high, at over 700% of the lower critical load. However, the predicted increase in the rate of acid deposition brought about by construction of the AP1 revised scheme in combination with other plans or projects is modest and no greater than 0.64% of the lower critical load at any point. Best practice guidance is clear that with such modest increases, likely significant effects can be ruled out in-combination because even though background rates of acid deposition exceed the lower critical load, the predicted increase falls below the 1% threshold.
- 3.4.23 Importantly, it should be recognised that the traffic flows and changes to air quality applied to this transect will, in reality, be lower than shown. This is because traffic flows were taken from a location to the west of Wybunbury Moss where the distances to the qualifying features were greater and so considered to be less harmful.

Table 2: Assessment of acid deposition at Wybunbury Moss (construction, AP1 revised scheme in-combination)

Distance to road (m)	Acid deposition (k eq/ha/yr)			Change in acid deposition as percent of CL _{max}	With AP1 revised scheme acid deposition as percent of CL _{max}
	2018 baseline	2025 do nothing	2025 with the AP1 revised scheme		
70	0.00	0.00	0.07	N/A	N/A
80	0.00	0.00	0.07	N/A	N/A
100	0.00	0.00	0.07	N/A	N/A
150	0.00	0.00	0.07	N/A	N/A
200	2.30	2.30	2.37	0.64%	717.2%

Screening opinion for Wybunbury Moss (construction) in-combination

- 3.4.24 It is considered that there is no credible risk that changes in NO_x, nitrogen deposition or acid deposition during the construction phase could undermine the conservation objectives of Wybunbury Moss and likely significant effects (in-combination) can be ruled out. Therefore, it is considered there is no need for any further assessment.

4 Impacts on other components of the Midland Meres and Mosses Phase 1 Ramsar site and West Midlands Mosses SAC

- 4.1.1 It is recognised that as the Ramsar site and SAC comprise multiple components, should the AP1 revised scheme, following an appropriate assessment, be found to be likely to cause adverse effects to arise on one, this could require the consideration of whether the AP1 revised scheme or other plans or projects had caused adverse effects to arise on other components. The cumulative impact of these could result in a greater adverse effect.
- 4.1.2 However, as it is considered that even the risk of a significant effect has been ruled out alone or in-combination at Wybunbury Moss there is no need for an appropriate assessment and, therefore, there is no risk of an adverse effect. Furthermore, separate reports have also ruled out adverse effects on Tatton Meres and The Mere, Mere (as part of the original scheme and the AP1 revised scheme respectively), the two other components of the Phase 1 Ramsar site, also considered to be potentially at risk from air pollution. Therefore, it is considered there is no potential for any cumulative impacts with any other plans or projects on this or any other component of the Phase 1 Ramsar site and there is no need for any further assessment.

5 Conclusions

5.1.1 This document provides all the necessary information for the competent authority to carry out an HRA for the purposes of Regulation 63 of the Habitats Regulations 2017, as amended, should one be required. The outcomes allow the following conclusions to be drawn for the Wybunbury Moss SSSI component of the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses SAC:

- It is considered there is no credible risk that changes in NO_x, nitrogen deposition or acid deposition, during construction of the AP1 revised scheme, in combination with other plans or projects, could undermine the conservation objectives of Wybunbury Moss and likely significant effects could be ruled out (in-combination). Therefore, it is considered there is no need for an appropriate assessment (in-combination).

Annex A: Additional air quality information to inform a Habitats Regulations Assessment

1 Purpose

This Annex provides additional air quality information in relation to impacts from vehicle emissions to support the 'Document to inform a HRA for the Midland Meres and Mosses Phase 1 Ramsar site and West Midland Mosses SAC (Wybunbury Moss)'.

This report assesses the impact of air pollution on the Wybunbury Moss SSSI component of the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses SAC. For simplicity, it is referred to as Wybunbury Moss throughout the rest of this report except where specific mention is required of the Ramsar site and SAC.

2 Scope, assumptions and limitations

The scope, assumptions and limitations for the air quality assessment are set out in full in Volume 1 (Section 8), of the main ES SMR³⁷ and accompanying Technical note – Air quality: Guidance on the assessment methodology.

Key elements in relation to the assessment of vehicle emissions on ecologically sensitive sites are:

- screening of traffic data using the criteria set out in the SMR, which is based on the DMRB criteria²⁶, to identify where assessment is required;
- these criteria are the following for assessing the impacts of the scheme alone:
 - change in road alignment by 5m or more;
 - change in daily traffic flows by 1,000 vehicles or more as AADT;
 - change in daily flows of HDV by 200 AADT or more;
 - change in daily average speed by 10kph or more; or
 - change in peak hour speed by 20kph or more.
- these criteria are the following for assessing the impacts of the scheme in combination with other plans and projects:
 - change in daily traffic flows by 1,000 vehicles or more as AADT; or
 - change in daily flows of HDV by 200 AADT or more.
- ecological receptors included in the air quality assessment are designated sites with habitats sensitive to nitrogen deposition. These could include SAC, SPA and Ramsar sites;
- transects have been used within a designated site with modelled points at 0m, 10m, 20m, 30m, 40m, 50m, 75m, 100m, 150m and 200m from the edge of the road unless the shape of the site and potential impacts necessitates different distances to characterise the impacts;
- a deposition velocity relevant to the habitat of each site has been used, as detailed in the IAQM ecological guidance³⁸. Data on nitrogen and acid deposition has been taken from the most recent information available on the APIS³⁴ website. No reduction in future background deposition rates has been applied;

³⁷ High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report*, Volume 5, Appendix: CT-001-00001. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

³⁸ Institute of Air Quality Management (2020), *A guide to the assessment of air quality impacts on designated nature conservation sites*, v1.1. Available online at: <https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>.

- the following scenarios were assessed:
 - baseline;
 - selected year(s) within the construction period for the assessment of the effects of construction. The year(s) of assessment were selected based on the worse case peak period during the construction programme and on when significant effects might be expected; and
 - an operational scenario was assessed for the first full operational year after construction is completed.
- for each assessment year, both the scenario without the AP1 revised scheme in place and the scenario with the AP1 revised scheme in place have been modelled. This comparison was used to assess the impacts of the AP1 revised scheme alone;
- for the assessment of the AP1 revised scheme in combination with other plans and projects, a different without scheme scenario was used and described as the ‘do nothing’ scenario. This uses traffic data from the 2018 baseline, but background pollutant concentrations/deposition rates and emission factors representing the future year being assessed;
- the assessment incorporated HS2 Ltd’s policy on construction vehicle emissions standards. These standards are published in Information Paper E31³⁹; Air Quality and include Euro VI for HGV, and Euro 6 and Euro 4 for diesel and petrol Light-Duty Vehicles (LDV) respectively;
- in-combination-effects were largely taken into account in the traffic data used for the assessment which incorporates likely changes brought about by other proposed and committed developments⁴⁰; and

³⁹ High Speed Two Ltd (2017), *High Speed Two Phase One Information Paper E31: Air Quality*. Version 1.5.

Available online at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/672406/E31 - Air Quality v1.5.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/672406/E31_-_Air_Quality_v1.5.pdf).

⁴⁰ A number of strategic traffic models have been sourced from key stakeholders, including Local Highway Authorities and National Highways. In combination, these models cover the areas that are expected to be affected by the AP revised scheme and have been used as the basis of assessment for traffic flow analysis. The models have been developed by the relevant stakeholders in accordance with Transport Analysis Guidance (TAG) provided by the Department for Transport, with each model representing a base year position between 2016 and 2018.

Forecast year models have also been supplied by the above stakeholders which reflect committed and planned changes to the transport network and growth associated with committed and planned developments that are sufficiently certain to be introduced after the base year of the strategic model. Reviews of committed developments will have been undertaken by the relevant stakeholders at the same time as preparing and validating the base year model and developing future year models. Given that the models represent a base year position between 2016 and 2018, it is likely that the reviews of forecast committed developments will have been undertaken between 2016 and 2018 depending on when each model was last updated.

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- consideration was also given to relevant non-road plans and projects.

In order to account for traffic growth from 2018 to future years, growth factors were directly obtained from TEMPro version 7.2 which uses the National Trip End Model (NTEM 7.2 ((2017)) dataset and the National Transport Model (NTM) 2015. TEMPro inherently incorporates future planned development, being based on approved plans, irrespective of whether it is approved, committed, or simply included in approved plans. It includes all economic and population growth forecasts, and assumes growth in housing and commercial development, therefore providing a prediction of traffic growth by area.

3 Air quality standards

Air quality limit values and objectives are quality standards for clean air and to protect human health or harm to vegetation. The term ‘air quality standards’ has been used to refer to both the English air quality objectives and the air quality limit values and critical levels introduced in the UK based on EU Directives. Table A1 sets out the air quality standard for NO_x.

Table A1: Air quality standards

Pollutant	Averaging period	Standard
NO _x (for protection of vegetation)	Annual mean	30µg/m ³

For the assessment of changes in nitrogen and acid deposition, comparison has been made against the applicable critical loads⁴¹ for the site, as provided by APIS.

⁴¹ The critical loads for deposition vary and are specific to each qualifying feature. These are presented as a range of values (expressed as a rate, e.g. 10kg N/ha/yr – 20 kg N/ha/yr).

4 How significance is assessed

For the assessment of NO_x concentrations, if the change is predicted to be less than 1% of the air quality standard then the effect is considered to be not significant. However, should the NO_x concentration change by more than 1% then the assessment of significance will be undertaken by an ecologist and reported accordingly.

For the assessment of nitrogen deposition, if the change is predicted to be less than 1% of the lower critical load⁴¹, then the effect is considered to be not significant. However, should the deposition change by more than 1%, then the assessment of significance will be undertaken by an ecologist and reported accordingly.

For the assessment of acid deposition, if the total concentration is predicted to be less than the lower critical load, then the effect is considered to be not significant. If the change in concentration is more than 1% of the maximum critical load and the total for acid deposition is greater than the maximum critical load, then the assessment of significance will be undertaken by an ecologist and reported accordingly.

5 Assessment of construction traffic effects – AP1 revised scheme alone

5.1 Screening of traffic data

The screening process identified no roads in the area, around Wybunbury Moss, exceeding the screening thresholds and therefore no further assessment is required.

6 Assessment of construction traffic effects – AP1 revised scheme in combination with other plans and projects

6.1 Screening of traffic data

The assessment of construction traffic impacts has used traffic data based on an estimate of the average daily flows in the peak year during the construction period (2025 – 2037). Traffic data is presented in Table A2.

The screening process identified one road in the area exceeding the screening thresholds:

- the B5071 Stock Lane.

Further roads have been included in the assessment to account for their emissions at nearby receptors.

Wybunbury Moss is located 1.8km south-west of the land required for construction of the AP1 revised scheme. There are no planned construction traffic routes running adjacent to the site. Traffic impacts are primarily a result of traffic re-routing due to the scheme in combination with traffic growth from the baseline year.

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Table A2: Traffic data used in modelling (construction phase, AP1 revised scheme in-combination)

Road ID	Road name	Annual Average Daily Traffic (AADT)			In-combination change (2025 with the AP1 revised scheme - 2018 baseline)	Heavy Duty Vehicles (HDV)			In-combination change (2025 with the AP1 revised scheme - 2018 baseline)
		2018 baseline	2025 without the AP1 revised scheme	2025 with the AP1 revised scheme		2018 baseline	2025 without the AP1 revised scheme	2025 with the AP1 revised scheme	
11006_14023	Dig Lane	901	1,052	1,298	397	0	0	0	0
11019_14023	B5071, Stock Lane	2,461	2,954	3,195	734	16	16	16	0
14011_14015	Annions Lane	678	889	1,097	419	0	0	0	0
14012_14014	Wybunbury Lane	1,867	2,151	2,250	383	0	0	0	0
14014_14016_01	Wybunbury Lane	1,732	1,819	1,804	72	0	0	0	0
14014_14017_01	Wybunbury Lane	135	332	446	310	0	0	0	0
14015_14016	B5071, Main Road	4,959	5,494	5,853	894	16	16	16	0
14015_14019	B5071, Main Road	4,382	4,700	4,850	468	16	16	16	0
14016_14017	B5071, Main Road	3,227	3,674	4,048	820	16	17	16	1
14017_14023	B5071, Stock Lane	3,363	4,006	4,494	1,131	16	16	16	0
14019_14015	B5071, Main Road	4,382	4,700	4,850	468	16	16	16	0

Note: Values in bold indicate change in traffic flow triggering for assessment.

6.2 Non-road plans and projects

No non-road plans or projects have been identified that require further consideration within the in-combination assessment.

6.3 Receptors assessed and background concentrations

Figure A1 presents a detailed map of the modelled area including assessed roads (road network in green) and modelled receptors (yellow dots).

Table A3 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads and Table A4 shows the background information for acid deposition.

Table A3: Modelled ecological receptor NOx and N deposition backgrounds, APIS data and critical loads (construction phase – in-combination)

Receptor	Sensitive habitat	2018 NOx background concentration ($\mu\text{g}/\text{m}^3$)	2025 NOx background concentration ($\mu\text{g}/\text{m}^3$)	APIS data of average total nitrogen deposition ($\text{kg N}/\text{ha}/\text{yr}$) ³⁴	Lower critical load ($\text{kg N}/\text{ha}/\text{yr}$)
Wybunbury Moss	Deciduous woodland	9.3	7.2	56.4	10
	Lowland fen	9.3	7.2	32.0	5
	Grassland	9.3	7.2	0.0	20
	Bog	9.3	7.2	32.0	5

Table A4: Modelled ecological receptor acid deposition backgrounds, APIS data and critical loads (construction phase – in-combination)

Receptor	Sensitive habitat ⁴²	APIS data ³⁴ of average total acid deposition ($\text{k eq}/\text{ha}/\text{yr}$)	Critical load ($\text{kg eq}/\text{ha}/\text{yr}$) (min)	Critical load ($\text{kg eq}/\text{ha}/\text{yr}$) (max)
Wybunbury Moss	Deciduous woodland	4.1	0.1	1.2
	Lowland fen	0.0	0.0	0.0
	Grassland	0.0	0.0	0.0
	Bog	2.3	0.3	0.3

6.4 Assessment results

Table A5 presents a summary of the modelled NOx concentrations for the ecological site, the change in concentration and a comparison against the air quality standard ($30\mu\text{g}/\text{m}^3$).

Table A6 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A7 presents a summary of the modelled acid deposition, percentage change in deposition and percentage change in relation to the critical load.

⁴² APIS does not provide critical loads for the grassland or woodland at this site and so standard values have been chosen for woodland and very precautionary values for grassland, more representative of a high-quality neutral meadow rather than the (semi) improved agricultural grassland it is. Following best practice guidance, the lower values of each critical load has been used in the air quality analysis. This is a precautionary measure that will emphasise any negative outcomes.

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Table A5: Predicted annual mean of NOx concentrations at ecological sites (construction phase, AP1 revised scheme in-combination)

Ecological site	Distance to road (m)	NOx concentrations (µg/m³)			Change in NOx concentrations (µg/m³)	Comparison against air quality standard (30µg/m³)	Percent change in relation to air quality standard
		2018 baseline	2025 do nothing	2025 with the AP1 revised scheme			
Wybunbury Moss	70	14.25	9.60	10.04	0.44	Within standard	1.5%
	80	13.98	9.46	9.88	0.42	Within standard	1.4%
	100	13.48	9.20	9.60	0.40	Within standard	1.3%
	150	12.79	8.84	9.21	0.37	Within standard	1.2%
	200	12.45	8.66	9.02	0.36	Within standard	1.2%

Table A6: Assessment of nitrogen deposition at ecological sites (construction phase, AP1 revised scheme in-combination)

Ecological site	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent change in relation to lower critical load
		2018 baseline	2025 do nothing	2025 with the AP1 revised scheme			
Wybunbury Moss	70	0.39	0.20	0.23	0.03	20	0.2%
	80	0.37	0.18	0.22	0.04	20	0.2%
	100	0.33	0.16	0.20	0.04	20	0.2%
	150	0.28	0.14	0.16	0.02	20	0.1%
	200	32.25	32.12	32.15	0.03	5	0.6%

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Table A7: Assessment of acid deposition at ecological sites (construction phase – AP1 revised scheme in-combination)

Ecological site	Distance to road (m)	Acid deposition (k eq/ha/yr)			Change in acid deposition as percent of CLmax	Total with AP1 revised scheme acid deposition as percent of CLmax
		2018 baseline	2025 do nothing	2025 with AP1 revised scheme		
Wybunbury Moss	70	0.00	0.00	0.07	N/A	N/A
	80	0.00	0.00	0.07	N/A	N/A
	100	0.00	0.00	0.07	N/A	N/A
	150	0.00	0.00	0.07	N/A	N/A
	200	2.30	2.30	2.37	0.64%	717.2%

6.5 Assessment of significance

Annual mean NO_x concentrations at Wybunbury Moss are predicted to be within the air quality standard at all locations in all scenarios. The changes in NO_x concentrations between the 2025 do nothing scenario and with the AP1 revised scheme in-combination scenario are greater than 1% of the air quality standard. Potentially significant effects are therefore predicted.

Nitrogen deposition rates are predicted to be above the lower critical load at all modelled receptors in the baseline and future scenarios with or without the AP1 revised scheme. The change in nitrogen deposition due to the AP1 revised scheme is predicted to be lower than 1% of the lower critical load at all modelled receptors. No potentially significant in-combination effects are therefore predicted.

Acid deposition rates are predicted to be above the lower critical load at relevant modelled receptors in all scenarios with or without the AP1 revised scheme in-combination. The changes in acid deposition between the 2025 do nothing Scenario and with the AP1 revised scheme in-combination scenario are less than 1% of the maximum critical load. No potentially significant effects are therefore predicted.

7 Assessment of operational traffic effects – AP1 revised scheme alone

7.1 Screening of traffic data

The screening process identified no roads in the area, around Wybunbury Moss, exceeding the screening thresholds in the operation phase and therefore no further assessment is required.

8 Assessment of operational traffic effects – AP1 revised scheme in combination with other plans and projects

8.1 Screening of traffic data

The screening process identified no roads in the area, around Wybunbury Moss, exceeding the screening thresholds in the operation phase and therefore no further assessment is required.

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