

# **High Speed Rail (Crewe – Manchester)**

## **Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement**

### **Volume 5: Appendix EC-016-00009**

#### **Ecology and biodiversity**

Designated site assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss)

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## Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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# 1 Introduction

## 1.1 Purpose of this appendix

- 1.1.1 This report is an appendix to the ecology and biodiversity assessment which forms part of Volume 5 of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES).
- 1.1.2 It provides an assessment to enable the identification of likely significant effects on the Wybunbury Moss Site of Special Scientific Interest (SSSI) component of the West Midland Mosses Special Area of Conservation (SAC) and Midland Meres and Mosses Phase 1 Ramsar site (hereafter referred to as Wybunbury Moss).
- 1.1.3 This report provides the background assessment for identifying any likely significant effects on Wybunbury Moss as a result of the AP2 revised scheme to be reported under the EIA Regulations 2017 (as amended)<sup>1</sup>. This background assessment is provided in Section 3 of this report.
- 1.1.4 The High Speed Two (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement (ES) was published in 2022<sup>2</sup> (the main ES). Volume 5 of the main ES and SES1 and AP1 ES included a draft assessment to inform a Habitats Regulations Assessment for Wybunbury Moss<sup>3</sup>. Further and separate assessment is being carried out in line with Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended)<sup>4</sup>. Section 4 of this report provides the emerging results at this current stage of design and assessment, which will be finalised as part of the further and separate assessment.
- 1.1.5 This report should be read in conjunction with the SES2 and AP2 ES Volume 2, Community Area report: Hough to Walley's Green (MA01).

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<sup>1</sup> *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*. Available online at: [https://www.legislation.gov.uk/ukxi/2017/571/pdfs/ukxi\\_20170571\\_en.pdf](https://www.legislation.gov.uk/ukxi/2017/571/pdfs/ukxi_20170571_en.pdf).

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

<sup>3</sup> High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Document to inform a Habitats Regulations Assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses SPA (Wybunbury Moss)*, Volume 5, Appendix EC-016-00009. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

<sup>4</sup> *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.

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1.1.6 In order to differentiate between the original scheme and the subsequent changes, the following terms are used in the SES2 and AP2 ES:

- ‘the original scheme’ – the Bill scheme submitted to Parliament in 2022, which was assessed in the main ES;
- ‘the SES1 scheme’ – the original scheme with any changes described in SES1 that are within the existing powers of the Bill;
- ‘the AP1 revised scheme’ – the original scheme as amended by SES1 changes and AP1 amendments;
- ‘the SES2 scheme’ – the original scheme with any changes described in SES1 (submitted in July 2022) and the SES2; and
- ‘the AP2 revised scheme’ – the original scheme as amended by SES1 and SES2 changes (as relevant) and AP2 amendments.

1.1.7 This report assesses the impacts on Wybunbury Moss using an updated methodology for the assessment of air pollution arising from traffic flows. Further details are provided in the SES2 and AP2 ES Volume 5, Appendix: CT-001-00003 Air quality – Technical note – Updated guidance on the assessment methodology for Phase 2b SES2 and AP2 ES.

## 2 Context

### 2.1 AP2 revised scheme

- 2.1.1 Wybunbury Moss lies approximately 1.8km south-west from the land required for the construction of the AP2 revised scheme in the Hough to Walley's Green (MA01) community area. The AP2 revised scheme will result in changes to traffic flows during construction, along the B5071, which lies approximately 155m to the west of the site (Stock Lane), 70m to the south (Main Road), and 115m from the junction with Wybunbury Lane.
- 2.1.2 Neither the B5071 Main Road nor B5071 Stock Lane are planned construction traffic routes; changes in traffic flows will arise as a consequence of the redistribution of vehicles in the area caused by construction of the AP2 revised scheme and the general growth in traffic volumes over time.

### 2.2 Site description and nature conservation targets

#### Midland Meres and Mosses Phase 1 Ramsar site

- 2.2.1 The Midland Meres and Mosses Phase 1 Ramsar site extends over 510ha across 16 discrete sites distributed throughout the north-west Midlands, over an area that extends 80km from north to south and 75km from west to east. Figure 1 shows the location and extent of the Phase 1 Ramsar site and Figure 2 shows the location of Wybunbury Moss relevant to the AP2 revised scheme.
- 2.2.2 The Ramsar Information Sheet<sup>5</sup> 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 Phase 1 Ramsar site as comprising open water (meres) and their associated fringing habitats (for example, reed swamps, fen, carr and damp pasture) and a 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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<sup>5</sup> 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>.



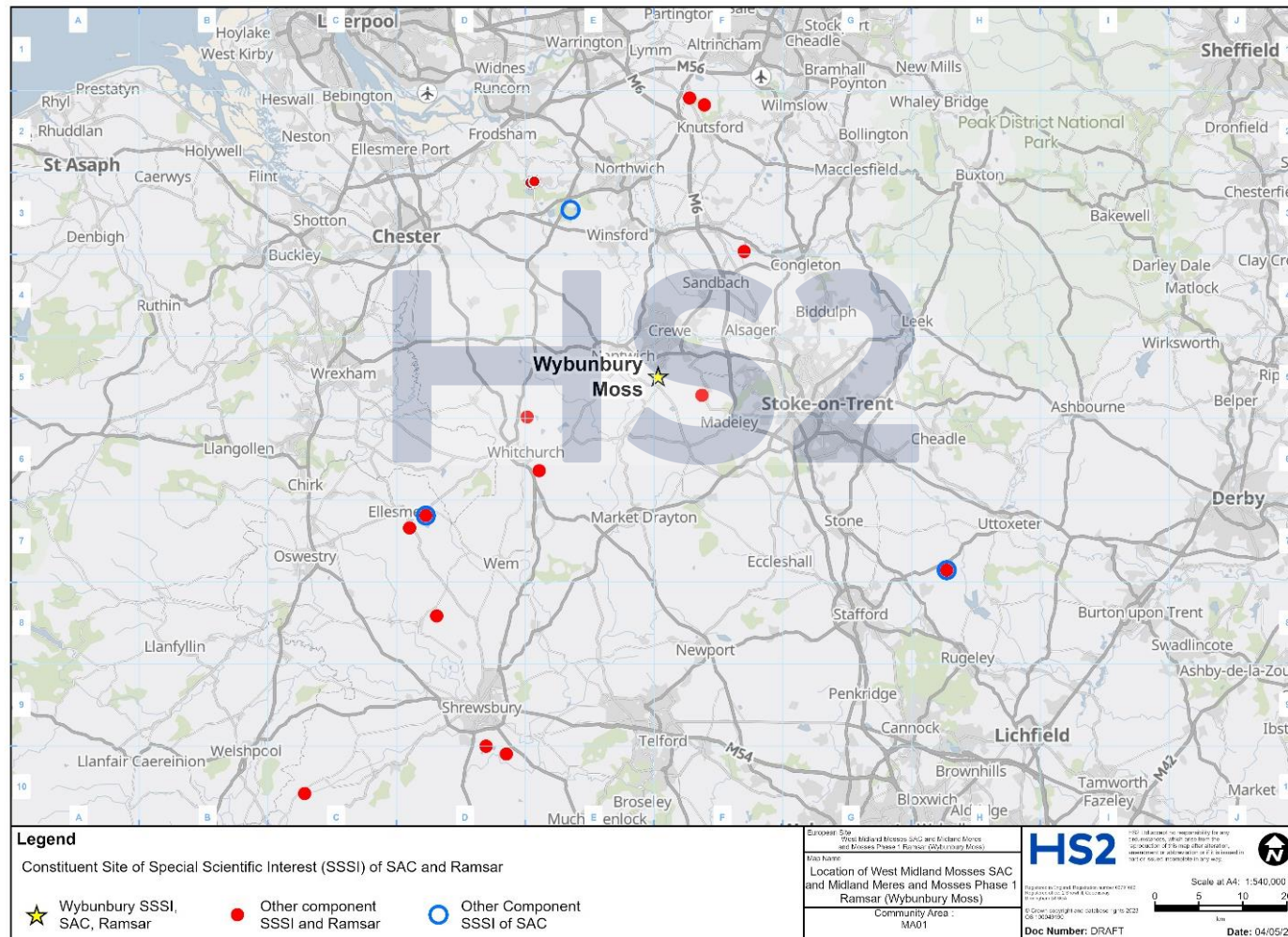
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**Figure 1: Location of constituent SSSI forming the Midland Meres and Mosses Phase 1 Ramsar site and West Midland Mosses SAC (Wybunbury Moss)**



## West Midland Mosses SAC

- 2.2.3 The SAC citation<sup>6</sup> and Supplementary advice<sup>7</sup> describe all four components (Abbots Moss SSSI, Chartley Moss SSSI, Clarepool Moss SSSI and Wybunbury Moss SSSI, locations of these SSSI components are 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.
- 2.2.4 The qualifying habitats are listed as follows:
- Natural dystrophic lakes and ponds; and
  - Transition mires and quaking bogs.
- 2.2.5 Further information is provided in the National Nature Reserves (NNR) Management Plan<sup>8</sup> and Favourable Condition Tables (FCT)<sup>9</sup> for Wybunbury Moss. However, it should be noted that given the latter's 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<sup>9</sup> 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.

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<sup>6</sup> Department for Environment, Food and Rural Affairs (2005), *Citation for Special Area of Conservation West Midland Mosses*. Available online at:

<https://publications.naturalengland.org.uk/publication/6449667604742144>

<sup>7</sup> 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:

<https://publications.naturalengland.org.uk/publication/6449667604742144>.

<sup>8</sup> Natural England (undated), *Wybunbury Moss NNR Management Plan*.

<sup>9</sup> 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=&IFCAAArea=.](https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001468&SiteName=Wybunbury%20Moss&countyCode=&responsiblePerson=&SeaArea=&IFCAAArea=)

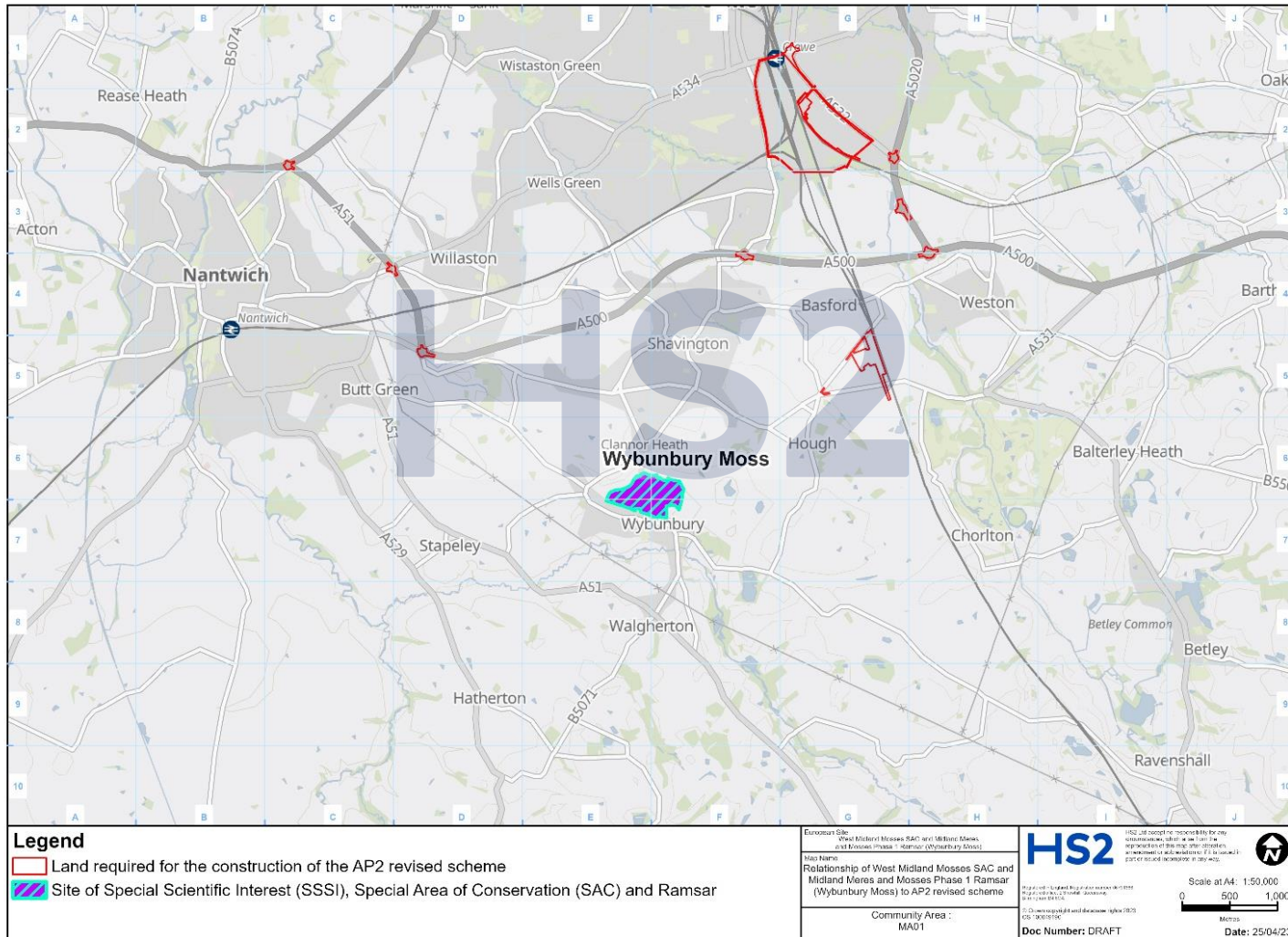
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Figure 2: Relationship of Wybunbury Moss to the AP2 revised scheme



## Conservation objectives

2.2.6 The conservation objectives<sup>10</sup> 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’.

2.2.7 These are given greater expression in the associated ‘Supplementary advice’ and Site Improvement Plan (SIP)<sup>11</sup>. Both identify ‘air pollution’ as a negative factor and note that the critical loads of 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...’.

2.2.8 It provides other objectives relating to water quality and acidity for both qualifying features.

2.2.9 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 Favourable Condition Table within the Supplementary advice<sup>9</sup>, 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. Consequently, this report will rely solely on the SAC objectives.

## Condition assessment

2.2.10 The most recent formal condition monitoring assessment of Wybunbury SSSI was carried out by Natural England in 2014<sup>12</sup>. However, this only covered the single central unit which comprises the transition mire, quaking bog and associated features such as the lagg fen. The remaining nine units, last assessed in 2012, comprise the surrounding grassland. It is understood the latter was included within the boundary to safeguard the more fragile

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<sup>10</sup> Natural England (2018), *European Site Conservation Objectives for West Midland Mosses Special Area of Conservation. Version 3*. Available online at:

<https://publications.naturalengland.org.uk/publication/6449667604742144>.

<sup>11</sup> Natural England (2014), *Site Improvement Plan, West Midlands Mosses, Version 1.0*. Available online at:

<https://publications.naturalengland.org.uk/publication/5422476326600704>.

<sup>12</sup> 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>.

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features at the centre by, for example, reducing diffuse pollution. The Meres and Mosses Conservation Plan<sup>13</sup> 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; however, it may provide a role in supporting the hydrological functioning of the site.

- 2.2.11 The Conservation Plan 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' condition<sup>13</sup>. In slight contrast, in terms of the specific SAC qualifying features, the transition mire and quaking bog were assessed, in an undated Natural England report, as favourable<sup>14</sup>. It is noted though, that all the assessments pre-dated, and so would not have taken account of, the current objectives.
- 2.2.12 A site check was also undertaken in March 2022<sup>15</sup>, which reported that: '...significant tree and scrub removal has been carried out on the NNR over the recent years'.
- 2.2.13 While this assessment was carried out nine years ago or more, it is apparent that active management is ongoing, for example, tree clearance, and, overall, it is assumed that Wybunbury Moss is meeting its objectives given that it is owned and managed by Natural England.

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<sup>13</sup> Environmental Consultancy University of Sheffield (2001), *Meres and Mosses Conservation Plans*. Wybunbury Moss.

<sup>14</sup> 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>.

<sup>15</sup> Natural England (2022), *Wybunbury Moss 'Site Check'*. Available online at: <https://designatedsites.naturalengland.org.uk/UnitDetail.aspx?UnitId=1014847&SiteCode=S1001468&SiteName=Wybunbury%20moss&countyCode=&responsiblePerson=>.

## **3 Assessment of the AP2 revised scheme**

### **3.1 Introduction**

- 3.1.1 This section provides the background assessment for identifying any likely significant effects on Wybunbury Moss to be reported under the EIA Regulations 2017 (as amended). The conclusions of this assessment are summarised in the SES2 and AP2 ES Volume 2, Community Area report: Hough to Walley's Green (MA01).
- 3.1.2 This assessment identifies the likely significant effects as a result of the AP2 revised scheme. In addition, the air quality modelling, from which the impacts and effects reported below are derived, has taken into account cumulative effects from background traffic growth, committed developments<sup>16</sup> and impacts related to traffic emissions arising from the SES2 changes and AP2 amendments.

### **3.2 Scope, assumptions and limitations**

- 3.2.1 Wybunbury Moss lies 1.8km away from the land required for construction of the AP2 revised scheme. Given the distance from Wybunbury Moss, direct impacts can be ruled out. The only potential impacts that could arise as a result of the AP2 revised scheme are restricted to changes in air quality and hydrology.
- 3.2.2 Wybunbury Moss is located within a different hydrological catchment to the AP2 revised scheme (Checkley Brook – Lower). In addition, there would be no hydraulic connection between Wybunbury Moss and the AP2 revised scheme with the reasonable assumption that groundwater flow in the glaciofluvial deposits/glaciofluvial sheet deposits, which underlie the peat in this area, follow topography. Therefore, potential impacts from changes in hydrology can be ruled out.
- 3.2.3 Consequently, the only plausible impact is from air pollution caused by changes in traffic brought about by the AP2 revised scheme, allied with the general growth in traffic in the area. This single issue is assessed below.

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<sup>16</sup> Committed developments relevant to the AP2 revised scheme are reported in Volume 5 Planning data report of the SES2 and AP2 ES (see SES2 and AP2 ES Volume 5, Appendix: CT-004-00000). Committed developments are defined as developments with planning permission and sites allocated for development in adopted development plans, on or close to the land required for the scheme.

## **Air pollution assessment methodology**

- 3.2.4 The assessment of air pollution is informed by established best practice provided by National Highways<sup>17,18</sup>, Natural England<sup>19,20</sup>, and the Institute for Air Quality Management (IAQM)<sup>21</sup>.
- 3.2.5 These provide evidence that natural or semi-natural habitats can be harmed by vehicle emissions through two intimately linked pathways: via the concentration of nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>) and the subsequent deposition of nitrogen and acid. The assessment of the impact of air pollution therefore comprises the analysis of the dispersal of these compounds.
- 3.2.6 In sufficient concentrations, airborne NO<sub>x</sub> and NH<sub>3</sub> can result in direct toxic effects on vegetation. Further, the subsequent 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.
- 3.2.7 The concentrations and/or rates of the deposition of nitrogen compounds fall quickly in the first few metres from the roadside before gradually levelling out; beyond 200m, it becomes difficult to distinguish from background levels. This means that impacts at 10m, 50m or 200m or more can be very different from those at the roadside.
- 3.2.8 The assessment of air pollution impacts for ecologically sensitive sites within 200m of roads is undertaken where one or more of the following Design Manual for Roads and Bridges (DMRB)<sup>17</sup> criteria are met:

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<sup>17</sup> 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/dmrbr/search/10191621-07df-44a3-892e-c1d5c7a28d90>.

<sup>18</sup> National Highways (2021), *Ammonia N Deposition Tool V2*.

<sup>19</sup> 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>.

<sup>20</sup> Although designed for Habitats Regulations Assessments, Natural England (2018) guidance is applicable for the assessment under the EIA Regulations, 2017 (as amended). Section 1.1.6 states: '...this guidance does not specifically cover nationally significant sites, which are covered by a different regulatory framework. However, the general principles for air quality assessment outlined here for European Sites are likely to be equally relevant for this and other designations...'.

<sup>21</sup> 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://www.the-ies.org/sites/default/files/reports/air-quality-impacts-on-nature-sites-2020.pdf>.

- change in road alignment by 5m or more;
- change in daily traffic flows by 1,000 vehicles or more as Annual Average Daily Traffic (AADT);
- change in daily flows of Heavy Duty Vehicles<sup>22</sup> (HDV) by 200 AADT or more;
- change in daily average speed by 10kph or more; and
- change in peak hour speed by 20kph or more.

3.2.9 It can be seen, therefore, that the additional emissions that might arise from increased traffic are only likely to be significant where:

- a designated site lies within 200m of a road;
- traffic flows are expected to increase (or other DMRB criteria are met); and
- a qualifying feature is known to be sensitive to such impacts.

3.2.10 Should all three criteria be met, best practice guidance<sup>19</sup> recommends that the ecological characteristics of the site should be explored and, if necessary, traffic and/or air quality assessments carried out to evaluate any impacts during construction or operation.

3.2.11 The ecological characteristics of a site are derived from the formal citations, condition assessments, conservation objectives, FCT, SIP, supplementary advice and any other surveys and management plans where available.

3.2.12 Traffic flows are assessed by calculating AADT figures using established models. Should increases in traffic be less than 1,000 AADT<sup>23</sup> 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 necessary.

3.2.13 The air quality analysis typically models any changes at fixed points on a 200m transect extending from the roadside. Impacts identified through the air quality analysis are assessed by calculating the relative contribution of the plan or project in relation to the relevant critical levels for NO<sub>x</sub> and NH<sub>3</sub> and the critical loads for the deposition of nitrogen and acid, as described by the Air Pollution Information System (APIS)<sup>24</sup>, as follows:

- the critical level for NO<sub>x</sub> is fixed and is expressed as a concentration: 30µg/m<sup>3</sup>. 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;

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<sup>22</sup> 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.

<sup>23</sup> These values are utilised as there is evidence to show that these equate approximately to a 1% change in critical loads.

<sup>24</sup> UK Centre for Ecology and Hydrology (2021), *Air Pollution Information System*. Available online at: <http://www.apis.ac.uk/>.



- the critical level for NH<sub>3</sub> is also expressed as a concentration and is set at 3µg/m<sup>3</sup> for higher plants and at 1µg/m<sup>3</sup> where bryophytes or lichens are present and are considered to ‘...form a key part of the ecosystem integrity’<sup>25</sup>;
  - the critical loads for nitrogen 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 – 20kg N/ha/yr) and typically, only the lowest value is used (unless there are compelling reasons to do otherwise) as this will emphasise any negative outcomes; and
  - acid deposition is also assessed via critical loads, though measured in keq/ha/yr.
- 3.2.14 Natural England best practice guidance<sup>19</sup> specifies that should nitrogen deposition increase by less than 1% of the critical level, likely significant effects can be ruled out for concentrations of NO<sub>x</sub> or NH<sub>3</sub>. However, should the 1% threshold be exceeded, a likely significant effect cannot be ruled out.
- 3.2.15 The assessment of significance of acid deposition differs. If the total concentration is predicted to be less than the lower critical load, then the effect is considered not to be significant. However, a likely significant effect cannot be ruled out when: the change in concentration is more than 1% of the maximum critical load and the total for acid deposition is also greater than the maximum critical load.
- 3.2.16 The 1% threshold, set at two orders of magnitude below the critical load or level, is highly precautionary. Account must also be taken of the type of habitats (some are more resilient than others) and the distribution of the designated features as not all will be distributed evenly across sites, and other factors may be at play.

### 3.3 Assessment of impact and effects

- 3.3.1 Wybunbury Moss lies approximately 70m from the B5071 Main Road to the south, 115m from the junction with Wybunbury Road and 155m from the B5071 Stock Lane to the west, within the 200m threshold described in Section 3.2. Consequently, an assessment of traffic flows is required.
- 3.3.2 The following assessment utilises relevant traffic and air quality analysis as set out in Annex A and reports any likely significant effects on a precautionary basis. HS2 Ltd is continuing to identify suitable measures to mitigate or compensate for potential significant effects identified on designated sites.

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<sup>25</sup> Air Pollution Information System (2016), *Critical Loads and Critical Levels – a guide to the data provided in APIS*. Available online at: [https://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#\\_Toc279788054](https://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788054).

## **Assessment of traffic flows and air pollution during construction**

- 3.3.3 The traffic analysis (see Section 5.1 Annex A) indicates that no roads in the area around Wybunbury Moss exceed the screening thresholds described in Section 3.2 and therefore no further assessment is required.

## **Assessment of traffic flows and air pollution during operation**

- 3.3.4 The traffic analysis (see Section 7.1, Annex A) indicates that the operation of the AP2 revised scheme will not exceed the AADT or HDV traffic thresholds described in Section 3.2. Therefore, no air quality assessment is required.

## **3.4 Mitigation measures**

- 3.4.1 The likely significant effects assessment above has been undertaken on a precautionary basis.
- 3.4.2 Where necessary, HS2 Ltd is continuing to seek to identify suitable measures to mitigate or compensate for potential significant effects identified on designated sites. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the receptors and the suitability of the measures.

## **3.5 Summary of likely significant effects**

- 3.5.1 Traffic flows as a result of the AP2 revised scheme during construction and operation do not trigger the requirement for an air quality assessment and therefore likely significant effects can be ruled out.

## **4 Ongoing work**

### **4.1 Introduction**

- 4.1.1 A further and separate assessment is being carried out to meet the needs of Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) ('Habitats Regulations')<sup>4</sup>. This section provides the emerging results at this current stage of design and assessment, which will be finalised as part of the further and separate assessment.
- 4.1.2 This section uses language that will be applicable to the further assessment carried out under the Habitats Regulations.
- 4.1.3 This section considers the AP2 revised scheme in combination with other plans and projects that fall within a 10km radius of the designated site. The other plans and projects relevant to this assessment have been in Section 2 of Annex A.

### **4.2 Air quality assessment of traffic flows in combination**

#### **Methodology**

- 4.2.1 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.
- 4.2.2 In combination effects are taken into account in the traffic and the non-traffic related emission sources used for the assessment, which incorporate 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.

#### **Critical loads and levels**

- 4.2.3 Given the orientation of Wybunbury Moss and the B5071 (Stock Lane/Main Road), three (200m) air quality modelling transects (represented by yellow dots on Figure 3) were employed: Transect 1 at the B5071 Main Road to the south; Transect 2 at the junction between B5071 Stock Lane/Main Road and, the unclassified Wybunbury Lane and Annions Lane to the west; and Transect 3 at Stock Lane to the north on the B5071 Stock Lane. The transects intersect with the boundary of Wybunbury Moss at a distance of 70m, 115m and 155m respectively. The transects were located to reflect the greatest air quality impact as well as to take account of the most sensitive habitat features.

- 4.2.4 Wybunbury Moss comprises the Annex I habitat type<sup>26</sup>, transitional mires and quaking bogs (hereafter referred to as 'mire'), which largely occupy the central part of the site. Within the drier parts of Wybunbury Moss, found mostly around the periphery, more transitional wetland communities are present (including mixed woodland and fen). For the purposes of the assessment, both the mire and its transitional communities are considered to represent qualifying features. This reflects the broad aims of the Supplementary advice<sup>27</sup>.
- 4.2.5 Drawing on the type and distribution of habitats provided in the conservation objectives, NNR management plan, FCT and evidence derived from APIS, the habitat types found along the transects within 200m of the road comprise:
- Transect 1 traverses houses and gardens before encountering grassland within the site boundary to approximately 175m from the roadside. The transect then crosses transitional communities, including a narrow band of mixed woodland, before encountering the mire;
  - Transect 2 crosses houses and gardens before encountering grassland within the site boundary to approximately 175m from the roadside. The transect then intersects with transitional communities within Wybunbury Moss at approximately 180m before exiting the site; and
  - Transect 3 extends across arable habitat outside of the site boundary to approximately 155m. The transect then intersects with a mosaic of transitional communities, including fen and mixed woodland, within Wybunbury Moss before encountering the mire, which continues through to the end of the transect.
- 4.2.6 The grassland communities do not represent qualifying features of Wybunbury Moss and so are considered to represent site fabric<sup>28</sup>, where the conservation objectives do not apply. However, to make the assessment more meaningful, conservative thresholds have been applied by using generic values for a grassland community more representative of a high quality neutral grassland than the improved or semi-improved sward it resembles.
- 4.2.7 For the 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,

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<sup>26</sup> This refers to Annex I of the Habitats Directive (Council Directive 92.43/EEC). The conservation of those habitats listed in Annex I, require the designation of SACs.

<sup>27</sup> The sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features, and areas capable of restoration to this habitat.

<sup>28</sup> 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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the SSSI values were chosen to inform this assessment. These also capture the communities described in the Ramsar citation.

4.2.8 Consequently, the air quality analysis has adopted the following critical loads:

- grassland (20kg N/ha/yr – 30kg N/ha/yr); and
- mire (5kg N/ha/yr – 10kg N/ha/yr).

4.2.9 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.

4.2.10 Given that bryophytes are considered to be an integral component of the qualifying wetland habitats, a critical level for NH<sub>3</sub> of 1µg/m<sup>3</sup> has been applied to the mire and its transitional habitats. As described above, the critical level for NO<sub>x</sub> is a constant (30µg/m<sup>3</sup>).

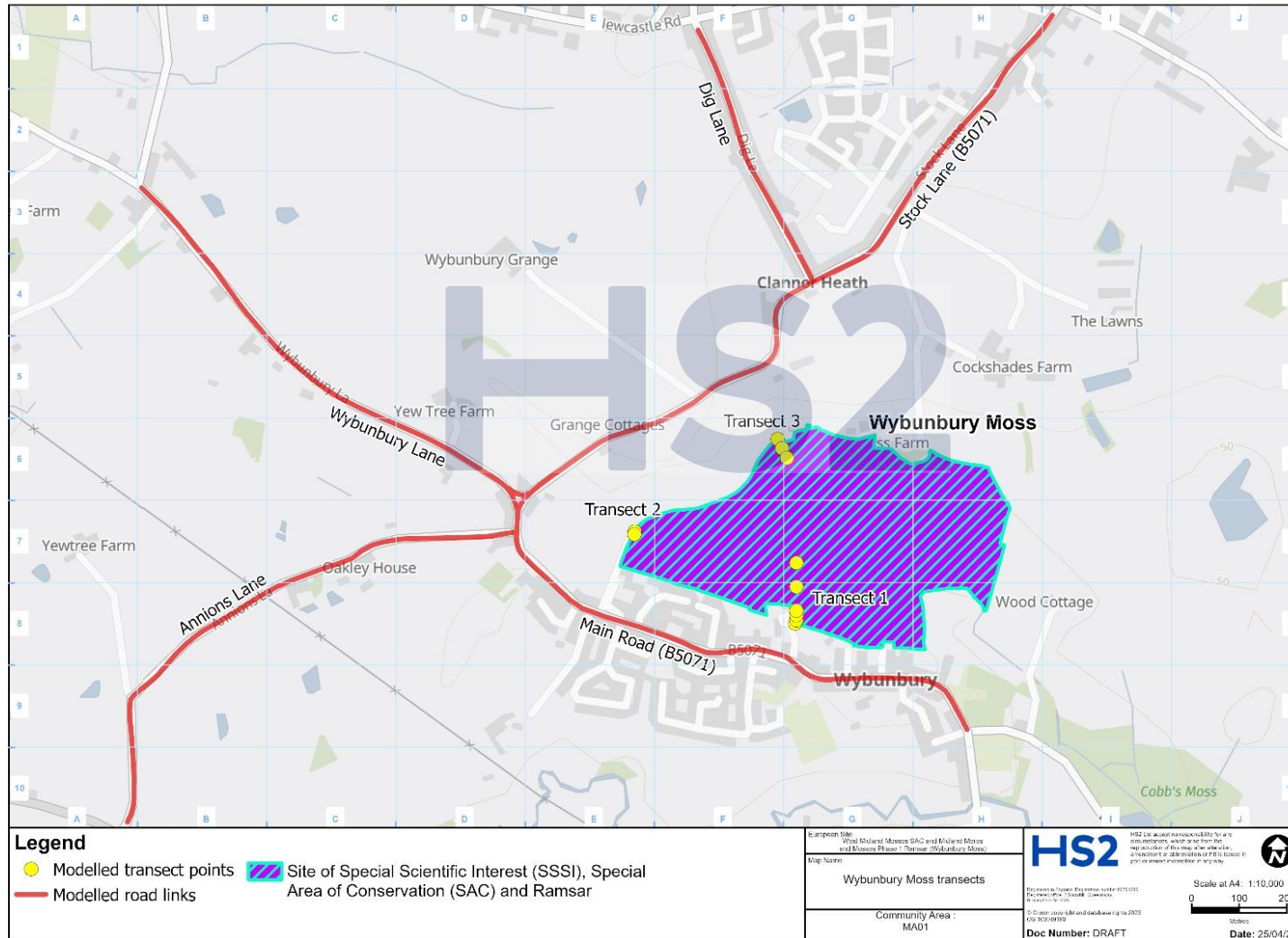
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**Figure 3: Location of Wybunbury Moss and the modelled transects**



## **Construction phase impacts in combination**

- 4.2.11 Table A5 of Annex A shows that NO<sub>x</sub> concentrations with the AP2 revised scheme are lower than the 2018 baseline at all modelled receptors (i.e. transect points). In addition, NO<sub>x</sub> concentrations are predicted to be within the air quality standard at all modelled receptors with or without the AP2 revised scheme. Furthermore, there is a less than 1% exceedance of the NO<sub>x</sub> critical level brought about by the AP2 revised scheme in combination. Therefore, likely significant effects in combination can be ruled out.
- 4.2.12 Table A6 of Annex A shows that NH<sub>3</sub> concentrations with the AP2 revised scheme are marginally lower than the 2018 baseline. However, NH<sub>3</sub> concentrations are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, the changes brought about by the AP2 revised scheme in combination, in places exceed or are equal to 1% of the critical level. The data show that the maximum change is 1.3% at 180m from the road on Transect 2. Therefore, likely significant effects in combination cannot be ruled out.
- 4.2.13 Table A7 of Annex A shows that nitrogen deposition rates with the AP2 revised scheme are lower than the 2018 baseline at all modelled receptors. However, nitrogen deposition rates are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, the changes brought about by the AP2 revised scheme in combination, in places exceed or are equal to 1% of the lower critical load. The data show that the maximum change is 1.5% at 180m from the road on Transect 2. Therefore, likely significant effects in combination cannot be ruled out.
- 4.2.14 Table A8 of Annex A shows that acid deposition rates with the AP2 revised scheme are marginally lower than the 2018 baseline. However, acid deposition rates are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, the changes brought about by the AP2 revised scheme in combination exceed 1% of the critical load at one point on Transect 2 at 180m from the road. Therefore, likely significant effects in combination cannot be ruled out.

## **Operational phase impacts in combination**

- 4.2.15 The traffic analysis (see section 408 of Annex A) indicates that the operation of the AP2 revised scheme in combination will not exceed the AADT or HDV traffic thresholds described in Section 3.2. Therefore, no air quality assessment is required.

## **4.3 Current status of the ongoing work**

- 4.3.1 At this current stage of design and assessment, it is considered that likely significant effects cannot be ruled out as a result of the AP2 revised scheme in combination during construction.

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- 4.3.2 Therefore, further and separate assessment of the AP2 revised scheme is being carried out to meet the needs of Regulation 63 of the Habitats Regulations. This will confirm the assessment conclusions at that stage of the design and assessment.



# **Annex A: Additional air quality information**

## **1 Purpose**

This annex provides additional air quality information in relation to impacts from vehicle emissions to support the assessment for the Midland Meres and Mosses Phase 2 Ramsar site and West Midland Mosses SAC (Wybunbury Moss).

This annex 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 annex 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 SMR (see Volume 5, Appendix: CT-001-00001) and accompanying SMR Technical note – Air quality: Guidance on the assessment methodology<sup>2</sup> and the SES2 and AP2 ES Volume 5, Appendix: CT-001-00003 Air quality – Technical note – Updated guidance on the assessment methodology for Phase 2b SES2 and AP2 ES. .

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 criteria<sup>17</sup>, to identify where assessment is required;
- these criteria are the following for assessing the impacts of the scheme:
  - 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; and
  - change in peak hour speed by 20kph or more.
- the following criteria are used 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; and
  - 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, Special Protection Areas (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; and
- a deposition velocity relevant to the habitat of each site has been used, as detailed in the IAQM ecological guidance<sup>21</sup>. Data on ammonia, nitrogen deposition and acid deposition has been taken from the most recent information available on the APIS<sup>24</sup> website. No plume depletion for ammonia dispersion modelling has been included. No reduction in future background deposition rates or background pollutant concentrations has been applied to the APIS data.

The following scenarios were assessed:

- baseline; and
- 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

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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.

The baseline scenario represents 2018.

For the construction assessments, emission factors and backgrounds (with the exception of the APIS data) used the earliest construction year (i.e. 2026). This is a worst case assumption as emissions from road vehicles are improving year-on-year (e.g. due to increasing numbers of electric vehicles) and the worst case construction period may not fall in the first year of construction.

For each assessment year, both the scenario without the AP2 revised scheme in place and the scenario with the AP2 revised scheme in place have been modelled, with background pollutant concentrations, deposition rates and emission factors representing the future year being assessed (with the exception of the APIS data). This comparison was used to assess the impacts of the AP2 revised scheme.

For the assessment of the AP2 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 (with the exception of the APIS data).

The assessment incorporated HS2 Ltd's policy on construction vehicle emissions standards. These standards are published in Information Paper E14<sup>29</sup>; Air Quality and include Euro VI for HGV, and Euro 6 and Euro 4 for diesel and petrol Light Duty Vehicles (LDV) respectively.

The traffic forecasts that underpin this report were derived from strategic traffic models that 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 AP2 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. It is understood that the strategic traffic models supplied to HS2 Ltd take account of the core development growth scenarios set out in the relevant local plan documents, transport strategy documents and model forecasting reports published at that time. Information about these development growth scenarios can be found in the following documents:

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<sup>29</sup> High Speed Two Ltd (2022), *High Speed Two Phase 2b Information Paper E14: Air Quality*. Version 2. Available online at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1084183/E14\\_Air\\_quality\\_v2.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1084183/E14_Air_quality_v2.pdf).

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- Cheshire East Local Plan Strategy 2010-2030, July 2017<sup>30</sup>;
- Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies, November 2017<sup>31</sup>;
- Winsford Transport Strategy Recommendations Report, June 2016<sup>32</sup>;
- Northwich Transport Strategy Recommendations Report, April 2018<sup>33</sup>;
- Regional Investment Programme (RIP) M6 Junction 19 Improvement PCF Stage 3 Transport Forecasting Report, January 2019<sup>34</sup>; and
- GMVDM4A Uncertainty Log for NTEM GMSF Full Scenario, Version 2, November 2018<sup>35</sup>.

In all cases, the traffic growth forecasts have been constrained to TEMPro version 7.2 which uses the National Trip End Model (NTEM 7.2 (2017))<sup>36</sup> 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.

Consideration was also given to relevant non-road plans and projects that could contribute to a cumulative increase in air pollution. Searches were carried out for the following non-traffic related emission sources (which were also included in the air quality model) within a 10km radius (unless stated otherwise below). This is considered to be reasonable and proportionate and meets the expectations in Section 4.48 of Natural England's guidance<sup>19</sup>:

- combustion and energy < 20MW (within 5km);
- combustion and energy > 20MW;
- farming, livestock and poultry;
- waste, e.g. landfill gas; and
- minerals activities.

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<sup>30</sup> Cheshire East Council (2022), *Local Plan Strategy 2010 – 2030*. Adopted 17 July 2017. Available online at: <https://www.cheshireeast.gov.uk/pdf/planning/local-plan/local-plan-strategy-web-version-1.pdf>.

<sup>31</sup> Cheshire West and Chester Council (2019), *Local Plan (Part Two) Land Allocations and Detailed Policies*. Adopted 18 July 2019. Available online at: <https://consult.cheshirewestandchester.gov.uk/kse/>.

<sup>32</sup> Mott MacDonald (2016), *Winsford Transport Strategy: Recommendations Report*. Available online at: [https://cheshirewestandchester.Appendix\\*20B\\*20Winsford\\*20Transport\\*20Strategy.pdf](https://cheshirewestandchester.Appendix*20B*20Winsford*20Transport*20Strategy.pdf).

<sup>33</sup> Mott MacDonald (2018), *Northwich Transport Strategy: Recommendations Report*. Available online at: <https://www.cheshirewestandchester.gov.uk/documents/parking-roads-and-travel/public-transport/transport-strategies/northwich-transport-strategy/northwich-transport-strategy-130318.pdf>.

<sup>34</sup> Highways England (2019), *Regional Investment Programme (RIP) M6 Junction 19 Improvement*. Issue Number 1.0. Available online at: <https://assets.highwaysengland.co.uk/roads/road-projects/M6+junction+19/Statement+of+Reasons.pdf>.

<sup>35</sup> TfGM (2018), *GMVDM4A Uncertainty Log for NTEM GMSF Full Scenario, Version 2*, November 2018, provided by personal communication to Mott MacDonald in December 2018.

<sup>36</sup> Department for Transport, TEMPro version 7.2. Available online at: <https://www.data.gov.uk/dataset/11bc7aaf-ddf6-4133-a91d-84e6f20a663e/national-trip-end-model-ntem>.

### 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<sub>x</sub>.

**Table A1: Air quality standards**

Pollutant	Averaging period	Standard
NO <sub>x</sub> (for protection of vegetation)	Annual mean	30µg/m <sup>3</sup>

In the context of air pollution impacts on ecological sites (e.g. in this case SAC, SPA and Ramsar sites), road traffic emits NO<sub>x</sub> and ammonia, which both contribute to nitrogen and acid deposition. Therefore, this assessment considers changes in NO<sub>x</sub> and ammonia as well as changes in nitrogen and acid deposition. Comparisons have been made against the applicable critical loads<sup>37</sup>, critical level or relevant standard for the site, as above or as provided by APIS.

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<sup>37</sup> 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) 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.

## 4 How significance is assessed

For the assessment of NO<sub>x</sub> 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<sub>x</sub> concentration change by more than 1% then the assessment of significance will be undertaken by an ecologist and reported within the main report.

For the assessment of ammonia (NH<sub>3</sub>), if the change is predicted to be less than 1% of the air quality critical level<sup>38</sup>, then the effect is considered to be not significant. However, should the concentration change by more than 1%, then the assessment of significance will be undertaken by an ecologist and reported within the main report.

For the assessment of nitrogen deposition, if the change is predicted to be less than 1% of the lower critical load<sup>37</sup>, 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 within the main report.

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 within the main report.

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<sup>38</sup> The critical level for NH<sub>3</sub> is 3µg/m<sup>3</sup> for low level vegetation and 1µg/m<sup>3</sup> high vegetation (e.g., trees).

## **5 Assessment of construction traffic effects – AP2 revised scheme**

### **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 – AP2 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 (2026 – 2039). Traffic data is presented in Table A2.

The screening process identified two roads in the area exceeding the screening thresholds:

- the B5071 Stock Lane; and
- the B5071, Main Road.

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 AP2 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 AP2 revised scheme in combination with traffic growth from the baseline year.



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**Table A2: Traffic data summary (construction phase, AP2 revised scheme in combination)**

Road ID	Road Name	Annual Average Daily Traffic (AADT)				Heavy Duty Vehicles (HDV)			
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	In combination change (2026 with the AP2 revised scheme – 2018 baseline)	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	In combination change (2026 with the AP2 revised scheme – 2018 baseline)
11006_14023	Dig Lane	943	1,624	1,868	925	0	0	0	0
11019_14023	B5071, Stock Lane	2,803	3,201	3,468	664	16	16	16	0
14011_14015	Annions Lane	696	1,027	1216	520	0	0	0	0
14012_14014	Wybunbury Lane	1,868	1,853	1824	-44	0	0	0	0
14014_14016_01	Wybunbury Lane	1,744	1,553	1,388	-356	0	0	0	0
14014_14017_01	Wybunbury Lane	124	301	436	312	0	0	0	0
14015_14016	B5071, Main Road	5,366	6,077	6,287	921	16	16	16	0
14015_14019	B5071, Main Road	4,766	5,145	5,166	400	16	16	16	0
14016_14017	B5071, Main Road	3,622	4,525	4,899	<b>1,277</b>	16	16	16	1
14017_14023	B5071, Stock Lane	3,746	4,825	5,335	<b>1,589</b>	16	16	16	0
14019_14015	B5071, Main Road	4,766	5,145	5,166	400	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

Table A3 shows the background concentrations for NO<sub>x</sub>, background nitrogen deposition and critical loads. Table A4 shows the background acid deposition, critical loads and background ammonia concentrations. Figure A1 presents a detailed map of the modelled area including assessed roads (modelled road links in red) and modelling transect points (yellow dots).

**Table A3: Modelled ecological receptor NO<sub>x</sub> and nitrogen deposition backgrounds and critical loads (construction phase)**

Receptor	Sensitive habitat	2018 NO <sub>x</sub> background concentration (µg/m <sup>3</sup> )	2026 NO <sub>x</sub> background concentration (µg/m <sup>3</sup> )	APIS data of average total nitrogen deposition (kg N/ha/yr)	APIS Critical load (kg N/ha/yr)
Wybunbury Moss	Deciduous woodland	9.3	7.0	60.5	10
	Grassland	9.3	7.0	34.4	Not sensitive
	Bog	9.3	7.0	34.4	5

**Table A4: Modelled ecological receptor acid deposition backgrounds, critical loads and ammonia background concentrations (construction phase)**

Receptor	Sensitive habitat <sup>39</sup>	APIS data of average total acid deposition (kg eq/ha/yr)	Critical load (kg eq/ha/yr) (min)	Critical load (kg eq/ha/yr) (max)	APIS Ammonia background concentration (µg/m <sup>3</sup> )
Wybunbury Moss	Deciduous woodland	4.4	0.1	1.2	5.0
	Grassland	2.5	Not sensitive	Not sensitive	5.0
	Bog	2.5	0.3	0.6	5.0

<sup>39</sup> 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.

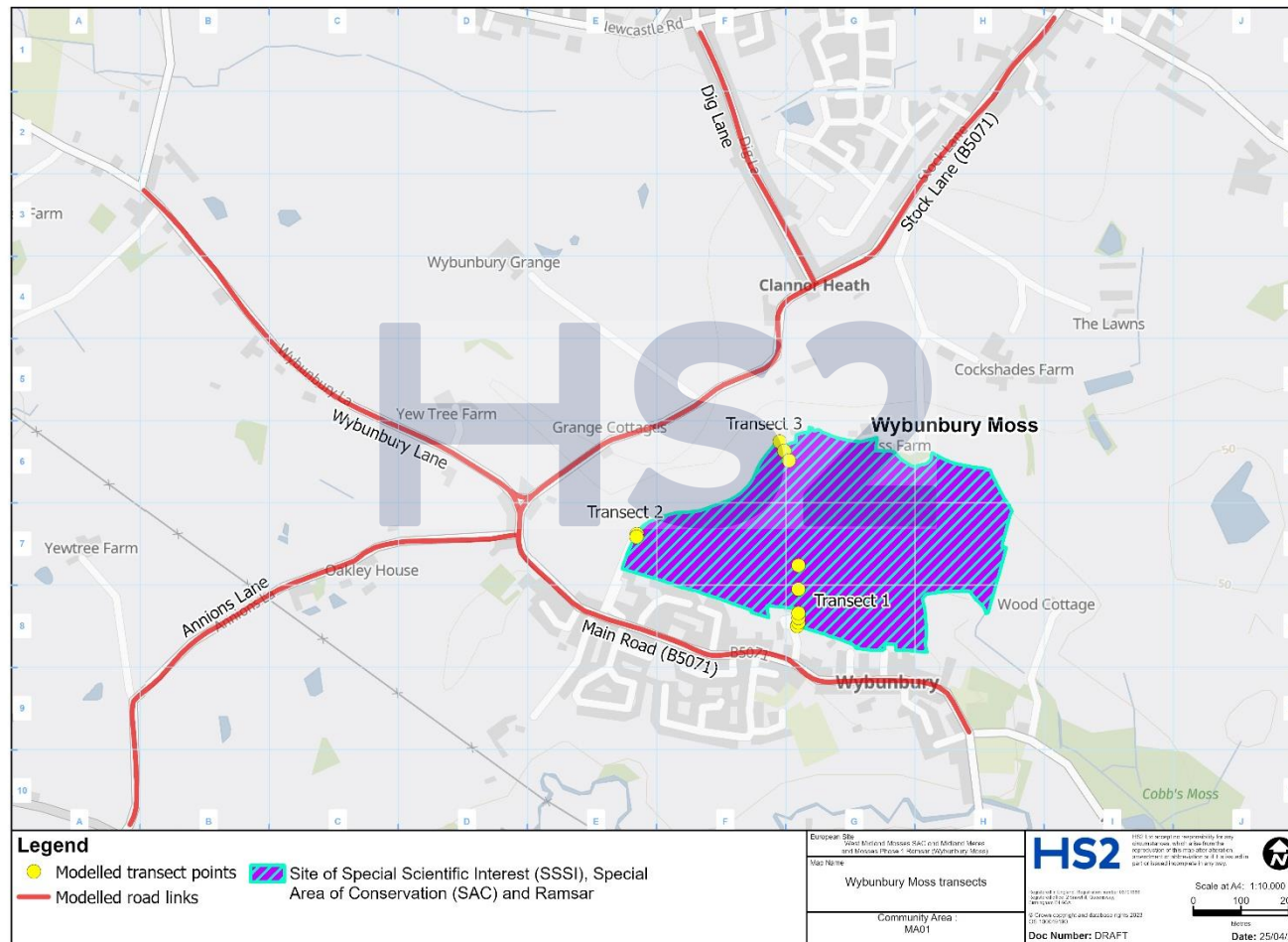
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**Figure A1: Map of Wybunbury Moss, including modelled road links and modelled transect points**



## 6.4 Assessment results

Table A5 presents a summary of the modelled NO<sub>x</sub> concentrations for the ecological site, the change in concentration and a comparison against the air quality standard (30µg/m<sup>3</sup>).

Table A6 presents a summary of the ammonia concentration results taken from the National Highways Ammonia N Deposition Tool<sup>18</sup>, change in concentration and percentage change in relation to the critical level.

Table A7 presents a summary of the modelled nitrogen deposition, with an additional ammonia component applied using the National Highways Ammonia N Deposition Tool, change in deposition and percentage change in relation to the lower critical load.

Table A8 presents a summary of the modelled acid deposition, with an additional ammonia component applied using the National Highways Ammonia N Deposition Tool, and percentage change in deposition and percentage change in relation to the critical load.

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Ecology and biodiversity

Designated site assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss)

**Table A5: Assessment of NOx concentrations at ecological sites (construction phase, AP2 revised scheme in combination)**

Ecological site	Sensitive habitat	Distance to road (m)	NOx concentrations (µg/m <sup>3</sup> )			Change in NOx concentrations (µg/m <sup>3</sup> )	Comparison against air quality standard (30µg/m <sup>3</sup> )	Percent change in relation to air quality standard
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
Wybunbury Moss Transect 1 (South)	Grassland	70	12.79	8.65	8.81	0.16	Within standard	0.5%
	Grassland	80	12.50	8.51	8.66	0.15	Within standard	0.5%
	Grassland	100	11.97	8.27	8.40	0.13	Within standard	0.4%
	Grassland	150	11.22	7.92	8.02	0.10	Within standard	0.3%
	Bog	200	10.82	7.73	7.82	0.09	Within standard	0.3%
Wybunbury Moss Transect 2 (South West)	Grassland	175	11.35	7.98	8.12	0.14	Within standard	0.5%
	Bog	180	11.32	7.97	8.11	0.14	Within standard	0.5%
Wybunbury Moss Transect 3 (North)	Outside of designation	155	10.45	7.56	7.69	0.13	Within standard	0.4%
	Bog	175	10.40	7.54	7.66	0.12	Within standard	0.4%
	Bog	200	10.37	7.53	7.63	0.11	Within standard	0.4%

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Designated site assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss)

**Table A6: Assessment of ammonia (NH<sub>3</sub>) at ecological sites (construction phase, AP2 revised scheme in combination)**

Ecological site	Sensitive habitat	Distance to road (m)	NH <sub>3</sub> concentrations (µg/m <sup>3</sup> )			Change in NH <sub>3</sub> concentrations (µg/m <sup>3</sup> )	Comparison against critical level (3µg/m <sup>3</sup> for low and 1µg/m <sup>3</sup> high vegetation)	Percent change in relation to critical level
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
Wybunbury Moss Transect 1 (South)	Grassland	70	5.13	5.10	5.11	0.01	Above standard	0.5%
	Grassland	80	5.11	5.09	5.10	0.01	Above standard	0.4%
	Grassland	100	5.09	5.06	5.07	0.01	Above standard	0.4%
	Grassland	150	5.05	5.03	5.04	0.01	Above standard	0.3%
	Bog	200	5.03	5.02	5.02	<0.01	Above standard	0.8%
Wybunbury Moss Transect 2 (South West)	Grassland	175	5.06	5.04	5.05	0.01	Above standard	0.4%
	Bog	180	5.06	5.04	5.05	0.01	Above standard	1.3%
Wybunbury Moss Transect 3 (North)	Outside of designation	155	5.01	5.00	5.01	0.01	Above standard	Not sensitive
	Bog	175	5.01	5.00	5.01	0.01	Above standard	1.0%
	Bog	200	5.01	5.00	5.01	0.01	Above standard	0.9%

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**Table A7: Assessment of nitrogen deposition with ammonia at ecological sites (construction phase, AP2 revised scheme in combination)**

Ecological site	Sensitive habitat	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	2026 do nothing	2026 with the AP2 revised scheme			
Wybunbury Moss Transect 1 (South)	Grassland	70	35.58	35.27	35.35	0.08	Not sensitive	Not sensitive
	Grassland	80	35.49	35.19	35.27	0.08	Not sensitive	Not sensitive
	Grassland	100	35.30	35.06	35.13	0.07	Not sensitive	Not sensitive
	Grassland	150	35.05	34.88	34.93	0.05	Not sensitive	Not sensitive
	Bog	200	34.92	34.78	34.82	0.04	5.0	1.0%
Wybunbury Moss Transect 2 (South West)	Grassland	175	35.10	34.91	34.99	0.08	Not sensitive	Not sensitive
	Bog	180	35.09	34.90	34.98	0.08	5.0	1.5%
Wybunbury Moss Transect 3 (North)	Outside of designation	155	34.79	34.69	34.76	0.07	Not sensitive	Not sensitive
	Bog	175	34.77	34.67	34.74	0.07	5.0	1.2%
	Bog	200	34.76	34.67	34.72	0.05	5.0	1.2%

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Designated site assessment for the Midland Meres and Mosses Phase 1 Ramsar site and the West Midland Mosses Special Area of Conservation (Wybunbury Moss)

**Table A8: Assessment of acid deposition with ammonia at ecological sites (construction phase, AP2 revised scheme in combination)**

Ecological Site	Sensitive habitat	Distance to road (m)	Acid deposition (k eq/ha/yr)			Change in acid deposition (k eq/ha/yr)	Change in acid deposition as percent of CLNmax	Total with AP2 revised scheme acid deposition as percent of CLNmax
			2018 baseline	2039 do nothing	2039 with the AP2 revised scheme			
Wybunbury Moss Transect 1 (South)	Grassland	70	2.60	2.58	2.59	0.01	Not sensitive	Not sensitive
	Grassland	80	2.60	2.58	2.58	<0.01	Not sensitive	Not sensitive
	Grassland	100	2.58	2.57	2.57	<0.01	Not sensitive	Not sensitive
	Grassland	150	2.56	2.55	2.56	0.01	Not sensitive	Not sensitive
	Bog	200	2.56	2.55	2.55	<0.01	0.6%	454.4%
Wybunbury Moss Transect 2 (South West)	Grassland	175	2.57	2.56	2.56	<0.01	Not sensitive	Not sensitive
	Bog	180	2.57	2.55	2.56	0.01	1.0%	456.3%
Wybunbury Moss Transect 3 (North)	Outside of designation	155	2.55	2.54	2.54	<0.01	Not sensitive	Not sensitive
	Bog	175	2.55	2.54	2.54	<0.01	0.8%	453.3%
	Bog	200	2.54	2.54	2.54	<0.01	0.7%	453.1%



## 6.5 Assessment of significance

NO<sub>x</sub> concentrations at the Wybunbury Moss are predicted to be within the air quality standard in all scenarios. The changes in NO<sub>x</sub> concentrations between the 2026 do nothing scenario and with the AP2 revised scheme in combination scenario are less than 1% of the air quality standard and therefore not significant.

NH<sub>3</sub> concentrations at the Wybunbury Moss are predicted to be above the air quality critical level in all scenarios. Changes in NH<sub>3</sub> concentrations are greater than 1% of the air quality standard at the bog habitat at Transects 2 and 3, up to a distance of between 175m and 200m from the road at Transect 3. Potentially significant effects are therefore predicted, and this is addressed further in Section 3.2 of the main report.

Nitrogen deposition rates are predicted to be above the relevant critical load up to 200m from both roads (where the critical load applies) in the baseline and future scenarios with or without the AP2 revised scheme in combination. Predicted nitrogen deposition rates in 2026, with the AP2 revised scheme in combination, are lower than the 2018 baseline rates at all modelled locations. The changes in nitrogen deposition between the 2026 do nothing scenario and with the AP2 revised scheme in combination scenario are greater than 1% of the relevant critical load at the bog habitat at Transects 2 and 3. Potentially significant effects are therefore predicted, and this is addressed further in Section 3.2 of the main report.

Acid deposition rates are predicted to be above the critical load up to 200m from the road (where the critical load applies) in all scenarios with or without the AP2 revised scheme in combination. The changes in acid deposition between the 2026 do nothing scenario and with the AP2 revised scheme in combination scenario are less than or equal to 1% of the maximum critical load. No potentially significant effects are therefore predicted due to acid deposition.

## **7 Assessment of operational traffic effects – AP2 revised scheme**

### **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 – AP2 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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