In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix EC-016-00007

Ecology and biodiversity

Document to inform a Habitats Regulations Assessment for the Midland Meres and Mosses Phase 1 Ramsar site (Tatton Meres)

M143

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix EC-016-00007

Ecology and biodiversity

Document to inform a Habitats Regulations Assessment for the Midland Meres and Mosses Phase 1 Ramsar site (Tatton Meres)

M143

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.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

A report prepared for High Speed Two (HS2) Limited:

ARUP+ ERM | FOSTER + PARTNERS | JACOBS
RAMBOLL | TYPSA | COSTAIN

MWJV
Mott MacDonald | WSP

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.

recycle

Printed in Great Britain on paper containing 100% recycled fibre.

Contents

Tables

Figures

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 Habitat 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). London, Her Majesty's Stationery Office.

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 Habitat 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 Tatton Meres Site of Special Scientific Interest (SSSI) is situated approximately 1.9km west of land required for the construction of the Proposed Scheme. It is one of 16 component SSSI of the Midland Meres and Mosses Phase 1 Ramsar site (or European site), distributed across Cheshire, Shropshire and beyond (Figure 1).

1.2.2 This document updates the HRA Screening Report for The Midlands Meres and Mosses Phase 1 Ramsar site[2], prepared in 2012. The 2012 HRA explored ten potential route options and, although it identified potential impacts on the surface water hydrological regime of Tatton Meres, likely significant effects were ruled out. This outcome remains valid.

1.2.3 This new HRA is required to take account of new traffic data which has identified that changes in traffic flows are primarily the result of increased traffic growth along the B5085 Mobberley Road, Knutsford. In turn, this could increase air pollution where it lies in proximity to Tatton Meres SSSI.

1.2.4 In addition, the potential for air pollution effects arising from the Proposed Scheme has required review of the assessments carried out for two other components of the Ramsar site: The Mere, Mere SSSI (see Volume 5: Appendix EC-016-00003) and Wybunbury Moss SSSI (see Volume 5: Appendix EC-016-00009).

1.2.5 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

[2] High Speed Two Ltd (2012), *HS2 Phase 2 HRA Screening Report for Midland Meres and Mosses Phase 1 Ramsar Site*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627056/E52_EC-017-001_WEB.pdf.

(amendment) (EU Exit) Regulations 2019[3]. It is informed by contemporary Department for Environment, Food and Rural Affairs (Defra), and Ministry of Housing, Communities and Local Government (MHCLG) guidance[4,5] and best practice. Where relevant, it takes full account of case law including the People Over Wind[6] and Wealden[7] judgements amongst others.

[3] 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.

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

[5] Ministry of Housing, Communities & Local Government (2019), *Planning Practice Guidance*. Available online at: https://www.gov.uk/guidance/appropriate-assessment.

[6] 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).

[7] Wealden District Council v SS Communities and Local Government, Lewes District Council and South Downs National Park Authority (2017), High Court of Justice, Case CO/3943/2016 No EWHC 351.

2 Context

2.1 Description of the Proposed Scheme

2.1.1 The Proposed 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). Tatton Meres is situated approximately 1.9km west of land required for the construction of the Proposed Scheme in the Hulseheath to Manchester Airport area (MA06). Here, the route of the Proposed Scheme will extend from Hulseheath in the west and will travel north-east towards Manchester Airport, and comprise 870m of viaducts, 6.3km of cuttings, 3.2km of embankments, a 235m long box structure and a 133m long tunnel, before entering the Manchester Tunnel South Portal in the Davenport Green to Ardwick area (MA07).

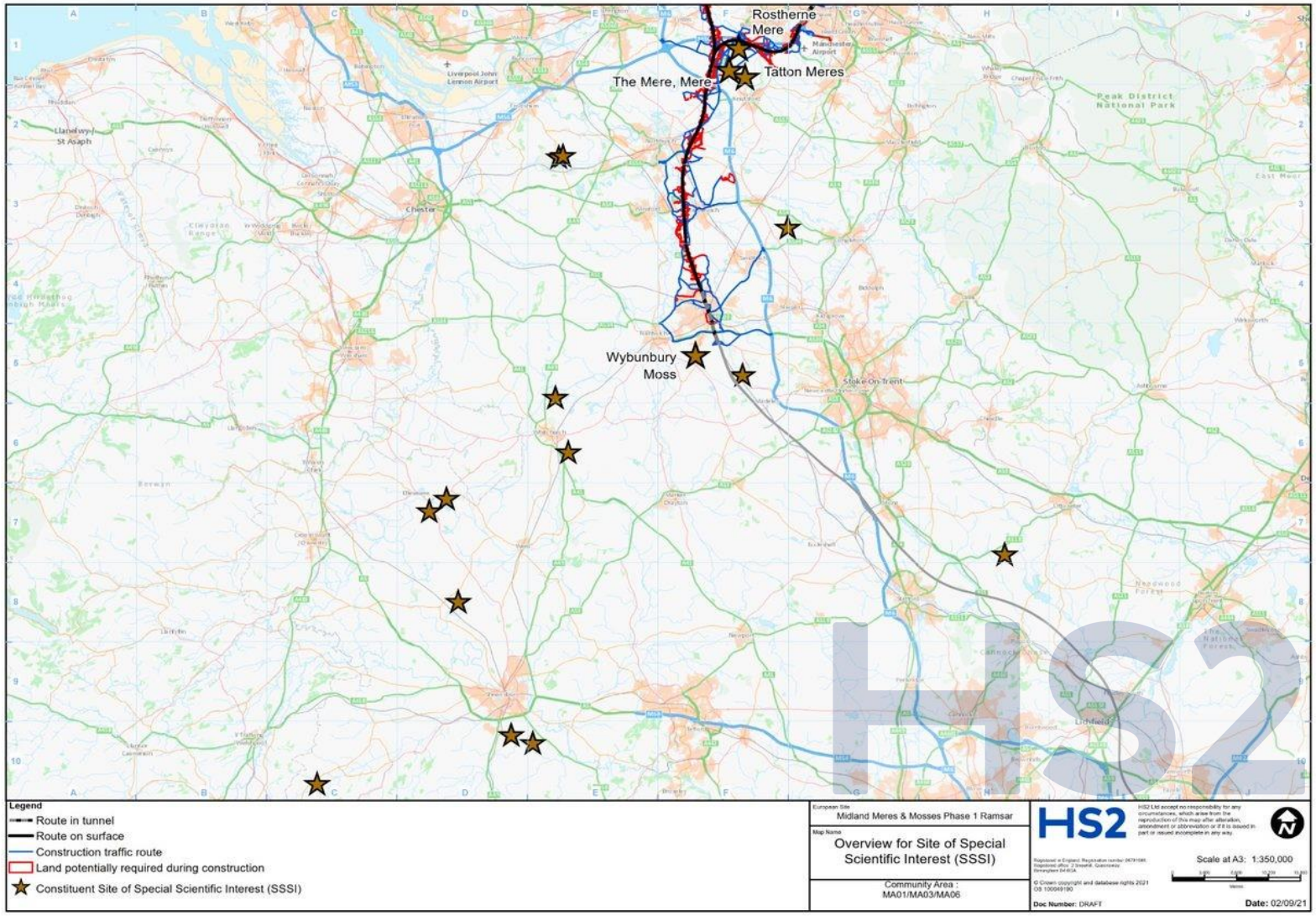
2.1.2 The Proposed Scheme, along with general growth in the area from the 2018 Base Year, will result in a change to traffic flows, and associated emissions, along the B5085 Mobberley Road which, at its closest point lies approximately 163m to the south-east of Tatton Meres.

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 Tatton Meres and other constituent SSSI relevant to the Proposed Scheme.

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



2.2.2 The Ramsar Information Sheet[8] identifies that the site 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 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.'

Tatton Meres SSSI

2.2.3 As Natural England does not produce conservation objectives, supplementary advice or site improvement plans for Ramsar sites, evidence is drawn from the citation[9] for Tatton Meres SSSI (which was notified for broadly similar reasons) and its draft Conservation objectives[10].

2.2.4 Tatton Meres SSSI extends over 90ha and comprises four discrete, eutrophic water bodies. Tatton Mere, the largest, lies in the centre with Melchett Mere to the north. Knutsford Moor (or 'The Moor') is made up of two water bodies and lies to the south. The SSSI citation identifies that Tatton Meres supports an extensive submerged macrophyte flora including autumnal pondweed (*Callitriche hermaphroditica),* stiff-leaved water crowfoot (*Ranunculus circinatus*) and spiked water-milfoil (*Myriophyllum spicatum*) amongst others. Melchett Mere is similar with the addition of slender spike-rush and is surrounded by swamp, fen and flushed pasture. Knutsford Moor supports one of the largest examples of fen and reedswamp in Cheshire. Whilst dominated by common reed, it also supports marsh fern (*Thelypteris thelypteroides*), cowbane (*Cicuta virosa*) and Cyperus sedge (*Carex pseudocyperus*). Alder (*Alnus glutinosa*)-dominated wet woodland surrounds the entire site. The Ramsar Information Sheet identifies eutrophication and invasive species as threats at the time of production (1994).

Conservation objectives

2.2.5 In lieu of formal Ramsar conservation objectives, the SSSI conservation objectives have been considered. These are regarded to be a reasonable surrogate for the Ramsar conservation

[8] 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.

[9] English Nature (1979), *Citation for Tatton Meres, SSSI.* Available online at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1003604.pdf.

[10] Natural England (2008), *(Draft) Conservation objectives and definitions of favourable condition for designated features of interest. Tatton Meres*.

objectives for the site. An extract of the most relevant higher-level targets is provided below, but reference to the entire document is encouraged for additional detail:

> '… subject to natural change, to maintain the following habitats … in favourable condition (*[11]), with particular reference to any dependent component special interest features (habitats, vegetation types, species, species assemblages etc.) for which the land is designated… '

- fen, marsh and swamp; and
- standing open water[12].

2.2.6 The Site-Specific Definitions of Favourable Condition for Fen, Marsh and Swamp are 'To maintain the fen, marsh and swamp at Tatton Meres in favourable condition, with particular reference to relevant specific designated interest features:

- habitat composition: no loss of variety of habitat within the site, including open water, swamp, fen and marshy grassland communities;
- vegetation composition (positive indicators):
  - S4 *Phragmites australis* reedswamp: *Phragmites australis* forming a closed or openstand; >90% cover;
  - associated species (*Typha latifolia, T. angustifolia, Carex riparia, Cladium mariscus*, *Berula erecta*) to be present and locally prominent, but <5% cover;
  - S14 *Sparganium erectum* swamp: *Sparganium erectum* to be constant*;*
  - S20 *Schoenoplectus tabernaemontani* swamp: *Schoenoplectus tabernaemontani t*o be constant; and
  - local distinctiveness: Presence of *Carex binervis, Carex elata, Cicuta virosa, Osmunda regalis, Ranunculus circinatus, Schoenoplectus tabernaemontani, Thelypteris palustris, Triglochin palustre, Ranunculus circinatus*'.

2.2.7 The Site-Specific Definitions of Favourable Condition for Open Water are 'To maintain the standing open water at Tatton Meres in favourable condition, with particular reference to relevant specific designated interest features:

- vegetation composition:
  - no reduction in the number of native aquatic species occurring in the meres;
  - non-native species should be no more than rare;
  - community structure; and

[11] (*) or restored to favourable condition if features are judged to be unfavourable'.

[12] It should be noted that Table 1 of the objectives also lists 'woodland' as a Ramsar feature but no specific objectives for this habitat are provided other than to note the loss of some woodland to fen/marsh/swamp would be acceptable. Consequently, in this HRA woodland is not considered to be a qualifying feature of the Ramsar site.

  - some beds of submerged macrophytes should be present.
- water quality:
  - total phosphorus <35 ug/l; and
  - pH >7.0 and <9.0'.

2.2.8 Whilst it is clear the above communities represent elements of the 'diverse range of habitats [and] rare species of plants …' described in the Ramsar Information Sheet, it is noted that there is no specific reference to the assemblage of rare invertebrates provided in either the favourable condition tables (FCT) or SSSI citation. Consequently, these are considered to be absent, and no consideration is given to these in this report to inform HRA. If, however, they are shown to be present, their requirements are considered to be satisfactorily addressed by the assessment of the supporting habitats.

Condition assessment

2.2.9 Natural England's most recent condition monitoring assessment of Tatton Meres was carried out in 2009[13] and would have been informed by the conservation objectives. This found that 50.89% of the site, comprising units 6, 8 and 9 (comprising both terrestrial and aquatic habitats) was considered to be in 'favourable' condition. In contrast, 49.11%, comprising Knutsford Moor and Tatton Mere (units 3 and 7, respectively[14]), which lie closest to the B5085 Mobberley Road, were assessed as 'unfavourable no change'. The reason for the unfavourable status appeared to be the presence of invasive species.

2.2.10 Whilst the most recent assessment was carried out seven years ago, there is little to suggest circumstances have changed and, overall, it is assumed that approximately half of Tatton Meres remains in an unfavourable condition and vulnerable to external influences. Given this, the objectives are interpreted not as 'to maintain' but 'to restore' the qualifying features in these areas.

2.3 Changes in evidence since 2012 HRAs

Reliance on previous HRAs

2.3.1 The original 2012 HRA concluded that likely significant effects on the hydrological regime of Tatton Meres could be ruled out, an outcome that was subsequently endorsed by Natural England. Defra guidance[4] allows competent authorities to rely on previous HRAs if they remain both robust and up to date, or, in other words, that there has been no material

[13] Natural England (2021), *Condition of SSSI Units for Site Tatton Meres SSSI.* Available online at: https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1003604&ReportTitle=Tatton%20Meres%20SSSI.

[14] Note that units 1, 2, 4 & 5 have been replaced by units 3, 6, 7, 8 & 9.

change in evidence in the intervening period. In terms of broad design parameters, the identification of potential impacts and vulnerable sites, for example, much within the original HRAs remains valid and where possible, these elements are relied upon in this report.

2.3.2 However, a new HRA will be needed where new issues have arisen, in this case air pollution, which have either not been evaluated before or where previous assessments ruled out harmful effects on the basis of evidence available at the time. Similarly, the HRA will have to take account of new case law, such as the Wealden decision and People Over Wind. Furthermore, new plans and projects nearby could either affect the environmental baseline or influence any in-combination assessment. In addition, the ecological and hydrological characteristics of Tatton Meres are now better understood and will require consideration. These are discussed below.

Ecological characteristics of Tatton Meres

2.3.3 The conservation objectives for Tatton Meres remain unchanged and valid. However, a 'Lake Management Plan for Tatton Meres SSSI' was produced in 2014[15]. This evidence informs understanding of the structure and function of the site although there has been no apparent update of the objectives and no subsequent condition assessment.

Design changes

2.3.4 Whilst the broad parameters of the Proposed Scheme remain largely unchanged, recent design changes will require the re-evaluation of previous outcomes; it is now apparent that the southern corner of Tatton Meres lies within 200m of a construction traffic route. This means there is a credible risk that this could result in increased air pollution within the site and so merits a new assessment.

2.4 Case law

2.4.1 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

2.4.2 The People Over Wind judgement (2017) 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 HS2, can be considered at screening whereas the latter are reserved for consideration in an appropriate assessment.

[15] APEM (2014), *Lake Management Plan for Tatton Meres SSSI*.

Wealden judgement

2.4.3 The Wealden judgement (2017) 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(3), the need to consider in-combination assessment, is also carried through into the appropriate assessment if one is necessary.

Dutch Nitrogen case

2.4.4 Here, the Court of Justice of the European Union (CJEU)[16] 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

2.4.5 This case[17] 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 …'.

[16] 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), Env. L.R. 27 at paragraph 30.

[17] 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 effect

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'[18] 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'[19];
- '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'[20]; 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'[21].

3.2 Potential impacts on Tatton Meres

3.2.1 Tatton Meres lie approximately 1.9km south of land required for the construction of the Proposed Scheme and so direct effects can be ruled out confidently. Similarly, evidence presented within the 2012 HRA allows impacts on the local hydrological regime to also be ruled out; this stated:

> 'The proposed routes do not intersect the contributing surface water catchment and there are no sections of route in cut through any aquifer which could affect flows into Tatton Mere. There will be no impact on the hydrology of this site.'

3.2.2 Consequently, the only credible threat that could affect this component of the Ramsar site is air pollution from vehicles making use of the B5085 Mobberley Road during construction

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

[19] 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.

[20] Waddenzee at paragraphs 44 and 45.

[21] 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, EWCA Civ. 1061 at paragraphs 36 and 37.

and/or operation of the Proposed Scheme; there are no other credible threats. Consequently, this single factor is assessed below.

3.3 Screening test on Tatton Meres

Methodology

3.3.1 The assessment of air pollution is influenced by established best practice provided by Highways England (the Design Manual for Roads and Bridges (DMRB))[22], Natural England[23] and the Institute for Air Quality Management (IAQM)[24]. Together, these make clear that vehicle emissions can increase the airborne concentration of nitrogen oxides (NO_x) and the subsequent rate of nitrogen deposition. The latter can lead to nutrient enrichment and, over time, not only hinder the growth, abundance and distribution of (especially lower) plants, but can also prompt the growth of ruderal species which can lead to changes in structure and function of qualifying habitats. Whilst certain species and communities are less susceptible to harm than others, nitrogen deposition can also exacerbate the effects of other factors such as climate change or pathogens leading to negative, synergistic effects.

3.3.2 The rate of nitrogen deposition falls quickly in the first few metres from the roadside before gradually levelling out; beyond 200m, it becomes difficult to distinguish from background levels. In other words, impacts at 10m, 50m or more can be very different from those at the roadside, and beyond 200m significant effects can be ruled out.

3.3.3 Assessment of nitrogen deposition is required for ecologically sensitive sites within 200m of roads where one or more of the following DMRB criteria are met:

- 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 Heavy Duty Vehicles (HDV)[25] by 200 AADT or more;
- change in daily average speed by 10kph or more; or
- change in peak hour speed by 20kph or more.

[22] 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/dmrb/.

[23] Natural England (2018), *Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations* – v1.4 Final. Available online at: http://publications.naturalengland.org.uk/publication/4720542048845824.

[24] Holman et al (2019), *A guide to the assessment of air quality impacts on designated nature conservation sites* – version 1.0. The Institute for Air Quality Management. Available online at: https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2019.pdf.

[25] HDVs 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.

3.3.4 It can be seen, therefore, that the additional nitrogen deposition that might arise from increased traffic is only likely to be significant where: a European site lies within 200m of a road; and, traffic flows are expected to increase (or other DMRB criteria are met); and, a feature is known to be sensitive to such effects. Should these criteria be met, best practice recommends that the ecological characteristics of the site should be explored and, if necessary, traffic and/or air quality assessments of traffic flows carried out to evaluate any impacts during construction or subsequent operation as appropriate.

3.3.5 The ecological characteristics of a site are derived from the formal citations, condition assessments, conservation objectives, FCT, site improvement plans (SIP), supplementary advice and any other surveys and management plans where available. Traffic flows are assessed by calculating AADT figures. The latter introduces further thresholds and, where changes in flows (alone and in-combination) are less than 1,000 AADT[26] 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 nitrogen deposition for the individual qualifying features. The air quality analysis typically models the rates of deposition at fixed points on a 200m transect extending from the roadside.

3.3.6 The critical level for NO_x is fixed and is expressed as a concentration: 30µg/m^3. It is a precautionary threshold below which there can be confidence that harmful effects on vegetation will not arise, and further assessment may not be necessary. If exceeded, assessment of critical loads is required. 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, 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.

3.3.7 Should nitrogen deposition increase by less than 1% of the lower critical load, likely significant effects can be ruled out. However, should the 1% threshold be exceeded, a significant effect cannot be ruled out and an appropriate assessment will be required. It should be noted that the 1% threshold, set at two orders of magnitude below the critical load, is highly precautionary. Furthermore, an exceedance of the threshold does not mean that a significant (or adverse) effect will automatically occur, it only represents a trigger that prompts further assessment. Indeed, this emphasises that assessment is not about establishing a simple mathematical relationship. Account must 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.

[26] These values are utilised as there is evidence to show that these equate approximately to a 1% change in critical loads (see Section 4.25 of Natural England Guidance document).

3.3.8 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 condition of the qualifying features to aiming to restore them 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 Section 2.2.

3.3.9 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 Tatton Meres 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.

3.3.10 To determine whether a formal screening exercise is required, this 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 follows.

Initial assessment

Background

3.3.11 Key information is presented in Annex A which summarises the associated air quality analysis. The following assessment draws on best practice (from Natural England and DMRB) and utilises selected information from Annex A though reference to the latter is encouraged.

Proximity

3.3.12 Tatton Meres lie approximately 163m from the B5085 Mobberley Road, well within the 200m threshold. Consequently, a traffic assessment is required.

Traffic assessment

3.3.13 The Proposed Scheme will result in a change to traffic flows, and associated emissions, along the B5085 Mobberley Road. The change in traffic flows is primarily a consequence of the Proposed Scheme and general growth in traffic volumes over the 2018 Base Year.

3.3.14 Traffic analysis (see Table A2 and Table A9 of Annex A) indicates that the construction of the Proposed Scheme will result in traffic flows that exceed 1,000 AADT only on the B5085

Mobberley Road during both construction and operation, both alone and in combination with other plans or projects. The thresholds were not exceeded on any other roads, including King Street which lies closer to Tatton Meres. Consequently, likely significant effects cannot be ruled out alone or in-combination, and a formal screening exercise and air quality assessment of traffic flows will be required. This is provided below.

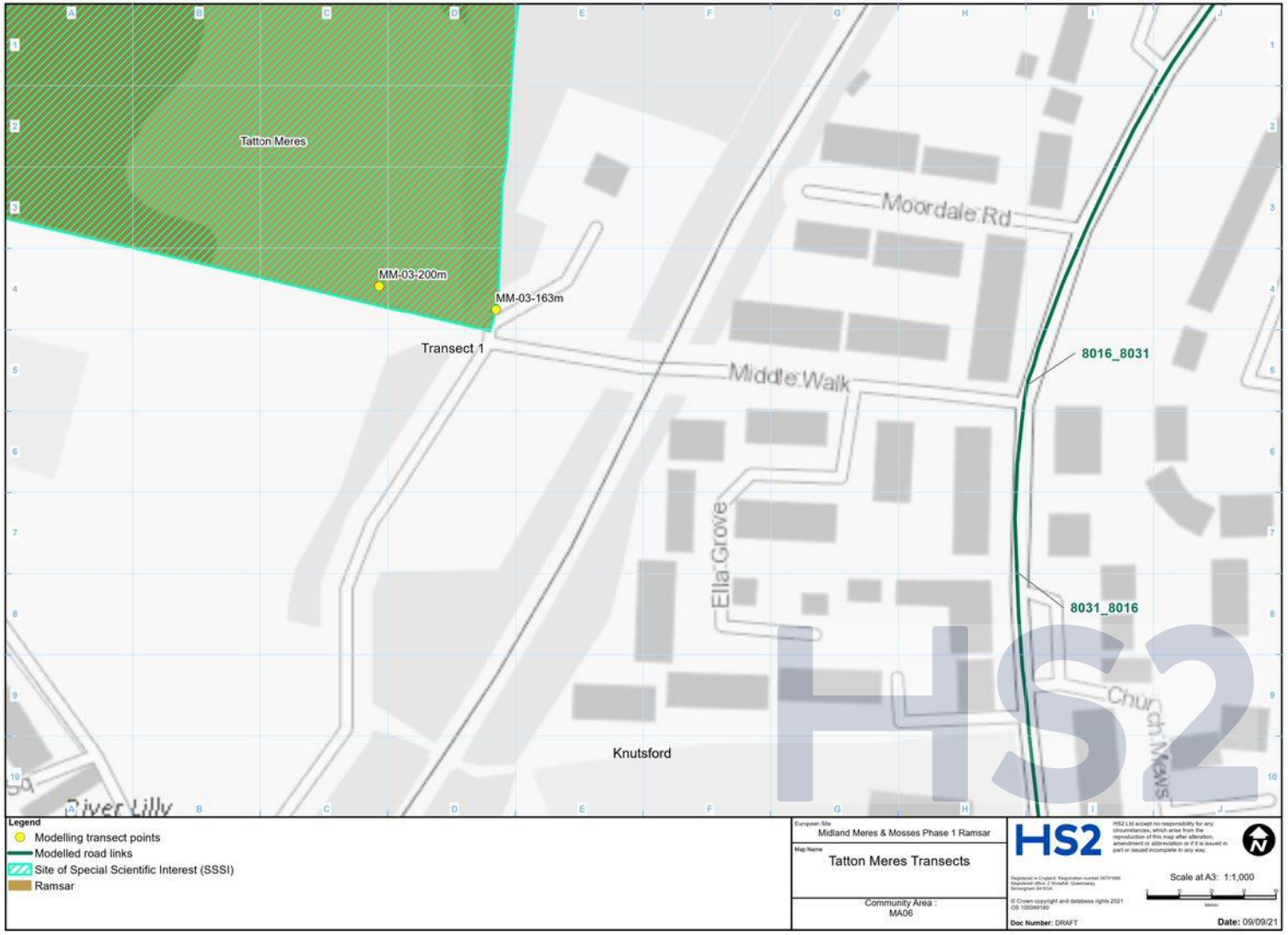
3.4 Screening assessment (construction) alone on Tatton Meres

Air quality assessment of traffic flows

3.4.1 The air quality assessment of traffic flows at Tatton Meres has been undertaken in accordance with the Environmental Impact Assessment Scope and Methodology Report (SMR) (see Volume 5: Appendix CT-001-00001). This is summarised in Annex A.

3.4.2 The only road that triggered the AADT thresholds under this scenario was the B5085 Mobberley Road. Given the orientation of the site and the road, only one (200m long) air quality modelling transect (represented by yellow dots) was employed, situated at a location in the south-eastern corner to capture the worst possible outcome (Figure 2). Only approximately 0.34ha of the site falls within 200m of the B5085 Mobberley Road and the use of a single transect is considered adequate.

Figure 2: Location of B5085 Mobberley Road and the modelled transect in the south-east corner of Tatton Meres



3.4.3 Reflecting the distance of Tatton Meres from the road, the transect initially crossed houses, gardens, a railway line and broadleaved woodland before entering the Ramsar site at 163m and remaining within it to the full extent of the 200m transect. Drawing on the type and distribution of habitats provided in the conservation objectives, and evidence derived from the Air Pollution Information System (APIS)[27], the habitat types found within 200m of the B5085 Mobberley Road were identified in broad terms as woodland, fen/marsh/swamp and open water. Woodland has already been ruled out as a qualifying feature and is not discussed further in this HRA except where necessary.

3.4.4 At this point, reference would normally be made to the published critical loads for these features at this site. However, APIS fails to provide critical loads for the individual Ramsar features (open water, fen/marsh/swamp and wet woodland). In such circumstances, reference can be made to the values for the underpinning SSSI but in this case, unusually, no critical loads are provided either. Normally, an HRA could search for supporting evidence in the Site Improvement Plans and the Supplementary Advice provided for SPA and SAC to explore if nitrogen deposition represented a conceivable threat. However, these are not produced for Ramsar sites either. It therefore falls to the air quality assessment and HRA to make cautious, evidence-based and reasonable assumptions to assess the magnitude of any possible impact.

3.4.5 Furthermore, the identification of critical loads can prove challenging in wetland environments which prompted Natural England to provide the following advice in terms of a similar assessment at Rostherne Mere Ramsar site (Annex B):

> 'It is difficult to specify appropriate critical load/levels for standing open waters and the approach generally taken is to apply the relevant loads/levels from associated terrestrial habitat so in the case of Rostherne Mere those relevant to fen, marsh and swamp should be used when assessing impact.'

3.4.6 Drawing on this advice, and given its proximity and ecological similarities with Rostherne Mere, the same approach was adopted at Tatton Meres and the critical loads for poor fen (10 – 15kgN/ha/yr) were applied to all the land and water within the 200m threshold. As a precautionary measure, it was also applied to the fringing woodland which, whilst not considered to be a qualifying feature at this site, can support examples of fen/marsh/swamp.

3.4.7 Following best practice, the lowest value of each critical load was used in the air quality analysis. Consequently, the value of 10kgN/ha/yr for poor fen was used to assess the qualifying features. Yet again, this represents a precautionary measure that will emphasise any negative outcomes. Key outputs are summarised below and in Annex A. The air pollution assessment used traffic data based on an estimate of the average daily flows in the

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

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 nitrogen deposition are less than this. However, the approach adopted meets the precautionary principle embedded in the Habitats Regulations.

3.4.8 Table A4 of Annex A describes the change in NO_x concentrations brought about by the Proposed Scheme during construction alone. Whilst the table is not repeated here, it interpreted the data as follows:

> 'NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.'

3.4.9 Despite this positive outcome, an assessment of nitrogen deposition was also made (see Table A5 of Annex A) and repeated below in Table 1[28].

Table 1: Nitrogen deposition (construction, alone)

Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme			
163	23.77	23.72	23.72	<0.01	10	<0.1%
200	23.74	23.70	23.70	<0.01	10	<0.1%

3.4.10 With reference to this data, Annex A states:

> 'Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.'

3.4.11 This evidence shows clearly that at all modelled points within Tatton Meres, the rate of nitrogen deposition brought about by the Proposed Scheme alone during construction, fails to exceed the 1% threshold. Drawing on best practice, likely significant effects can therefore be ruled out alone. Whilst no further assessment of the impact alone is required, the need remains to consider potential impacts in-combination.

[28] 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.

Screening opinion for Tatton Meres (construction) alone

3.4.12 The Proposed Scheme has been screened for the purposes of Regulation 63 of the Habitats Regulations 2017 as amended. It is considered that there is no credible risk that nitrogen deposition during the construction phase could undermine the conservation objectives of Tatton Meres and likely significant effects (alone) can be ruled out. Therefore, it is also considered that there is no need for an appropriate assessment (alone). However, mindful of the Wealden decision, an assessment of likely significant effects in-combination will be required.

3.5 Screening assessment (construction) in-combination on Tatton Meres

Rationale

3.5.1 Although likely significant effects during construction alone were ruled out in Section 3.4, an assessment of the Proposed Scheme during construction in combination with other plans or projects is also required. As the Directive[29] 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 Tatton Meres; all other potential impacts were 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…'

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

- In Foster and Langton[30], 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).

3.5.2 This evidence has determined the need for and scope of any in-combination assessment required for this European site as explained in Section 3.7.

Methodology

3.5.3 In-combination effects are largely 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.

3.5.4 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 Tatton Meres. 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.

3.5.5 This is considered to be reasonable and proportionate and meets the expectations laid down in Section 4.4.8 of Natural England's guidance[23].

Air quality assessment of traffic flows

3.5.6 The B5085 Mobberley Road remains the only road under scrutiny. The same broad approach employed in the assessment alone (above) was utilised as modified by the need to consider other plans or projects. However, no non-road plans or projects have been identified that require further consideration within the in-combination assessment. As with the assessment of the Proposed Scheme alone, changes in NO_x are summarised first followed by an assessment of nitrogen deposition.

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

3.5.7 Table A7 of Annex A describes the change in NO_x concentrations brought about by the Proposed Scheme during construction in combination with other plans or projects. Whilst this is not repeated here, it interpreted the data as follows:

> 'NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.'

3.5.8 Despite this positive outcome, an assessment of nitrogen deposition was also made (see Table A8 of Annex A) and repeated below in Table 2.

Table 2: Nitrogen deposition (construction, in-combination)

Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
	Baseline 2018	2025 do nothing	2025 with the Proposed Scheme			
163	23.77	23.71	23.72	<0.01	10	<0.1%
200	23.74	23.70	23.70	<0.01	10	<0.1%

3.5.9 This provides identical outcomes when compared with the construction phase alone. The outcomes are, therefore, similar as stated in Annex A. With reference to this data, Annex A states:

> 'Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme in-combination are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.'

3.5.10 This evidence shows clearly that at all modelled points within Tatton Meres, the rate of nitrogen deposition brought about by the Proposed Scheme in combination with other plans or projects during construction, fails to exceed the 1% threshold. Drawing on best practice, likely significant effects can therefore be ruled out in-combination.

Screening opinion for Tatton Meres (construction) in-combination

3.5.11 The Proposed Scheme has been screened for the purposes of Regulation 63 of the Habitats Regulations 2017 as amended. It is considered that there is no credible risk that nitrogen deposition during the construction phase could undermine the conservation objectives of Tatton Meres and likely significant effects (in-combination) can be ruled out. Therefore, it is considered there is no need for an appropriate assessment (in-combination).

3.6 Screening assessment (operation) alone on Tatton Meres

3.6.1 The same tasks, according to the same criteria as for the screening assessment for construction alone (see Section 3.4), were carried out for the operational phase and so they are not repeated here.

3.6.2 The only road meeting the criteria under this scenario remained the B5085 Mobberley Road. The outcomes of this exercise are presented in Table 3 below. As with previous assessments, changes in NO_x are summarised first and Table A11 of Annex A should be referred to for the detail. The annex states:

> 'NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.'

3.6.3 Despite this positive outcome, an assessment of nitrogen deposition was also made (see Table A12 of Annex A) and repeated below in Table 3.

Table 3: Nitrogen deposition (operation, alone)

Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
	2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme			
163	23.77	23.68	23.68	<0.01	10	<0.1%
200	23.74	23.68	23.68	<0.01	10	<0.1%

3.6.4 This provides identical outcomes when compared with the construction phase alone. The outcomes are, therefore, similar as stated in Annex A. With reference to this data, Annex A states:

> 'Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.'

3.6.5 This evidence shows clearly that at all modelled points within Tatton Meres, the rate of nitrogen deposition brought about by the Proposed Scheme alone during operation, fails to exceed the 1% threshold. Drawing on best practice, likely significant effects can therefore be ruled out alone. Whilst no further assessment of the impact alone is required, the need remains to consider potential impacts in-combination.

Screening opinion for Tatton Meres (operation) alone

3.6.6 The Proposed Scheme has been screened for the purposes of Regulation 63 of the Habitats Regulations 2017 as amended. It is considered that there is no credible risk that nitrogen deposition during the operational phase could undermine the conservation objectives of Tatton Meres and likely significant effects (alone) can be ruled out. Therefore, it is also considered that there is no need for an appropriate assessment (alone). However, mindful of the Wealden decision, an assessment of likely significant effects in-combination will be required.

3.7 Screening assessment (operation) in-combination on Tatton Meres

3.7.1 The same tasks, according to the same criteria as for the screening assessment for operation alone (see Section 3.6), were carried out for the operational phase and so they are not repeated here.

3.7.2 The only road meeting the criteria under this scenario remained the B5085 Mobberley Road. The outcomes of this exercise are presented in Table 4 below. As with previous assessments, changes in NO_x are summarised first and Table A14 of Annex A should be referred to for the detail. The annex states:

> 'NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.'

3.7.3 Despite this positive outcome, an assessment of nitrogen deposition was also made (see Table A15 of Annex A) and repeated below in Table 4.

Table 4: Nitrogen deposition (operation, in-combination)

Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
	2018 baseline	2038 do nothing	2038 with the Proposed Scheme			
163	23.77	23.68	23.68	<0.01	10	<0.1%
200	23.74	23.68	23.68	<0.01	10	<0.1%

3.7.4 This again provides identical outcomes when compared with all other scenarios. The outcomes are, therefore, similar as stated elsewhere above and, accordingly, Annex A states:

> 'Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme in-combination are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.'

3.7.5 This evidence shows clearly that at all modelled points within Tatton Meres, the rate of nitrogen deposition brought about by the Proposed Scheme in combination with other plans or projects during operation, fails to exceed the 1% threshold. Drawing on best practice, likely significant effects can therefore be ruled out in-combination.

Screening opinion for Tatton Meres (operation) in-combination

3.7.6 The Proposed Scheme has been screened for the purposes of Regulation 63 of the Habitats Regulations 2017 as amended. It is considered that there is no credible risk that nitrogen deposition from the operational phase could undermine the conservation objectives of Tatton Meres and likely significant effects can be ruled out (in-combination). Therefore, it is also considered there is no need for an appropriate assessment (in-combination).

Impacts on other components of the Midland Meres and Mosses Phase 1 Ramsar site

3.7.7 It is recognised that as the Ramsar site comprises multiple components, should the Proposed Scheme, following an appropriate assessment, cause adverse effects to arise on one, this could require the consideration of whether the Proposed 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. However, as it is considered that even the risk of a significant effect has been ruled out at Tatton Meres, there is no need for an appropriate assessment and, therefore, there is no risk of an adverse effect. As separate HRAs have also ruled out adverse effects on two other components of the Ramsar site. The Mere, Mere, and Wybunbury Moss, which were also considered at risk from air pollution, there is no potential for any cumulative impact with any other plans or projects. Therefore, it is considered there is no need for any further assessment.

4 Conclusions

4.1.1 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:

- it is considered there is no credible risk that nitrogen deposition, during construction of the Proposed Scheme either alone or in combination with other plans or projects, could undermine the conservation objectives of Tatton Meres and likely significant effects could be ruled out (alone or in-combination). Therefore, it is considered there is no need for an appropriate assessment (alone or in-combination);
- it is considered there is no credible risk that nitrogen deposition, during operation of the Proposed Scheme either alone or in combination with other plans or projects, could undermine the conservation objectives of Tatton Meres and likely significant effects could be ruled out (alone or in-combination). Therefore, it is considered there is no need for an appropriate assessment (alone or in-combination); and
- it is considered there is no need for any further assessment.

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 Habitats Regulations Assessment for Midland Meres and Mosses Phase 1 Ramsar site (Tatton Meres).

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 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 criteria[22], to identify where assessment is required; and
- 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 NOx. 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 guidance[24]. Data on nitrogen deposition has been taken from the most recent information available on the APIS27 website. No reduction in future background deposition rates has been applied; and
- the following scenarios are assessed:
  - baseline;
  - selected year(s) within the construction period for the assessment of the effects of construction. The year(s) of assessment are selected based on the worse case peak period during the construction programme and on when significant effects might be expected; and
  - an operational scenario will be assessed for the first full operational year after construction is completed.

- for each assessment year, both the scenario without the Proposed Scheme in place and the scenario with the Proposed Scheme in place will be modelled. This comparison is used to assess the impacts of the Proposed Scheme alone;
- for the assessment of the Proposed Scheme in combination with other plans and projects, a different without scheme scenario is 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 incorporates HS2 Ltd's policy on construction vehicle emissions standards. These standards are published in Information Paper E31[31]; 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 are largely taken into account in the traffic data used for the assessment which incorporates likely changes brought about by other proposed and committed developments[32], and consideration is also given to relevant non-road plans and projects.

[31] 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.

[32] A number of strategic traffic models have been sourced from key stakeholders, including Local Highway Authorities and Highways England. In combination, these models cover the areas that are expected to be affected by the proposed 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.

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' will be 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, comparison has been made against the applicable lower critical load[33] for the site, as provided by APIS.

[33] 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 - 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_x concentrations, the effect is considered to be not significant if the total predicted NO_x concentrations are below the air quality standard of 30µg/m^3.

For the assessment of nitrogen deposition, if the change in nitrogen deposition is predicted to be less than 1% of the lower critical load, then the effect is considered to be not significant. However, should the nitrogen deposition change by more than 1%, then the assessment of significance will be undertaken by an ecologist and reported Section 3 of the main HRA report.

5 Assessment of construction traffic effects – Proposed Scheme alone

5.1 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 are presented in Table A2.

The screening process identified one road in the area exceeding the screening thresholds: the B5085 Mobberley Road, Knutsford.

Tatton Meres is located north-east of Knutsford, east of the B5085 Mobberley Road, Knutsford. Traffic impacts are primarily the result of increased traffic along the B5085 Mobberley Road, Knutsford from minor vehicle rerouting due to construction disruption.

Table A2: Traffic data summary (construction phase)

Road ID	Road Name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme	Proposed Scheme alone change (2025 with Proposed Scheme – 2025 without Proposed Scheme)	In-combination change (2025 with the Proposed Scheme – 2018 baseline)	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme	Proposed Scheme alone change (2025 with Proposed Scheme – 2025 without Proposed Scheme)	In-combination change (2025 with the Proposed Scheme – 2018 baseline)
8016_8031, 8031_8016	B5085 Mobberley Road	16,778	17,609	17,958	349	**1,180**	142	152	97	-55	-45

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

5.2 Receptors assessed and background concentrations

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

Table A3 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Figure A1: Map of Tatton Meres Transect 1, including modelled links and modelled ecological receptor points

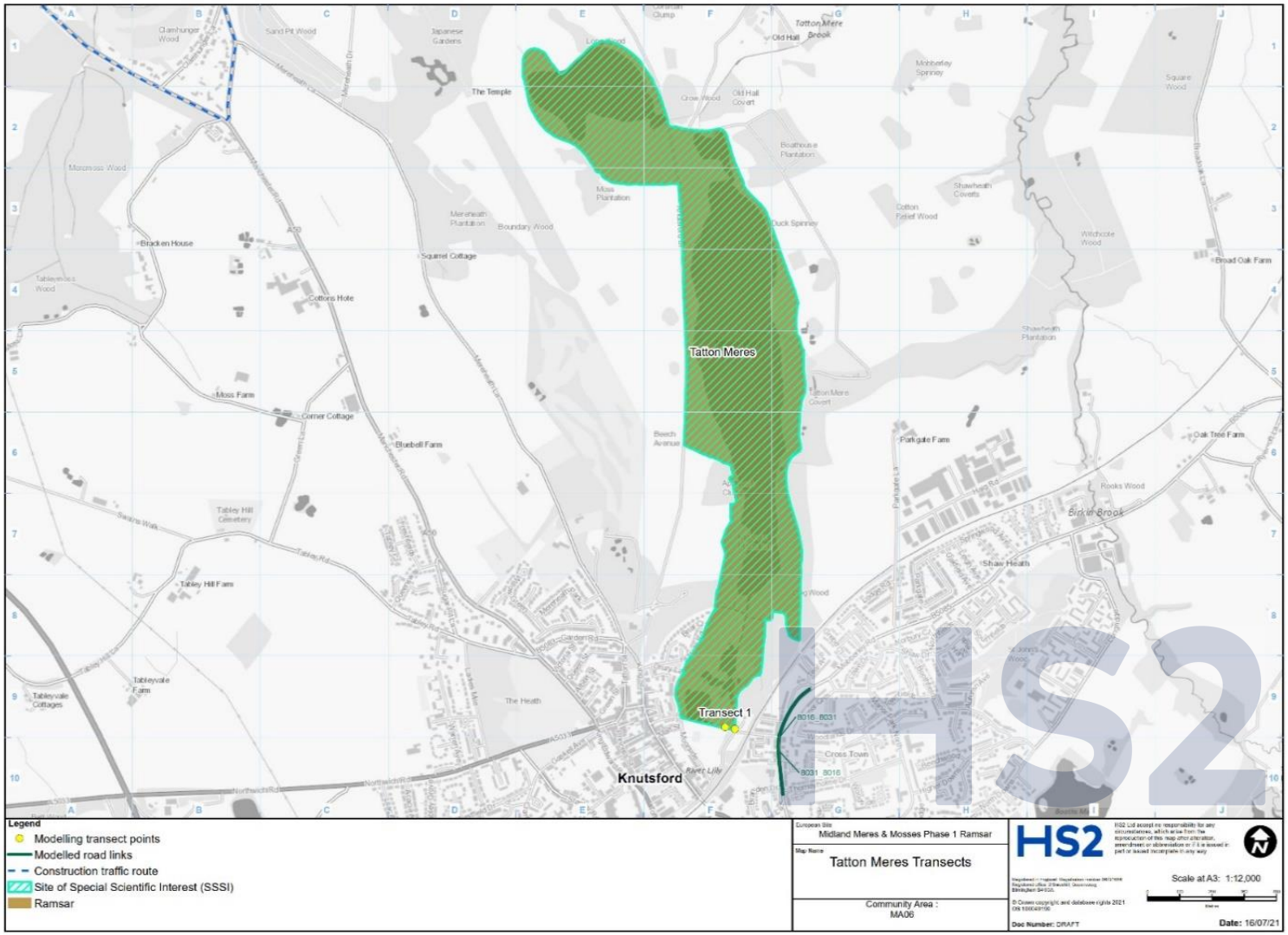


Table A3: Modelled ecological receptor backgrounds, APIS data and critical loads

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2025 NO_x background concentration ($\mu g/m^3$)	APIS data[27] of average total nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)
Tatton Meres Transect 1	Poor fen	18.5	13.3	23.7	10

5.3 Assessment results

Table A4 presents a summary of the modelled NO_x concentrations for the ecological site, the change in concentration and a comparison against the air quality standard ($30\mu g/m^3$).

Table A5 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A4: Predicted annual mean of NO_x concentrations at ecological sites (construction phase, Proposed Scheme, alone)

Ecological Site	Distance to road (m)	NO_x concentrations (µg/m³)			Change in NO_x concentrations (µg/m³)	Comparison against air quality standard (30µg/m³)
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme		
Tatton Meres Transect 1	163	19.87	14.01	14.03	0.02	Within standard
	200	19.53	13.83	13.84	0.01	Within standard

Table A5: Assessment of nitrogen deposition at ecological sites (construction phase, Proposed Scheme, alone)

Ecological Site	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme			
Tatton Meres Transect 1	163	23.77	23.72	23.72	<0.01	10	<0.1%
	200	23.74	23.70	23.70	<0.01	10	<0.1%

5.4 Assessment of significance (construction phase, Proposed Scheme alone)

NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.

Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.

6 Assessment of construction traffic effects – Proposed 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 are presented in Table A2.

The screening process identified one road in the area exceeding the screening thresholds: the B5085 Mobberley Road, Knutsford.

Tatton Meres is located north-east of Knutsford, east of the B5085 Mobberley Road, Knutsford. Traffic impacts are primarily the result of increased traffic growth along the B5085 Mobberley Road, Knutsford from the 2018 Base Year.

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 blue, haul roads in green) and modelled receptors (yellow dots).

Table A6 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Table A6: Modelled ecological receptor backgrounds, APIS data and critical loads

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2025 NO_x background concentration ($\mu g/m^3$)	APIS data[27] of average total nitrogen deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)
Tatton Meres Transect 1	Poor fen	18.5	13.3	23.7	10

6.4 Assessment results

Table A7 presents a summary of the modelled NO_x concentrations for the ecological site, the change in concentration and a comparison against the air quality standard (30µg/m^3).

Table A8 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A7: Predicted annual mean of NO_x concentrations at ecological sites (construction phase, Proposed Scheme in-combination)

Ecological Site	Distance to road (m)	NO_x concentrations (µg/m^3)			Change in NO_x concentrations (µg/m^3)	Comparison against air quality standard (30µg/m^3)
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme		
Tatton Meres Transect 1	163	19.87	13.97	14.03	0.06	Within standard
	200	19.53	13.80	13.84	0.04	Within standard

Table A8: Assessment of nitrogen deposition at ecological sites (construction phase, Proposed Scheme in-combination)

Ecological Site	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme			
Tatton Meres Transect 1	163	23.77	23.71	23.72	<0.01	10	<0.1%
	200	23.74	23.70	23.70	<0.01	10	<0.1%

6.5 Assessment of significance (construction phase, Proposed Scheme in-combination)

NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.

Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme in-combination are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.

6.6 Assessment of operational traffic effects - Proposed Scheme alone

Screening of traffic data

The assessment of operational traffic impacts has used traffic data based on an estimate of the average daily flows in the opening year of operation (2038). Traffic data are presented in Table A9. The screening process identified one road in the area exceeding the screening thresholds: the B5085 Mobberley Road, Knutsford.

Tatton Meres is located north-east of Knutsford, east of the B5085 Mobberley Road, Knutsford. Traffic impacts are primarily the result of increased traffic along the B5085 Mobberley Road, Knutsford.

Table A9: Traffic data summary (operational phase)

Road ID	Road Name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme	Proposed Scheme alone change (2038 with the Proposed Scheme – 2038 without Proposed Scheme)	In-combination change (2038 with the Proposed Scheme – 2018 baseline)	2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme	Proposed Scheme alone change (2038 with the Proposed Scheme – 2038 without Proposed Scheme)	In-combination change (2038 with the Proposed Scheme – 2018 baseline)
8016_8031, 8031_8016	B5085 Mobberley Road	16,778	17,780	18,656	876	**1,878**	142	183	183	0	41

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

Receptors assessed and background concentrations

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

Table A10 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Table A10: Modelled ecological receptor backgrounds, APIS data and critical loads

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2038 NO_x background concentration ($\mu g/m^3$)	APIS data[27] of average total nitrogen deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)
Tatton Meres Transect 1	Poor fen	18.5	11.6	23.7	10

Assessment results

Table A11 presents a summary of the modelled NO_x concentrations for the ecological site, the change in concentration and a comparison against the air quality standard ($30\mu g/m^3$).

Table A12 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A11: Predicted annual mean of NO_x concentrations at ecological sites (operation phase, Proposed Scheme alone)

Ecological Site	Distance to road (m)	NO_x concentrations (µg/m^3)			Change in NO_x concentrations (µg/m^3)	Comparison against air quality standard (30µg/m^3)
		2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme		
Tatton Meres Transect 1	163	19.87	11.86	11.88	0.02	Within standard
	200	19.53	11.78	11.80	0.02	Within standard

Table A12: Assessment of nitrogen deposition at ecological sites (operation phase, Proposed Scheme alone)

Ecological Site	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
		2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme			
Tatton Meres Transect 1	163	23.77	23.68	23.68	<0.01	10	<0.1%
	200	23.74	23.68	23.68	<0.01	10	<0.1%

6.7 Assessment of significance (operational phase, Proposed Scheme alone)

NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.

Nitrogen deposition is predicted to be above the lower critical load in all scenarios. However, the changes in nitrogen deposition due to the Proposed Scheme are lower than 1% of the lower critical load at all modelled receptors. No potentially significant effects are therefore predicted.

7 Assessment of operational traffic effects - Proposed Scheme in combination with other plans and projects

7.1 Screening of traffic data

The assessment of operational traffic impacts has used traffic data based on an estimate of the average daily flows in the opening year of operation (2038). Traffic data are presented in Table A9.

The screening process identified one road in the area exceeding the screening thresholds: the B5085 Mobberley Road, Knutsford.

Tatton Meres is located north-east of Knutsford, east of the B5085 Mobberley Road, Knutsford. Traffic impacts are primarily the result of increased traffic growth along the B5085 Mobberley Road, Knutsford from the 2018 Base Year.

7.2 Non-road plans and projects

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

7.3 Receptors assessed and background concentrations

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

Table A13 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Table A13: Modelled ecological receptor backgrounds, APIS data and critical loads

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2038 NO_x background concentration ($\mu g/m^3$)	APIS data of average total nitrogen deposition (kg N/ha/yr)	Critical load (kg N/ha/yr)
Tatton Meres Transect 1	Poor fen	18.54	11.6	23.7	10

7.4 Assessment results

Table A14 presents a summary of the modelled NO_x concentrations for the ecological site, the change in concentration and a comparison against the air quality standard (30µg/m^3).

Table A15 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A14: Predicted annual mean of NO_x concentrations at ecological sites (operation phase, Proposed Scheme in-combination)

Ecological Site	Distance to road (m)	NO_x concentrations (µg/m^3)			Change in NO_x concentrations (µg/m^3)	Comparison against air quality standard (30µg/m^3)
		2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme		
Tatton Meres Transect 1	163	19.87	11.84	11.88	0.04	Within standard
	200	19.53	11.77	11.80	0.03	Within standard

Table A15: Assessment of nitrogen deposition at ecological sites (operation phase, Proposed Scheme in-combination)

Ecological Site	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in NO_x concentrations (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
		2018 baseline	2038 without the Proposed Scheme	2038 with the Proposed Scheme			
Tatton Meres Transect 1	163	23.77	23.68	23.68	<0.01	10	<0.1%
	200	23.74	23.68	23.68	<0.01	10	<0.1%

7.5 Assessment of significance (operational phase, Proposed Scheme in-combination)

NO_x concentrations are predicted to be within the air quality standard in all scenarios and at all locations with or without the Proposed Scheme.

hs2.org.uk

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk