In Parliament – Session 2021 - 2022

HS2

High Speed Rail (Crewe – Manchester) Environmental Statement

Volume 5: Appendix EC-016-00002

Ecology and biodiversity

Document to inform a Habitats Regulations Assessment for Manchester Mosses SAC (Holcroft Moss) - Addendum 2021

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Department for Transport

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1 Introduction

1.1 Purpose of report

1.1.1 There are certain ecological sites that are designated for their international importance and to which special considerations attach under the Conservation of Species and 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 Manchester Mosses SAC (or European site) supports remnants of the once extensive mossland that covered much of south Lancashire. It comprises three discrete sites: Astley and Bedford Mosses, Holcroft Moss and Risley Moss (all notified as separate Sites of Special Scientific Interest (SSSI)). Reflecting centuries of development and agricultural change that have altered surrounding land uses, each of the three discrete components of the European site now support examples of the Annex I habitat, 'degraded raised bog capable of natural regeneration'[2].

1.2.2 This document updates an earlier 'HRA Screening Report for Manchester Mosses SAC' from 2012[3] and a subsequent addendum from 2016[4]. The former, the original HRA, assessed four route options considered within the Phase Two Appraisal of Sustainability (AoS)[5]; all of which included the construction of a viaduct immediately to the west of Holcroft Moss. In conclusion, it ruled out likely significant effects on the SAC alone or in-combination for all four routes options, providing that mitigation measures identified in the report, including the viaduct, were implemented; an outcome that was endorsed by Natural England[6].

1.2.3 The need for the 2016 Addendum arose to accommodate proposed design changes, specifically the replacement of the section of viaduct to the west of Holcroft Moss with an embankment. However, in November 2018 Natural England advised that it would not be

[2] Joint Nature Conservation Committee (2015), *Manchester Mosses SAC Standard Data Form*. Available online at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030200.pdf.

[3] Temple-ERM (2012), *HS2 Phase Two Manchester Mosses SAC Habitat Regulations Assessment Screening Report*.

[4] Temple-RSK (2016), *HS2 Phase Two Manchester Mosses SAC Habitat Regulations Assessment Screening Report – Addendum*.

[5] Temple-RSK (2016), *High Speed Rail: Phase 2b Preferred Route - Sustainability Statement including Post Consultation Update*. Available online at: https://www.gov.uk/government/publications/hs2-phase-2b-sustainability-statement-2016.

[6] Natural England letter to HS2 Ltd (2018).

possible to rule out likely significant effects with an embankment in place. In turn, this has prompted a return to the use of a viaduct.

1.2.4 Two additional considerations have arisen following further studies and changes to the design. Firstly, the requirement to decommission a high-pressure gas main that intercepts the alignment at multiple points (see Volume 2: MA04 Map Book, map CT-06-325, D3 to CT-06-326a I9) and which, in part, also lies beneath Holcroft Moss. Secondly, the potential impact of air pollution (in terms of nitrogen deposition) from construction vehicles using both on-site haul routes and on the adjacent M62. The construction period will last from 2025 to 2038.

1.2.5 Together, these changes have prompted the production of this further Addendum, which also provides an opportunity to take full account of recent changes to the Regulations, case law and best practice. For instance, it should be noted that both previous HRAs pre-dated the People Over Wind[7] judgement that subsequently restricted mitigation to the appropriate assessment stage. However, information in the previous HRAs that remains robust and up to date has been relied upon and used to inform the outcomes here.

1.2.6 This report has been prepared to provide all the necessary information for the competent authority to carry out an HRA under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 as amended by the Conservation of Habitats and Species (amendment) (EU Exit) Regulations 2019[8] as informed by contemporary Department for Environment, Food and Rural Affairs (Defra)[9] and the Ministry of Housing, Communities and Local Government (MHCLG)[10] guidance and best practice. Where relevant, it takes full account of case law including the People Over Wind and the Wealden[11] judgements, amongst others.

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

[8] 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.

[9] 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.

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

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

2 Context

2.1 Description of the 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 Mainline (WCML).

2.1.2 At its closest point, the M62 West viaduct will pass within 44m of Holcroft Moss SSSI, part of the Manchester Mosses SAC. Here, an area of wetland habitat will be created to the east of the viaduct and west of Holcroft Moss SSSI. This is proposed to provide replacement habitat for losses elsewhere within the Proposed Scheme and is not related to any harm that might arise within the SAC. As such, it does not affect the outcome of this HRA. Key elements of the Proposed Scheme situated in Broomedge to Glazebrook (MA04) and Risley to Bamfurlong (MA05) areas of relevance to this HRA are as follows:

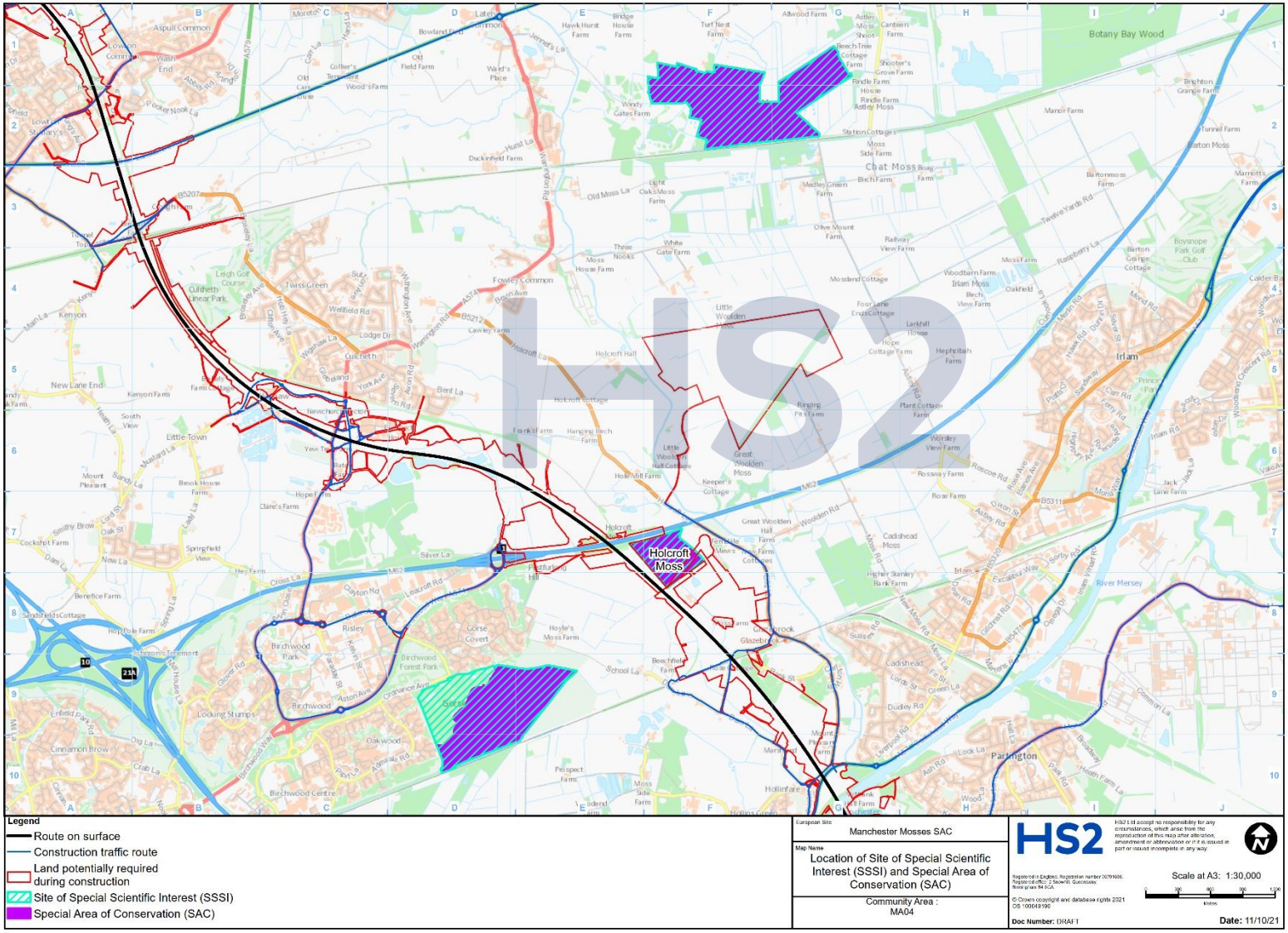
- M62 West viaduct, approximately 830m in length and up to 11m in height, with spans of 40m, which is situated approximately 44m west of Holcroft Moss SSSI. The construction of the M62 West viaduct will take two years and nine months to complete;
- Glazebrook North embankment, 793m in length and up to 11m in height, which is situated 40m to southwest of Holcroft Moss SSSI. The construction of the Glazebrook North embankment will take four years to complete;
- a gravel-filled trench close to the northern end of the Glazebrook North embankment, to reduce potential groundwater flow impacts on Holcroft Moss; and
- diversion, 540m long, of a section of an underground, 1,050mm diameter high-pressure gas main, which crosses the route of the Proposed Scheme at multiple points and, of which, 370m lies beneath Holcroft Moss SSSI.

2.1.3 The following construction compounds will be situated close to Holcroft Moss, to the west of land required for the construction of the M62 West viaduct:

- M62 West viaduct south satellite compound will be used to manage the construction of the Glazebrook South embankment, the Glazebrook North embankment and the M62 West viaduct, within the Broomedge to Glazebrook area; and
- M62 West viaduct north satellite compound will be used to manage construction of the M62 West viaduct, within the Broomedge to Glazebrook area.

2.1.4 The route of the Proposed Scheme and location of the Manchester Mosses SAC is shown in Figure 1.

Figure 1: Location of Manchester Mosses SAC



2.2 Previous assessment

The 2012 HRA

2.2.1 In 2012, the original HRA screening exercise assessed the impacts of four potential route options on the Manchester Mosses SAC. This identified potential threats from all four possible route options arising from pollution and similar incidents during construction, and from permanent impacts on the local hydrological regime from the viaduct, on the Holcroft Moss SSSI component of the Manchester Mosses SAC. However, the assessment subsequently concluded that the adoption of best-practice working methods, as defined in the draft Code of Construction Practice (CoCP), Volume 5: Appendix CT-002-00000[12], and suitable engineering techniques would rule out the possibility of likely significant effects alone or in-combination in terms of both potential risks, respectively.

2.2.2 Based on the adoption of the 2012 Proposed Scheme, the 2012 HRA was also able to rule out the possibility of any effects on the remaining two component sites of the Manchester Mosses SAC (i.e. Astley and Bedford Mosses SSSI and Risley Moss SSSI), on the basis of their distance from land required for the construction of the 2012 Proposed Scheme (1.6km and 1.0km respectively). This was supported, in the case of Astley and Bedford Mosses, by a conceptual hydrological model that suggested the Liverpool to Manchester Line (Chat Moss) marks the watershed for both the surface and groundwater flows, and that all route options lay beyond the surface and groundwater catchments of Risley Moss. These particular elements of the HRA are considered robust in relation to the current Proposed Scheme and, consequently, these sites are not considered further in this report.

2.2.3 Holcroft Moss was close to the 2012 route of the Proposed Scheme (within 50m). However, the 2012 HRA was endorsed by Natural England, subject to the adoption of a suitably designed viaduct that would remove the threat of an adverse effect on Holcroft Moss.

2.2.4 These outcomes subsequently informed the selection of the current route of the Proposed Scheme.

The 2016 HRA Addendum

2.2.5 In 2016, an Addendum[13] to the original HRA was prepared to assess proposals to replace the entire viaduct up to the crossing of the M62 with an embankment. The Addendum stated:

[12] Volume 5: Appendix CT-002-00000, draft Code of Construction Practice (CoCP).

[13] Temple-RSK (2016), *HS2 Phase Two Manchester Mosses SAC Habitat Regulations Assessment Screening Report – Addendum*.

> 'The conclusions reached in the 2012 HRA remain unchanged …. The change in construction from viaduct to embankment should therefore have no likely significant effect on the qualifying interest features of the SAC'.

2.2.6 However, Natural England disagreed, expressing concern at the design, scale, and its potential impact on the local hydrological regime, advising that if pursued, a likely significant effect could not be ruled out and that an appropriate assessment would be required.

2.2.7 As a consequence, the embankment was abandoned leading to the subsequent re-adoption of the viaduct, which now forms part of the Proposed Scheme. As the 2016 Addendum only evaluated the use of an embankment instead of the viaduct now proposed, it is considered redundant and is not considered any further in this HRA.

2.3 Site description and conservation objectives

Manchester Mosses SAC

2.3.1 Extensive mosslands dominated by highly characteristic, but fragile, *Sphagnum* communities formerly extended between the towns of Leigh and Warrington and across the River Mersey floodplain. Although the vast majority has since been lost to agriculture and development, isolated examples remain, three of which have been notified as separate SSSI: Astley and Bedford Mosses (1989), Risley Moss (1986) and Holcroft Moss (1991).

2.3.2 However, prior to notification, these and other surviving fragments were subject to inappropriate management, such as burning, drainage and peat cutting. Reflecting historical land ownership, Holcroft Moss is almost unique in that peat cutting has not been known to have ever taken place, allowing the original peat surface to persist, though today it remains far from natural. All sites, however, have been significantly and negatively influenced by nearby development and intensive agricultural practices on surrounding land. All, bar Risley Moss, still occupy relatively rural locations, surrounded by pasture and arable farmland, with the following notable infrastructure features:

- the M62 lies immediately adjacent to and forms the northern boundary of Holcroft Moss, which has been impacted by construction in the late 1960s and ongoing drainage;
- the alignment of the dismantled Wigan to Glazebrook railway line, constructed in the 1880s and abandoned in 1968 forms the western boundary of Holcroft Moss;
- the Manchester to Liverpool Railway defines the southern border of Astley and Bedford Mosses, which have been impacted by construction in the 1820s and by ongoing drainage; and
- Warrington New Town, which was constructed in the 1970s, now lies on the edge of Risley Moss, which once formed part of a Royal Ordnance factory during WWII, during which the moss was used, in part, for the disposal of munitions.

2.3.3 Consequently, these three examples remain as heavily modified, isolated fragments, their characteristic peat-forming flora largely replaced with purple moor-grass (*Molinia caerulea*) grasslands, birch (*Betula spp*) woodland and bracken, the peat bodies elevated above the surrounding landscape as land levels have sunk as a consequence of farming practices.

2.3.4 Over the last 40 years, restoration management on increasing areas of land across all three SSSIs, carried out by Natural England, Warrington Borough Council, and both Lancashire and Cheshire Wildlife Trusts, has provided suitable physical conditions at the surface to allow the expansion of peat-forming vegetation[14]. However, this fragile and easily disturbed habitat remains vulnerable to external influences.

2.3.5 As a consequence of these competing factors, the degraded, raised bog features of all three SSSIs are considered to be in favourable, or unfavourable recovering, condition (November 2018, Holcroft Moss; February 2020, Astley and Bedford Mosses; October 2020, Risley Moss).

2.3.6 Reflecting these circumstances, the three SSSI, together extending over 170ha, were designated as the Manchester Mosses SAC in 2005 as examples of the Annex I habitat, 'degraded raised bogs capable of natural regeneration'[15]. Although this designation as a 'degraded bog' assumed no active peat formation, it did recognise that it was capable of natural restoration where the hydrology can be repaired and where, with appropriate rehabilitation management there is a reasonable expectation of re-establishing vegetation with peat-forming capability within 30 years[16].

2.3.7 The conservation objectives[17] for the Manchester 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.'

[14] Joint Nature Conservation Committee (2015), *Manchester Mosses SAC Standard Data Form*. Available online at: https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030200.pdf.

[15] Joint Nature Conservation Committee (2021), *Habitat description for 7120 Degraded raised bogs still capable of natural regeneration.* Available online at: https://sac.jncc.gov.uk/habitat/H7120/.

[16] DG Environment and European Commission (2013), *Interpretation Manual of European Union Habitats.* Available online at: https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf.

[17] Natural England (2018), *Conservation Objectives for Manchester Mosses Special Area of Conservation. Version 3.* Available online at: http://publications.naturalengland.org.uk/file/6584230239010816.

2.3.8 Raised bogs are dependent on the maintenance of, but vulnerable to adverse changes in, a favourable hydrological regime, both within and beyond the designated site boundaries. Classic raised bogs are ombrotrophic (i.e. reliant on rainfall for water and nutrients) and separated hydrologically from groundwater influences. However, in the case of Holcroft Moss, the hydrological regime has been disrupted by peat cutting and changes to local drainage patterns on surrounding land from farming and development. The construction of the proposed embankments and viaduct could lead to further adverse effects on the hydrological regime. Furthermore, this fragile habitat is highly susceptible to nitrogen deposition from the emissions of vehicles associated with construction of the Proposed Scheme, and the peat-forming communities are extremely vulnerable to direct physical disturbance and pollution, such as from oil spillages or particulates from concrete production.

2.3.9 Consequently, the conservation objectives are given greater expression in the associated Supplementary advice[18] and Site Improvement Plan (SIP)[19]. Both identify air pollution as a negative factor. 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 …'.

2.3.10 The risk of adverse effects on the Astley and Bedford Mosses and Risley Moss components of the SAC from construction of the Proposed Scheme has been ruled out in previous HRAs, due to the distance from the land required for construction of the Proposed Scheme and the extent of the surface and sub-surface catchments. Consequently, these sites are not directly considered further here except where residual effects are identified and an assessment of impacts on the entire Manchester Mosses SAC is considered necessary.

2.3.11 However, the risk of harm to Holcroft Moss from the effects described above remains, given its proximity to the land required for the construction of the Proposed Scheme, the need to decommission the gas main, and the proximity of the M62 and the M62 West viaduct, which is situated 44m west of Holcroft Moss.

2.4 Changes in evidence since 2012 screening

Reliance on previous HRA

2.4.1 Defra guidance[10] 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 change in

[18] Natural England (2019), *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features, Manchester Mosses Special Area of Conservation (SAC).* Available online at: http://publications.naturalengland.org.uk/file/5279013610455040.

[19] Natural England (2014), *Site Improvement Plan Manchester Mosses - Version 1.0.* Available online at: http://publications.naturalengland.org.uk/file/6266576827318272.

evidence in the intervening period. For example, much of the 2012 HRA remains valid in terms of broad scheme design and the identification of vulnerable sites and, where possible, these elements are relied upon in this report.

2.4.2 However, new assessment is required where the potential impacts of design changes introduce new issues not evaluated before. Similarly, as discussed in more detail below, any new HRA must take account of:

- changes to the understanding of the ecological characteristics and condition of the sites;
- new case law, such as the Wealden decision[20] and People Over Wind; and
- any nearby plans and projects that could affect either the environmental baseline or influence any in-combination assessment, if required, such as the widening of the M62 and Warrington's emerging Local Plan.

Ecological characteristics of the Manchester Mosses

2.4.3 The ecological characteristics of Manchester Mosses SAC, now better understood than in 2012, have been more clearly defined by Natural England's production of the SIP (2014), SAC Conservation Objectives (2018) and Supplementary Advice (2019) and referred to above in Section 2.3.

2.4.4 Their overall aim is to restore the favourable conservation status of the degraded raised bog, by maintaining its current extent, creating an appropriate hydrological regime (in terms of both quality and resources) and reducing both nitrogen deposition and fragmentation.

2.4.5 The Supplementary Advice and SIP provide further definition and, importantly, extend these aspirations, where appropriate, onto adjacent land beyond the European site boundary. In particular, the former seeks to influence development on adjacent land to ensure it does not compromise the structure and function of the SAC. This could have implications for the Proposed Scheme.

2.4.6 In 2018, Natural England produced a site assessment[21] categorising the entire site as unfavourable recovering. This provides evidence that the existing management regime on Holcroft Moss remains successful, although it reaffirms the importance of the maintenance of a favourable hydrological regime. Although the prognosis for the site would appear to be positive, this cannot be assumed, given the complexities and inherent fragility of degraded raised bogs.

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

[21] Natural England (2018), *Holcroft Moss Condition Assessment.* Available online at: https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1006461&ReportTitle=Holcroft%20Moss%20SSSI.

2.4.7 Furthermore, a programme of hydrological investigations carried out by HS2 Ltd has continued to provide greater insight into the behaviour of surface and sub-surface flows in the vicinity of the Holcroft Moss component.

Design changes

2.4.8 Elements of the Proposed Scheme have been amended since the last HRA. In addition, new factors have emerged that have not been evaluated previously. These are described below, and all require (re-)assessment.

2.4.9 The 2012 HRA ruled out any impact on Holcroft Moss from changes in surface and groundwater flows as a consequence of the 2012 embankment and viaduct design. However, the current Proposed Scheme increases the length of the M62 West viaduct southwards. Given its proximity to the SAC, and potential to affect the local hydrological regime, a new screening exercise is required. It should be noted that the currently proposed Glazebrook North embankment should not be confused with the much larger embankment assessed in the 2016 Addendum.

2.4.10 Similarly, the measures that would typically be employed to de-commission the gas main beneath Holcroft Moss will risk the loss or disturbance of the mossland habitat, and/or negatively influence drainage within the peat body.

2.4.11 In addition, the need has arisen to assess the impact of air pollution associated with construction traffic both on the M62 and, given the proximity of the land required for construction of the Proposed Scheme, on an internal haul route.

2.5 Case law

2.5.1 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

2.5.2 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. Consequently, the screening conclusion of the 2012 HRA[3], that the CoCP would mitigate potentially harmful, localised effects, such as dust pollution, cannot now be relied upon. Further consideration will therefore be required.

Wealden judgement

2.5.3 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

2.5.4 Here, the Court of Justice of the European Union (CJEU)[22] 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

2.5.5 This case[23] 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... '.

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

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

3 Likely significant effects

3.1 The likely significant effects test

3.1.1 Regulation 63(1) identifies whether a proposed development will result in a 'likely significant effect … (either alone or in combination)' on a European site. An in-combination assessment is only required where an impact is identified which would not result in a significant effect on its own but where significant effects may arise when combined with other plans or projects. The screening test is seen only as a trigger[24] 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'[25];
- 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 [26]; 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'[27].

3.2 Potential impacts

3.2.1 Drawing on the outcomes of the preliminary assessment above and the original 2012 HRA[3], the following potential impacts on Holcroft Moss have been identified as requiring consideration:

- construction related impacts typically comprising *inter alia,* localised contamination of air, water and land as a consequence of dust, siltation and erosion (though excluding emissions from construction vehicles);
- habitat loss of degraded raised bog and changes to the hydrological regime within the peat body from de-commissioning of the gas main;
- changes to the local hydrological regime from construction of the Glazebrook North embankment and/or M62 West viaduct; and

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

[25] 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.

[26] Waddenzee at paragraph 44.

[27] Peter Charles Boggis and Easton Bavants Conservation v Natural England and Waveney District Council, High Court of Justice Court of Appeal case C1/2009/0041/QBACF. Paragraphs 36 and 37.

- nitrogen deposition from Heavy Goods Vehicles (HGV) utilising both on-site and off-site construction traffic routes.

3.2.2 The potential for likely significant effects as a result of these impacts is discussed below.

3.3 Construction related activities

3.3.1 Holcroft Moss lies 44m east of the M62 West viaduct. The SAC will therefore be vulnerable to a range of possible effects, including pollution of surface and sub-surface flows from spillages of materials and concrete production; compaction of peat-based soils; erosion and siltation of local watercourses; and, airborne dust from construction. All provide mechanisms by which harm could arise, for instance from eutrophication of the bog by dust deposition (and the subsequent encouragement of more ruderal communities at the expense of the typically more sensitive qualifying features), or compacted soils compromising the local hydrological regime. It should be noted that air pollution from construction vehicle exhaust is assessed under 'nitrogen deposition'.

3.3.2 The 2012 HRA identified the potential for harm arising from these and similar activities. Although the 2012 HRA screening stage subsequently negated the potential for harm through reliance on the draft CoCP[12], this can no longer be relied upon because of changes in case law. Therefore, in a departure from the 2012 HRA, this issue requires further scrutiny.

3.3.3 Therefore, it is considered there is a credible risk that construction-related activities could undermine the conservation objectives of Holcroft Moss and that likely significant effects cannot be ruled out (alone). An appropriate assessment is therefore required.

3.4 Gas main decommissioning

3.4.1 A high-pressure gas main buried within the peat body bisects Holcroft Moss. It forms part of a 2.6km long stretch of gas main that broadly follows the route of the Proposed Scheme and intercepts it on multiple occasions. Installed in 1977, its route is visible on the surface where extracted peat was reinstated following excavation and installation. As this preceded notification of the SSSI in 1991, it is assumed that installation did not involve measures to reduce ecological damage.

3.4.2 The decommissioning of gas mains forms a frequent component of major infrastructure development and, consequently, several techniques are typically employed to provide secure and, importantly, safe outcomes. However, the engineering options cannot rule out the possibility of the direct loss of habitat and subsequent disruption of the hydrological regime within the peat body, which would represent a direct conflict with the conservation objectives.

3.4.3 Therefore, decommissioning of the high-pressure gas main is considered here as a credible risk to the conservation objectives of Holcroft Moss and a likely significant effects cannot be ruled out (alone). An appropriate assessment is therefore required.

3.5 Construction of viaduct and embankment

3.5.1 This effect is concerned with the localised effects on surface and sub-surface flows.

3.5.2 The degraded bog communities are fragile and dependent, to a greater or lesser degree, on the maintenance of a favourable hydrological regime that incorporates both water quality and water resource elements. Raised bogs are typically separated from groundwater influences, but at Holcroft Moss this may have been compromised by past land use. Given the proximity of the M62 West viaduct and the Glazebrook North embankment, and the engineering activities required for the construction of their foundations, there is the potential for sub-surface flows to be interrupted and subsequent damaging changes to the degraded raised bog community.

3.5.3 Therefore, it is considered there is a credible risk that construction of the M62 West viaduct and/or Glazebrook North embankment could lead to changes to the hydrological regime which could undermine the conservation objectives of Holcroft Moss. Therefore, likely significant effects cannot be ruled out (alone) and an appropriate assessment is required.

3.6 Nitrogen deposition

Methodology

3.6.1 The assessment of air pollution is influenced by established best practice provided by Highways England (the Design Manual for Roads and Bridges (DMRB))[28], Natural England[29] and the Institute for Air Quality Management (IAQM)[30]. 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

[28] Highways England, Transport Scotland, Welsh Government & Department for Infrastructure (2019), *LA105 Air quality.*

[29] 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/file/5431868963160064.

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

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.

3.6.2 However, 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.

3.6.3 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)[31] by 200 AADT or more;
- change in daily average speed by 10kph or more; or
- change in peak hour speed by 20kph or more.

3.6.4 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 where traffic flows are expected to increase (or other changes are apparent see bullet points above), and where 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 carried out to evaluate any impacts during construction or subsequent operation as appropriate.

3.6.5 The ecological characteristics of a site are derived from the formal citations, condition assessments, conservation objectives, favourable condition tables (FCT), 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[32] 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.

3.6.6 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

[31] 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.

[32] These values are utilised as there is evidence to show that these equate approximately to a 1% change in critical loads (see paragraph 3.6.7).

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.

3.6.7 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.

3.6.8 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 (see Section 2.3).

3.6.9 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 Holcroft Moss is one of three discrete components of the Manchester Mosses SAC (which, in straightforward terms, is regarded as the sum of its parts), there is a separate need to assess the impact of air pollution on all other components as well.

3.6.10 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, should one be considered necessary. An assessment of any impacts on the entire Manchester Mosses SAC follows.

Initial assessment

Background

3.6.11 Key information is presented in Annex A which summarises the associated air quality assessment. The following assessment draws on best practice (from Natural England and DMRB, see Paragraph 3.6.1) and utilises selected information from Annex A, though reference to the latter is encouraged.

Proximity

3.6.12 Holcroft Moss is bordered by the M62 to the north and a construction haul route to the South West. Both lie well within the 200m threshold. Consequently, a traffic assessment is required.

Traffic assessment

3.6.13 The M62 is a planned construction route for HGV. This, and the site haul route will be in use from 2025 to 2037. The haul route will be decommissioned once construction of this section ceases. Therefore, the roads assessed under this scenario comprise the M62, between junctions 11 to 12, and the on-site construction haul route.

3.6.14 Annex A indicates that the construction phase of the Proposed Scheme will result in traffic flows that exceed the screening thresholds (of 200 HDV or 1,000 for all vehicles), both alone and in-combination with other plans or projects. 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.

3.6.15 In contrast, this analysis confirms that the Proposed Scheme will not change traffic movements in the operational phase and, therefore, no further assessment of that component is required. No other criteria are triggered.

Construction phase air quality assessment of traffic flows (alone)

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

3.6.17 Three transects, each 200m long, were established at Holcroft Moss. Transects 1 and 2 were located on the North East and North West corners extending southwards, to capture impacts from the M62; Transect 3 was located on the south-west corner, extending in a north-easterly direction, to assess impacts from the site haul route. Each started from the kerbside, including those on the M62. The transects intercepted the boundary of the

European site at 23m, 26m and 34m respectively. All subsequent points fell within the European site.

3.6.18 The air pollution assessment has used traffic data based on an estimate of the average daily flows in the peak year during the construction period and adopts vehicle emission rates and background pollutant concentrations from the first year of construction. It should be noted that the air quality model takes a conservative approach and assumes that the highest flows in any one year are applied to the entire construction period. In reality, there will be considerable periods, perhaps years, where traffic flows and hence nitrogen deposition are less than this. However, the approach adopted meets the precautionary principle embedded in the Habitats Regulations.

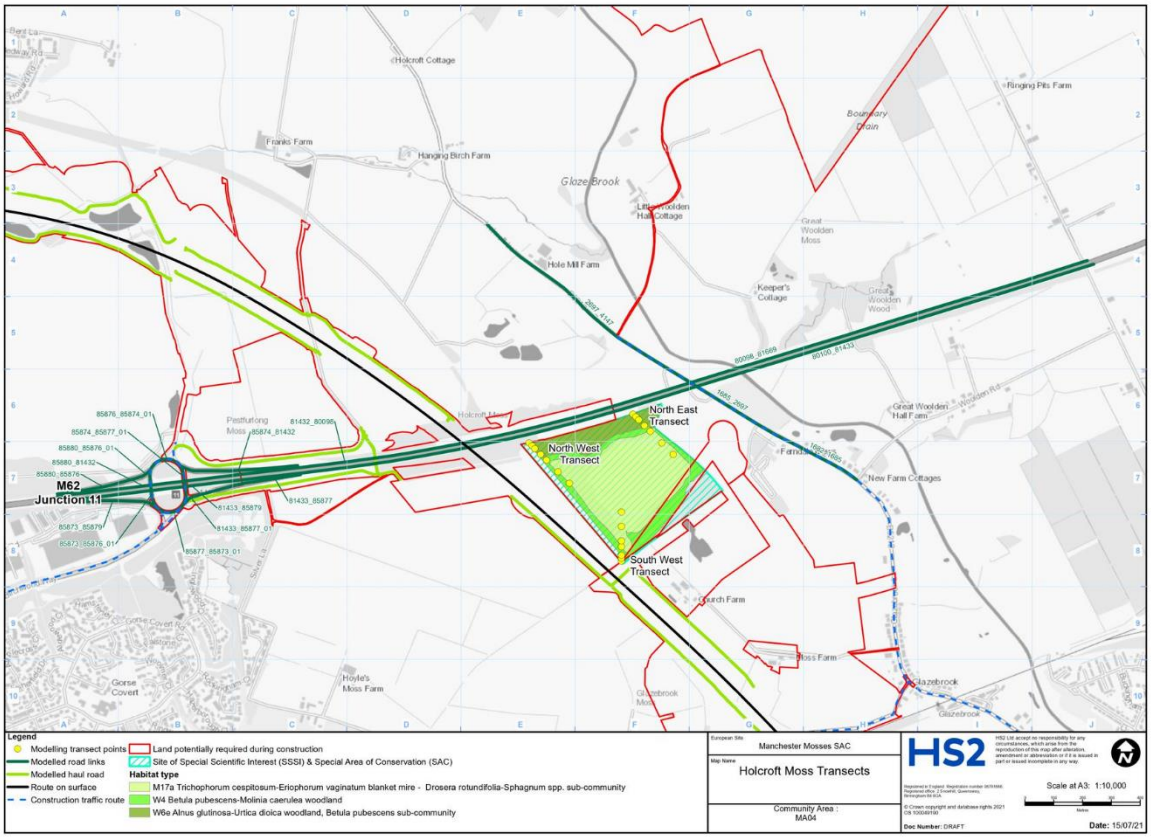
3.6.19 Background NO_x and nitrogen deposition rates were obtained from the Air Pollution Information System (APIS)[33]. Two semi-natural habitat types were identified and are listed below with the appropriate critical loads (also derived from APIS):

- broadleaved woodland (10kg N/ha/yr – 20kg N/ha/yr); and
- lowland raised mire (5kg N/ha/yr – 10kg N/ha/yr).

3.6.20 The distribution of these is shown in Figure 2 though lowland raised mire, which dominates the majority of the site, represents the sole qualifying feature of the SAC. The woodland lies to the north and separates the mire from the M62. Following best practice, only the lower value of each range has been used in this assessment.

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

Figure 2: Air quality model, extent of habitats and location of transects



3.6.21 Table A5 of Annex A shows that average existing and predicted background levels of NO_x lie well below the air quality standard, and that rates of nitrogen deposition exceed the critical loads for all habitats identified. Table A5 of Annex A describes the change in NO_x concentrations brought about by the Proposed Scheme alone during construction and is described in Annex A as follows:

> 'In all scenarios, at all modelled locations in the South West transect, NO_x concentrations are within the air quality standard. 2018 baseline annual mean NO_x concentrations are predicted to be above the air quality standard at all other transects. At the North East and North West transects, NO_x concentrations are predicted to be above the standard within approximately 50m of the nearest road, both with and without the Proposed Scheme.'

3.6.22 In turn, these outcomes prompted an analysis of nitrogen deposition across all transects during construction (alone). This is presented in Table 1[34] below (which is taken from Table A6 of Annex A).

[34] Note that all tables in this HRA are drawn from Annex A. Whilst minor changes have been made to the layout, the data remains unchanged.

Table 1: Assessment of nitrogen deposition (construction, Proposed Scheme alone)

Tran-sect (T)	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)	% Change in relation to lower critical load
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme			
T1	23	42.41	39.03	39.07	0.04	10	0.3%
	35	40.92	38.15	38.18	0.03	10	0.3%
	48	39.98	37.62	37.65	0.03	10	0.2%
	73	38.84	37.01	37.03	0.02	10	0.2%
	98	23.04	22.29	22.30	0.01	5	0.2%
	148	22.63	22.09	22.10	0.01	5	0.2%
	198	22.40	21.98	21.99	<0.01	5	0.1%
T2	26	41.97	38.78	38.83	0.05	10	0.5%
	38	40.67	38.01	38.07	0.06	10	0.5%
	50	39.82	37.54	37.58	0.04	10	0.5%
	74	38.75	36.96	37.01	0.05	10	0.5%
	98	23.01	22.27	22.30	0.03	5	0.5%
	146	22.62	22.08	22.11	0.03	5	0.5%
	194	22.39	21.97	22.00	0.03	5	0.5%
T3	34	21.90	21.75	21.79	0.04	5	0.9%
	41	21.91	21.75	21.79	0.04	5	0.8%
	50	21.91	21.75	21.79	0.04	5	0.7%
	77	21.94	21.76	21.79	0.03	5	0.6%
	97	21.95	21.77	21.80	0.03	5	0.5%
	145	22.00	21.79	21.81	0.02	5	0.4%
	195	22.1	21.8	21.8	0.02	5	0.3%

3.6.23 With reference to this data, Annex A states:

> 'Nitrogen deposition rates at Holcroft Moss SSSI are predicted to be above the relevant critical load at all modelled receptors in the baseline and future scenarios with or without the Proposed Scheme. 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'.

3.6.24 This evidence shows that predicted increases in deposition brought about by the Proposed Scheme alone are relatively modest, and no higher than 0.1kg N/ha/yr. Indeed, the 1% threshold is not exceeded anywhere. Best practice is clear that with such modest increases, likely significant effects can be ruled out.

3.6.25 Whilst no further assessment of the impact alone is required, mindful of the requirements of the Wealden decision, an in-combination assessment is required. This is provided below.

Construction phase air quality assessment (in-combination)

Scope of in-combination assessment

Rationale

3.6.26 Although likely significant effects during construction alone (and during operation both alone and in-combination) were ruled out in paragraph 3.6.24, an assessment of the Proposed Scheme during construction in combination with other plans or projects is also required. As the Directive[35] 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 Holcroft Moss; 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 …'

- In Foster and Langton[36], 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).

- This evidence has determined the need for and scope of any in-combination assessment required for this European site as explained in Section 5.2.

Methodology

3.6.27 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

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

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

committed developments. The approach to this assessment, which has been agreed with Natural England, is provided in Section 2 of Annex A.

3.6.28 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 Holcroft Moss. Annex A details how development that could cause traffic emission related in-combination effects have been accounted for within the traffic data used in the air quality assessment of traffic flows. Searches were also carried out for the following non-traffic related emission sources (which are also included in the air quality model) within a 5km radius:

- combustion and energy > 1MW;
- farming, livestock and poultry (any);
- waste, e.g. landfill gas (any); and
- minerals activities.

3.6.29 This is considered to be reasonable and proportionate and meets the expectations laid down in Section 4.48 of Natural England's guidance[29].

Air quality assessment of traffic flows in-combination

3.6.30 Roads investigated under this scenario remain as before: the M62 and the site haul route with the addition of the B5212 (Holcroft Lane). The latter crosses the M62 to the north-east and its impact is effectively captured by the existing transect. Traffic flows along the M62 and B5212 are presented in Table A7 of Annex A. As with the assessment of the Proposed Scheme alone, changes in NO_x are summarised first and reference to Table A10 of Annex A is encouraged for the detail. Annex A states:

> 'In all scenarios NO_x concentrations are within the air quality standard at all modelled locations in the South West transect. 2018 baseline annual mean NO_x concentrations are predicted to be above the air quality standard at the North East and North West transects. By 2025, in the do nothing and with the Proposed Scheme scenarios, concentrations are predicted to be within the air quality standard beyond approximately 90m from the nearest road.'

3.6.31 In turn, this prompted an analysis of nitrogen deposition across all transects. This is presented in Table A11 of Annex A and also shown in Table 2 below.

Table 2: Assessment of nitrogen deposition at Holcroft Moss (Proposed Scheme in-combination)

Transect (T)	Distance to road (m)	2018 baseline nitrogen deposition (kg N/ha/yr)	Dry deposition (kg N/ha/yr)		Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
			2025 do nothing	2025 with the Proposed Scheme			
T1	23	42.41	38.70	39.27	0.57	10	5.6%
	35	40.92	37.93	38.38	0.45	10	4.5%
	48	39.98	37.46	37.75	0.29	10	2.9%
	73	38.84	36.89	37.13	0.24	10	2.4%
	98	23.04	22.24	22.40	0.16	5	3.1%
	148	22.63	22.06	22.20	0.14	5	2.8%
	198	22.40	21.96	22.09	0.13	5	2.7%
T2	26	41.97	38.47	39.03	0.56	10	5.6%
	38	40.67	37.80	38.27	0.47	10	4.6%
	50	39.82	37.37	37.68	0.31	10	3.1%
	74	38.75	36.85	37.11	0.26	10	2.6%
	98	23.01	22.23	22.40	0.17	5	3.3%
	146	22.62	22.05	22.21	0.16	5	3.1%
	194	22.39	21.95	22.10	0.15	5	3.0%
T3	34	21.90	21.73	21.79	0.06	5	1.2%
	41	21.91	21.74	21.79	0.05	5	1.1%
	50	21.91	21.74	21.79	0.05	5	1.0%
	77	21.94	21.75	21.79	0.04	5	0.8%
	97	21.95	21.76	21.80	0.04	5	0.8%
	145	22.00	21.78	21.81	0.03	5	0.7%
	195	22.10	21.80	21.80	0.03	5	0.6%

3.6.32 Annex A states:

> 'Nitrogen deposition rates at Holcroft Moss SSSI are predicted to be above the relevant critical load at all modelled receptors in the baseline and future scenarios with or without the Proposed Scheme. Predicted nitrogen deposition rates in 2025, with the Proposed Scheme, are lower than the 2018 baseline rates at all modelled locations. The changes in nitrogen deposition between the 2025 do nothing Scenario and with the Proposed Scheme scenario are greater than 1% of the relevant critical load in:
>
> - all modelled areas in the North East Transect [T1];
> - all modelled areas in the North West Transect [T2]; and
> - up to approximately 50m from the road in the South West Transect [T3].
>
> Potentially significant effects are therefore predicted within these areas of the SAC.'

3.6.33 The outcomes clearly reflect the increase in traffic on the M62 from growth projected in the area. Whilst all represent relatively modest increases, with the greatest (0.57g N/ha/yr) occurring in closest proximity to the M62 (T1 and T2), it is clear that these now extend into the lowland raised bog along all transects, though the greatest increase in this area only amounts to less than 0.2kg N/ha/yr at most before gradually declining as the transect progresses further into the bog. However, this is the equivalent to an increase in deposition of between approximately 3% of the critical load closest to the M62, and does not fall below 2.7% for the remainder of the transect. This slow rate of decline indicates similar values can be expected to affect much of the bog surface beyond the end of the transects. The data also indicates increased deposition from the site haul route (T3) though the maximum exceedance is only 1.2%, falling to less than 1% beyond 50m.

3.6.34 Importantly though, the third, fourth and fifth columns of the table show that at all transect points the rate of nitrogen deposition at the end of the construction period will be lower than at present, with or without the scheme, and with or without growth from other development. Nevertheless, the increase in the rate of nitrogen deposition is sufficient to ensure that likely significant effects cannot be ruled out.

3.6.35 Therefore, it is considered there is a credible risk that nitrogen deposition associated with the Proposed Scheme in combination with other plans or projects could undermine the conservation objectives of Holcroft Moss and that likely significant effects cannot be ruled out; an appropriate assessment (in-combination) is required.

3.7 Screening assessment

3.7.1 Having applied the screening test in Regulation 63, HS2 Ltd considers that there is a credible risk that the conservation objectives could be undermined and, consequently, that likely significant effects and the need for appropriate assessment cannot be ruled out:

- construction-related impacts on the degraded raised bog of Holcroft Moss, typically comprising *inter alia,* the localised contamination of air, water and land, on the degraded raised bog (alone);
- loss of degraded raised bog and changes to the hydrological regime within the peat body from decommissioning of the gas main (alone);
- changes to the local hydrological regime within and around the degraded raised mire from construction of the Glazebrook North embankment and/or M62 West viaduct (alone); and
- nitrogen deposition on the degraded raised bog from HGV utilising both on-site and off-site construction traffic routes, (in-combination).

3.7.2 Consequently, it is considered that an appropriate assessment is required of all these factors to identify if it can be ascertained that the Proposed Scheme will not adversely affect the integrity of Holcroft Moss.

4 Appropriate assessment

4.1 The appropriate assessment test

4.1.1 The screening assessment has identified that likely significant effects could not be ruled out in terms of impacts arising from construction related activities, the decommissioning of the gas main, the construction of the embankment/viaduct and nitrogen deposition from vehicles utilising both on- and off-site routes. All will impacts require appropriate assessment. No other potential impacts were identified.

4.1.2 The appropriate assessment is defined in Regulation 63(5). The following definitions are applied as necessary to the subsequent assessment of likely significant effects.

4.1.3 Regulation 63(5) states that where a project is 'likely to have a significant effect alone or in combination', it can only be consented if the competent authority can ascertain (following an appropriate assessment made '… in view of that site's conservation objectives') that it 'will not adversely affect the integrity of the European site'. Drawing on Regulation 63(3), the in-combination test is also carried forward onto the appropriate assessment.

4.1.4 In Sweetman[37], 'integrity' is defined as:

> 'the lasting preservation of the constitutive characteristics of the site … whose preservation was the objective justifying the designation of the site'.

4.1.5 In the Advocate General's opinion on the above case (Sweetman)[38], she stated that a plan or project involving '… some strictly temporary loss of amenity which is capable of being fully undone …' would avoid an adverse effect on the integrity of a site. This was supported by the Court which ruled that '… the lasting and irreparable loss…' of part of a European site would represent an adverse effect on its integrity.

4.1.6 In Planning Practice Guidance[10], it is described as:

> 'the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated.'

4.1.7 In Grace & Sweetman[39], the CJEU held that it is only when it is sufficiently certain that a measure will 'make an effective contribution to avoiding harm, guaranteeing beyond all

[37] Minister for the Environment, Heritage and Local Government v An Bord Pleanala (2013), Sweetman reference for a preliminary ruling from the Supreme Court of Ireland, Peter Sweetman Ireland Attorney General (together with the opinion of the Advocate General delivered on 22 November 2012). C-258/11.

[38] Advocate General Opinion in Case C-258/11 Sweetman paragraphs 58-61.

[39] Grace & Sweetman v An Bord Pleanala (2019), PTSR 266, C-164/17, at paragraphs 51-53 and 57.

reasonable doubt that the project will not adversely affect the integrity of the area, that such a measure may be taken into consideration'.

4.1.8 Mindful of this, it is clear that, for mitigation to be considered to effectively remove adverse effects, it 'should be effective, reliable, timely, and guaranteed to be delivered for as long as necessary to achieve its objectives'[40].

4.1.9 The burden of proof is made clear in Waddenzee and where 'doubt remains as to the absence of adverse effects … the competent authority will have to refuse authorisation'[41] and 'that is the case where no reasonable scientific doubt remains as to the absence of such effects'[42]. However, absolute certainty is not required. In Champion, whilst referring to Advocate General Kokott in Waddenzee at paragraph 107, the Supreme Court found that 'absolute certainty' is not required as: '… the necessary certainty cannot be construed as meaning absolute certainty since that is almost impossible to attain …'.

4.2 Construction related activities

Assessment of effects

4.2.1 The screening exercise identified that likely significant effects from pollution and other impacts associated with construction activities cannot be ruled out alone (though this excludes the impact of vehicle emissions which are assessed elsewhere). Anticipated to extend over a prolonged period, construction will comprise intense activity including, amongst others, the use of harmful materials and the movement of large number of vehicles; the on-site construction traffic route encroaches to within 30m of the SAC and the M62 West viaduct south satellite compound and Transfer Node lies approximately 468m to the North West. Note that impacts on the wider hydrological regime caused by viaduct and embankment construction, and emissions from construction vehicles are assessed separately, below.

4.2.2 In the absence of mitigation, it is uncertain if these potential changes would conflict with the conservation objectives for Holcroft Moss and threaten its integrity by compromising the ability to 'Ensure that the integrity of the site is maintained or restored [and] contributes to achieving Favourable Conservation status …'.

4.2.3 Therefore, in terms of construction related activities, it is considered that adverse effects on the integrity of Holcroft Moss cannot be ruled out and mitigation is required.

[40] Tyldesley, D., and Chapman, C. (2013), *The Habitats Regulations Handbook*, April 2021 edition UK: DTA Publications Limited.

[41] Waddenzee at paragraph 57.

[42] Waddenzee at paragraph 59.

Mitigation of construction related impacts

4.2.4 Mitigation is required because possible adverse effects on the integrity of Holcroft Moss from construction-related activities cannot be ruled out. The type of effects identified above are common to most major construction projects. Consequently, a range of relatively straightforward, robust and reliable techniques have been developed by the industry, over decades, to avoid, cancel or reduce the scale of effects to acceptable levels, even in proximity to fragile sites. Most, if not all, are required as a matter of best practice and law, providing confidence that they will be effective, reliable and deliverable, and that they will be implemented for as long as is necessary to remove the threat. These are typically supported by sophisticated management and monitoring programmes, to ensure correct implementation and enable prompt remedial action, should any fail.

4.2.5 These measures are proposed via an Environmental Memorandum forming part of the Environmental minimum requirements for HS2. This includes implementation of a CoCP, which contains control measures and the standards to be implemented throughout the Proposed Scheme. Site-specific control measures identified in Local Environmental Management Plans (LEMPs) will be developed following consultation with the relevant stakeholders. Additionally, key environmentally sensitive worksites are identified for areas with complex sensitivities and consenting procedures. The nominated undertaker and/or its contractors will be required to work in accordance with the CoCP and LEMPs, and prepare method statements that will describe mitigation, compensation, enhancement and monitoring measures.

4.2.6 HS2 Ltd will work with Natural England to develop robust and effective local measures for the implementation of the draft CoCP, to avoid adverse effects from the construction of HS2 on the Manchester Mosses SAC. Consequently, there is no reasonable doubt as to why measures to control the effects of construction activities will not be effective at removing the threat throughout the construction process.

4.2.7 Therefore, in terms of construction related activities, it is considered there is no reasonable scientific doubt that implementation of the pollution control measures in the draft CoCP allows adverse effects on the integrity of Holcroft Moss to be ruled out alone. Consequently, it is considered there is no need for an in-combination assessment.

4.3 Gas main decommissioning

Assessment of effects

4.3.1 As part of the Proposed Scheme, a gas main situated beneath the southern part of Holcroft Moss SSSI, is to be decommissioned. Such activities form a frequent component of major infrastructure development and, consequently, several techniques are typically employed to provide secure and safe outcomes.

4.3.2 These include:

i. 'do nothing' other than weld on plates/'dome ends' onto the pipe ends;

ii. grout plug the ends leaving an unfilled section in the middle;

iii. fill pipe with an inert gas;

iv. physical extraction of entire section of main; and

v. grouting (filling the pipe with concrete foam at various points along its length) would allow the decommissioned main to remain in situ with no monitoring/access required within the SAC boundary.

4.3.3 The gas main extends for a distance of 370m beneath Holcroft Moss, in a south-west to north-east direction (Figure 2). Any excavation within the SAC, for example to carry out the operation or to undertake future monitoring of the gas main (for safety reasons), would result in direct ecological loss, not only of the living peat surface and the bog communities present (the acrotelm), but also inevitable damage to, and localised disturbance of, the peat body (the catotelm). Furthermore, it is anticipated that the gas main has been laid on a gravel (or similar) bed. As this lies within the peat body, it has the potential to act as a drain when excavations are made. The potential also exists for the grout to also act as a permeable substrate, should the steel pipe eventually corrode. All these aspects of the decommissioning process could be expected to compromise the hydrological regime of the bog across a much wider area, even if the peat was subsequently replaced.

4.3.4 Each option has the potential to require some form of physical intervention, either in the short or long-term and, therefore, each has the potential to conflict with the conservation objectives for Holcroft Moss by compromising the ability to 'Ensure that the integrity of the site is maintained or restored' [and] 'contributes to achieving Favourable Conservation status …'.

4.3.5 Therefore, in terms of the decommissioning of the gas main, it is considered that adverse effects on the integrity of Holcroft Moss cannot be ruled out alone and mitigation is required.

Mitigation of gas main decommissioning impacts

4.3.6 Each of the five standard options has been shown to potentially require excavation, which would lead to the subsequent loss of habitat and harm to the hydrological regime of the bog, and so, have the potential to conflict with the conservation objectives for the SAC.

4.3.7 Options i, ii and iii would avoid the need for physical works within the SAC, and so, avoid immediate habitat loss. However, this would only be a short-term benefit as none would preclude the need for maintenance and interventions in the long-term, which could result in excavation and habitat loss in due course. In contrast, whereas Options iv and v would require major interventions either along the entire stretch of the gas main (Option iv) or at

regular intervals along it (Option v), both would preclude the need for future maintenance and investigation, and the disturbance associated with this.

4.3.8 Overall, in their basic form, none would remove the conflict with the conservation objectives, and none can be considered to represent effective mitigation.

4.3.9 However, where circumstances demand, the ability exists to modify the standard methodology of Option v that would allow a chemically inert grout of a lighter viscosity to be pumped into the entire 370m stretch of the gas main from just two locations, one at either end, from locations beyond the SAC boundary. Although each would require excavations to access the gas main, this adaptation of the standard methodology has the benefit of avoiding the need to enter the European site at all, so removing the threat of direct habitat loss or disturbance.

4.3.10 Working methods are also available to temporarily prevent the egress of water from the gravel bed when the excavation is open, and permanently, when grouting is completed, and the site reinstated. Further, whilst removal of the cathodic protection would normally leave the pipeline open to corrosion and potential collapse, the grout will prevent future collapse.

4.3.11 Therefore, should an appropriate method be designed to take account of these factors, and implemented effectively, there is no reasonable doubt why these measures will not be effective at removing the threat of an adverse effect on the integrity of the SAC by avoiding the direct loss/disturbance of the peat body, and changes to the hydrological regime.

4.3.12 Therefore, in terms of the decommissioning of the gas main, it is considered there is no reasonable scientific doubt that implementation of a suitably modified and implemented Option v allows adverse effects on the integrity of Holcroft Moss to be ruled out alone. Consequently, it is considered there is no need for an in-combination assessment.

4.4 Construction of viaduct and embankment

Assessment of effects

4.4.1 The screening assessment has concluded that a likely significant effect cannot be ruled out, alone, in terms of the potential impact of changes to the hydrological regime on the degraded bog communities of Holcroft Moss from construction of the viaduct and/or the Glazebrook North embankment.

4.4.2 All components of the degraded bog communities are dependent, to a greater or lesser extent, on the maintenance of a favourable hydrological regime. Changes in water levels brought about by a reduction in groundwater flow could affect sub-surface flows to the SAC, prompting damaging changes to the extent, species composition, abundance and/or distribution of the degraded bog communities.

4.4.3 Therefore, it is uncertain if these potential changes would conflict with the conservation objectives for the European site by compromising the ability to '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'.

4.4.4 Furthermore, there may be conflicts with the more detailed objectives described in the supplementary advice to maintain or restore the extent and distribution of the feature, the composition of its vegetation, structural diversity and key species, as well as achieving more favourable hydrological conditions on surrounding land. Importantly, 'bog' is taken here to mean the peat deposit irrespective of the precise nature and condition of the that vegetation. Consequently, further scrutiny of the site characteristics is required to thoroughly evaluate the level of threat.

4.4.5 Hydrological assessment including groundwater modelling has been undertaken to address this issue and reported in Groundwater modelling report – Holcroft Moss (Volume 5: Appendix WR-008-00001) (hereafter referred to as the Groundwater modelling report). Extracts from this note, which relates to the hybrid Bill design, are included in the following summary.

4.4.6 Each span of the M62 West viaduct will be 40m, with the viaduct piers supported by piles, sunk approximately 8m through superficial deposits and into the Sherwood Sandstone bedrock. Lines of three to four piles will be constructed beneath each pile cap, which in total are expected to amount to approximately 10% to 25% of the cross-sectional area along its length. For the embankment, piles at spacings of 1.8m along the entire length would comprise up to 33% of the embankment cross-sectional area.

4.4.7 Modelling suggests that groundwater levels in the Sherwood Sandstone Group decrease from west to east (in line with regional groundwater levels). Although uncertain, as groundwater level data in the superficial deposits is not available, groundwater levels also appear to decrease from the west eventually draining to Holcroft Lane Brook to the north and Glaze Brook in the east.

4.4.8 In the peat body, water levels are typically raised in areas of higher ground and decrease with proximity to ditches and drains. Overall, water levels are higher to the west though this will need to be confirmed by site investigation.

4.4.9 At present, it is uncertain if the superficial deposits, comprising glaciofluvial sands and gravels and glacial till, underlying the peat provide an upward flow of water into the base of the peat, or may restrict the draining of groundwater from the peat. However, the water balance exercise (see Section 2.4 of the Groundwater modelling report) indicates that water levels in the peat are supported predominantly by recharge from rainfall although some uncertainties remain.

4.4.10 Therefore, an adverse impact on water levels in the peat could result at Holcroft Moss if:

- groundwater levels in the superficial deposit affect water levels in the overlying peat; and
- groundwater flow in superficial deposits underlying the peat is found to occur from west to east across the route of the Proposed Scheme.

4.4.11 Groundwater modelling of Holcroft Moss and the surrounding area was carried out to assess the potential impacts of the Proposed Scheme (the viaduct and embankment) on water levels in the peat. This found that the maximum simulated impact of the Proposed Scheme in reducing groundwater levels on Holcroft Moss is very small and close to the model error of convergence (1mm). Indeed, where a reduction in groundwater levels is simulated, this is limited to only about 4% of the area of the SSSI, located in the south-west corner of the site. It should be noted, however, that this represents the area in which the simulated impact was greater than 1mm, the error of convergence for the model. It does not include any areas in which the modelled impact was less than the model error of convergence.

4.4.12 Importantly, the investigations confirmed that the reduction in groundwater levels was associated with the proximity and the use of piling within the Glazebrook North embankment, rather than piling associated with the piers for the M62 West viaduct.

4.4.13 Lowland raised bogs are characterised by an intimate relationship between the vegetation (typically *Sphagnum* dominated) communities and the hydrological status of the supporting body of peat. With degraded raised bogs this relationship can be even more complex, as past land use can introduce direct connections with groundwater influences not often present in undamaged sites. Although Holcroft Moss is unique in the area, as a surviving peatland that has not, apparently, been cutover, it has suffered significant dewatering from construction of the adjacent M62 and is surrounded by deep drains; it was also subject to the installation of the gas main in 1977, prior to the use of any environmental safeguards as the site had not been designated then. Furthermore, positive site management measures have included the use of suitably modified heavy vehicles scraping surface peat into bunds to assist the management of surface water.

4.4.14 It therefore represents a highly modified example of its type. Despite this, it is actively managed by Cheshire Wildlife Trust and has been for over 30 years by the installation of plastic piling and creation of peat bunds to retain water on-site. Although this should not be overestimated, this does introduce some resilience to the site that would not otherwise be present, and is reflected in its unfavourable recovering status, as identified by Natural England in its condition assessment[21] of Holcroft Moss SSSI.

4.4.15 Management activities carried out on the site by Cheshire Wildlife Trust and Natural England aim to secure relatively stable water levels close to or at the surface across as much of the site as possible throughout the year. However, this is difficult to achieve along the perimeter of the site where edge effects, in the form of deep drains associated with surrounding agricultural use, the M62 and a disused railway, mean that water levels in the peat fall rapidly, and the typical peatland communities are replaced by birch woodland, scrub and more ruderal vegetation. Management is further compromised by the presence of the gas main where safety requirements currently prelude the installation of water control features in its proximity (and so, in part, preclude the extension of site management closer to the perimeter). Overall, it is debatable, with or without the Proposed Scheme, whether the

restoration of peat-forming vegetation is possible on land close to the boundary ditches. The most recent condition assessment completed by Natural England in August 2021 noted wetter conditions overall and improvement in condition since the previous assessment in 2013. Even though overall unfavourable recovering status is retained, this reflects the positive impact of on-going management activities. It also notes differences in species diversity, most notably across the eastern side and centre of Holcroft Moss and suggests, though is unable to confirm, this could be related to nitrogen deposition from the M62 or the loss of grazing.

4.4.16 Despite these factors, a fall in the water level of about 1mm over 4% of the site area (equivalent to 0.74ha) could represent a threat to the achievement of the conservation objectives in the areas affected. Although any impacts will be concentrated towards the edge of the site, where achievement of the conservation objectives may not be possible because of the edge-effects described above, it is impossible to accurately determine the impact this will have on the degraded bog communities affected.

4.4.17 Therefore, in terms of impacts on the hydrological regime, it is considered that adverse effects on the integrity of Holcroft Moss cannot be ruled out alone and mitigation is required.

Mitigation of viaduct and embankment impacts

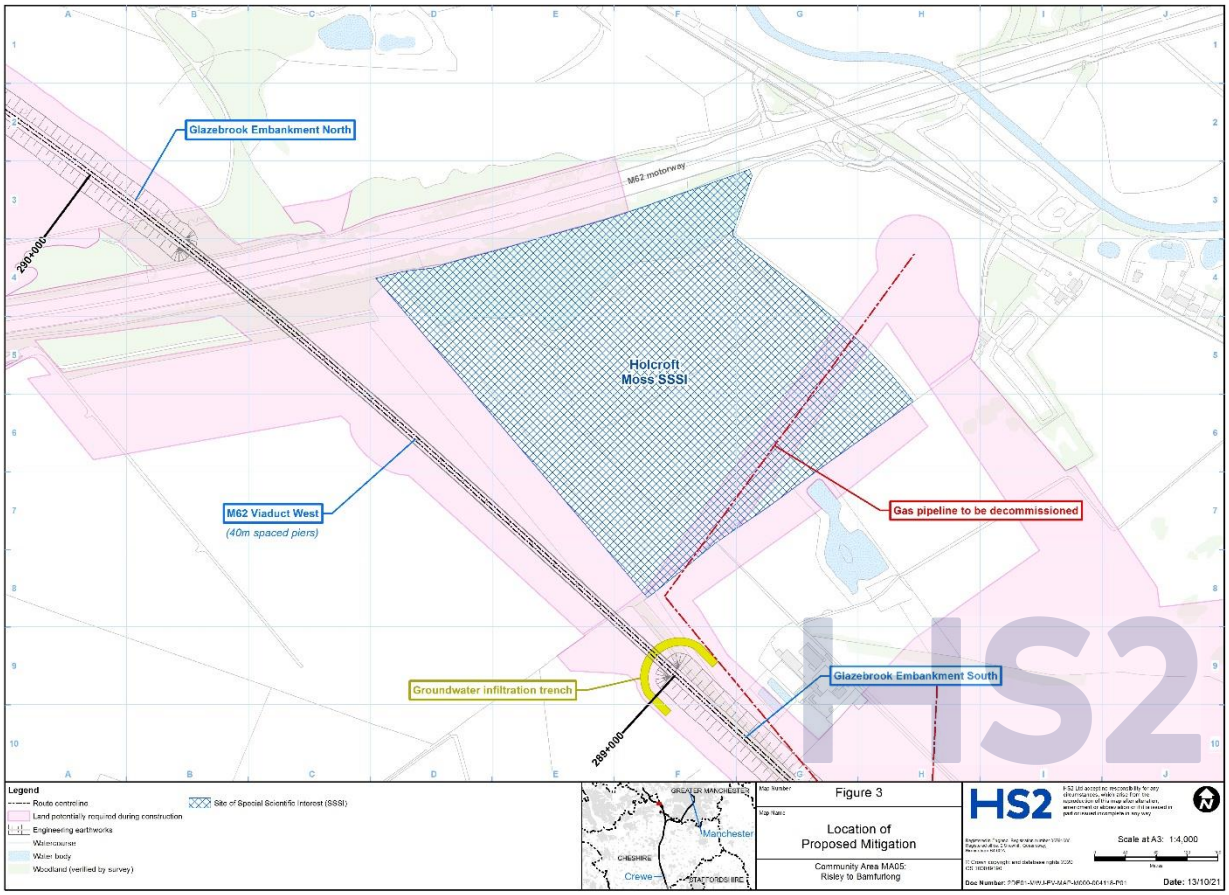
4.4.18 Several design options have been considered for this part of the alignment over the lifetime of the project.

4.4.19 The proposed mitigation reflects the current design and the circumstances at this location. Neither the viaduct nor the embankment will create an impermeable barrier to flow. In addition, the hydraulic permeability of the peat soils should remain unaltered although the area of permeable soils will be reduced along the route of the viaduct and embankment. Furthermore, modelling suggests the reduction in groundwater levels is associated only with the proximity and the use of piling within the Glazebrook North embankment. The reduction is not associated with the viaduct.

4.4.20 Mitigation comprises a U-shaped groundwater flow channel (a gravel filled trench), excavated in peat, close to the northern end of the Glazebrook North embankment (where it lies closest to the south-western corner of the SSSI) (Figure 3). The effectiveness of the trench has been simulated using groundwater modelling. The trench has been modelled as 10m wide and extending around the end of the embankment (Figure 3). The full depth of the peat has been replaced by the trench. The intention of this design is to increase groundwater flow from the west of the embankment to the east.

4.4.21 The distribution of these is shown in Figure 3 though lowland raised mire, which dominates the majority of the site, represents the sole qualifying feature of the SAC. The woodland lies to the north and separates the mire from the M62. Following best practice, only the lower value of each range has been used in this assessment.

Figure 3: Location of proposed mitigation



4.4.22 When allied with the M62 West viaduct, modelling of the trench was found to produce an impact on groundwater levels in the peat in all parts of Holcroft Moss of less than the model error of convergence (1mm). As a result, the modelling indicates that groundwater levels across the SSSI should not be affected by the viaduct option with this mitigation in place. However, as for the other model runs, the assessment cannot take into account any areas in which the modelled impact may be less than the model error of convergence.

4.4.23 It was concluded, therefore, that the impact of the current design of the Glazebrook North embankment and M62 West viaduct could be mitigated for by the inclusion of a suitably designed, gravel filled trench around the northern end of Glazebrook North embankment. By adjusting the design of the trench, it would be possible to eliminate entirely any impact on groundwater levels in the SSSI.

4.4.24 There should be no reasonable scientific doubt that the mitigation measures proposed, comprising the installation of a gravel-filled trench, will operate as designed and would effectively remove any impact. Importantly, should future ground investigations identify the need for more substantial mitigation, the extent of the trench may be extended or redesigned to meet the requirements.

4.4.25 Therefore, there can be adequate certainty that the proposed mitigation will neither compromise the ability to restore nor adversely affect the structure and function, and

constitutive characteristics of the site so removing any conflict with the conservation objectives which 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'.

4.4.26 The Waddenzee judgement rolls forward the requirement for in-combination assessment to the appropriate assessment stage. Drawing on the Boggis judgement[27], such effects have to be credible and not hypothetical. Given the conclusions above, it is equally considered implausible that any appreciable (residual) effects remain. Therefore, the need for a further in-combination assessment does not arise. Therefore, in terms of impacts on the hydrological regime, it is considered there is no reasonable scientific doubt that adverse effects on the integrity of the SAC can be ruled out alone. Consequently, it is considered there is no need for an in-combination assessment.

4.5 Nitrogen deposition

Assessment of effects alone and in-combination

4.5.1 The screening assessment has concluded that likely significant effects on the degraded raised bog communities of Holcroft Moss cannot be ruled out in combination with other plans or projects, in terms of the potential impact of nitrogen deposition from construction traffic using the M62, the B5212 and the site haul route. Given the alignment of the M62 and the B5212, the impact of both roads will be captured by the North East transect.

4.5.2 Therefore, the potential exists for nitrogen deposition to conflict with the conservation objectives for the European site, as it could compromise the ability to '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'.

4.5.3 Given that the screening test of the Proposed Scheme alone confirmed no exceedances of the 1% threshold along any of the transects, the focus of this appropriate assessment will be firmly on the outcome of the screening assessment in-combination, which described greater exceedances across a wide area of the bog.

4.5.4 The M62 is approximately 20m from the wooded northern boundary of Holcroft Moss and meets the DMRB criteria listed above in terms of proximity and HDV traffic volumes. In addition, the M62 West viaduct is approximately 44m from Holcroft Moss. This too requires consideration, as traffic data for construction vehicles using on-site construction traffic routes and moving between construction compounds has also been included in the assessment.

4.5.5 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.

4.5.6 Evidence presented in Annex A shows that critical loads are currently exceeded for all habitats on Holcroft Moss and are expected to remain so for the duration of the construction period. Consequently, as stated previously, the objective must shift to ensure the restoration rather than the maintenance of the qualifying features.

4.5.7 This is important as degraded raised bog is a fragile, ombrotrophic habitat that is particularly vulnerable to nutrient enrichment. This is reflected in its low critical load of just 5kg N/ha/yr – 10kg N/ha/yr; accordingly, both Supplementary Advice and the SIP for the SAC identifies air pollution as a potential threat with the aim of reducing nitrogen deposition to below the minimum value in the range. At present, background deposition (without the Proposed Scheme) is an order of magnitude higher than this.

4.5.8 However, drawing on the Compton[23] and, Foster and Langton[36] cases, the distribution of the woodland and degraded raised bog within Holcroft Moss is important. The former extends to a maximum width of around 125m and never below approximately 70m. As it is not a qualifying feature, increases in the rate of nitrogen deposition within the woodland are of no consequence. Although the aspirations of Natural England are to restore the degraded bog, the nature of the substrate and topography make restoration to a bog habitat here implausible.

4.5.9 Reflecting the impact of the M62, both the north east and north west transects display similar patterns when the transects emerge from the woodland and emerge onto the bog surface. At 98m from the M62 the North East and North West transects indicate increases in the rate of nitrogen deposition of 3.1% and 3.3%, respectively. This declines slowly for the rest of the 200m transect to minimum values of 2.7% and 3% for the North East and North West transects respectively. Given this rate of decline, exceedances of the 1% threshold can be anticipated across much if not all of the bog surface. Furthermore, APIS already shows that the critical loads are already exceeded at Holcroft Moss, and so this represents an additional contribution onto a habitat already at risk.

4.5.10 However, it must be remembered that the 1% threshold accommodates this scenario. Even where critical loads are already exceeded, such as at Holcroft Moss, even the risk of a significant effect can be dismissed at the screening stage. It therefore represents a very precautionary threshold set two orders of magnitude below the lower value of the critical load which itself does not automatically define whether an adverse effect will arise or not. Therefore, bearing in mind that critical loads are already exceeded, values of 3% or similar still represent very modest additional contributions. The potential impacts in the south west transect are even more modest with a maximum exceedance of just 1.2% which declines to below the 1% threshold after 50m where the risk of harm can be removed.

4.5.11 In addition, although the site escaped the damaging effects of peat cutting and has been actively managed for nature conservation for decades, the bog surface at Holcroft is heavily modified and far from pristine, though is improving. Whilst the further contributions predicted would conflict with the conservation objectives to achieve background deposition

rates below the critical load, it is considered implausible that these will result in measurable impacts to the extent, distribution and composition of the bog communities.

4.5.12 Furthermore, although extending from 2025 to 2038, construction of the Proposed Scheme will be temporary, and levels will fall to background levels once construction ceases. Indeed, such an outcome would comply with section 5.43 of Natural England's guidance[29] which states '… it may be possible to consider some increases as temporary and reversible, which would be unlikely to undermine site objectives'.

4.5.13 This resonates strongly with contemporary case law, including the definition of integrity provided in Sweetman decision and the opinion of the Advocate General in the same case who stated that a plan or project involving '… some strictly temporary loss of amenity which is capable of being fully undone …' would avoid an adverse effect on the integrity of a site.

4.5.14 In this context, the outcome of Table 2 is relevant. As noted previously, alone or in-combination, all transect points show clearly that the rate of nitrogen deposition will be lower than at present when construction ceases, with or without the Proposed Scheme, and with or without growth from other development. In other words, the Proposed Scheme does not reverse this trend though it clearly slows the rate of improvement. In these circumstances, the impact of the Proposed Scheme could be considered temporary and reversible.

4.5.15 Drawing the data and case law together, it is clear that even though critical loads are already exceeded, the increase in the rate of nitrogen deposition at Holcroft Moss is modest and temporary. Consequently, there will be no permanent conflict with the either the formal conservation objectives or the targets embedded in the Supplementary Advice. No adverse impacts on the 'ecological structure and function' of the site are anticipated and an adverse effect on the integrity of the site can be ruled out.

4.5.16 Accordingly, it is considered that adverse effects on the integrity of the Holcroft Moss component of the Manchester Mosses SAC can be ruled out alone or in-combination and there is no need for mitigation.

5 In-combination effects

5.1 Need for assessment

5.1.1 The possible need for an in-combination assessment is addressed by Regulation 63. If required, this would evaluate the cumulative effect of those impacts which are not significant or adverse alone but when combined could make those effects more likely, more significant or more adverse.

5.1.2 Because this HRA has shown that adverse effects have been avoided alone in terms of impacts from construction activities, the decommissioning of the gas main and construction of the embankment/the viaduct, the potential for adverse effects to arise in combination can also be ruled out. Therefore, it is considered there is no need for an in-combination assessment.

5.1.3 The evaluation of air pollution represents the single exception to this. To be consistent with the Wealden decision, the in-combination effects of air pollution have already been considered in the HRA. Therefore, no further assessment of air pollution is required.

5.1.4 Therefore, and mindful of case law (Foster and Langton), with the exception of air pollution where this additional consideration is built into the assessment process, it is considered there is no need for any further in-combination assessment.

5.2 Impacts on other components of the Manchester Mosses SAC

5.2.1 It is recognised that as the SAC 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 adverse effects have been ruled out at Holcroft Moss, 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.

Integrity test

5.2.2 The Proposed Scheme has been subjected to an appropriate assessment for the purposes of Regulation 63 of the Habitats Regulations 2017 as amended. It is considered that the competent authority is able to ascertain that an adverse effect on the integrity of the European site can be ruled out alone or in-combination.

6 Conclusions

6.1.1 This document provides all the necessary information to enable a HRA to be carried out 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:

- construction related activities: it is considered that the mitigation proposed is effective, reliable and deliverable, and allows the appropriate assessment to ascertain, beyond reasonable scientific doubt, that adverse effects on the integrity of the Manchester Mosses SAC will be avoided alone. There is no need for an in-combination assessment;
- gas main de-commissioning: it is considered that the mitigation proposed is effective, reliable and deliverable, and allows the appropriate assessment to ascertain, beyond reasonable scientific doubt, that adverse effects on the integrity of the Manchester Mosses SAC will be avoided, alone. It is considered there is no need for an in-combination assessment;
- construction of viaduct and embankment: it is considered that the mitigation proposed is effective, reliable and deliverable, and allows the appropriate assessment to ascertain, beyond reasonable scientific doubt, that adverse effects on the integrity of the Manchester Mosses SAC will be avoided alone. It is considered there is no need for an in-combination assessment; and
- nitrogen deposition: it is considered the appropriate assessment is able to ascertain, beyond reasonable scientific doubt, that adverse effects on the integrity of the Manchester Mosses SAC will be avoided, alone or in-combination.

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

1 Purpose

This Annex provides additional air quality information in relation to impacts from vehicle emissions to support the document to inform a HRA for the Manchester Mosses SAC (Holcroft Moss SSSI).

This report assesses the impact of air pollution on the Holcroft Moss SSSI component of the Manchester Mosses SAC. For simplicity, it is referred to as Holcroft Moss SSSI throughout the rest of this report except where specific mention is required of the 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), in the Environmental Impact Assessment SMR (see Volume 5: Appendix CT-001-00001) and accompanying SMR 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 are based on the DMRB criteria[28], to identify where assessment is required;
- these criteria are the following for assessing the impacts of the scheme alone:
  - change in road alignment by 5m or more;
  - change in daily traffic flows by 1,000 vehicles or more as AADT;
  - change in daily flows of HDV by 200 AADT or more;
  - change in daily average speed by 10kph or more; or
  - change in peak hour speed by 20kph or more.
- these criteria are the following for assessing the impacts of the scheme in combination with other plans and projects:
  - change in daily traffic flows by 1,000 vehicles or more as AADT; or
  - change in daily flows of HDV by 200 AADT or more.
- ecological receptors included in the air quality assessment are designated sites with habitats sensitive to NO_x deposition. These could include, SAC, SPA and Ramsar sites;
- transects have been used within a designated site with modelled points at 0m, 10m, 20m, 30m, 40m, 50m, 75m, 100m, 150m and 200m from the edge of the road. However, specific modelling points will be subject to the orientation of the site and nearby vehicle emission sources;
- a deposition velocity relevant to the habitat of each site has been used, as detailed in the IAQM ecological guidance[30]. Data on nitrogen deposition has been taken from the most recent information available on the APIS[33] website. No reduction in future background deposition rates has been applied;
- 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 has been 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[43]; 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[44]; and
- consideration is also given to relevant non-road plans and projects.

[43] HS2 (2017), *High Speed Two Phase One Information Paper E31: Air Quality*. Version 1.5.

[44] 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 for the site, as provided by APIS.

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[45], 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 within Section 3 of the main HRA report.

[45] 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.

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 is presented in Table A2 and Table A3.

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

- the M62 junction 11 to junction 12; and
- a site haul route.

The M62 is a construction traffic route.

Table A2: Traffic data used in modelling (construction phase, Proposed Scheme alone)

Road ID	Road names	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)	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme	Proposed Scheme alone change (2025 with Proposed Scheme – 2025 without Proposed Scheme)
1682_1685	B5212 Glazebrook Lane	7,263	8,242	8,335	94	343	349	349	0
1685_2697	B5212 Glazebrook Lane	7,263	8,242	8,335	94	343	349	349	0
2697_4147	B5212 Holcroft Lane	7,263	8,242	8,335	94	343	349	349	0
80098_81669	M62 junction 11 to junction 12 eastbound	48,357	51,768	52,152	384	6,330	4,587	4,733	146
80100_81433 (a) (b)	M62 junction 11 to junction 12 westbound	51,726	55,442	55,853	411	6,636	4,945	5,093	147
81432_80098 (c)	M62 junction 11 to junction 12 eastbound	48,357	51,768	52,152	384	6,330	4,585	4,733	148
81433_85877	M62 junction 11 westbound offslip	8,149	9,172	9,336	163	175	178	213	35
81433_85879 (d)	M62 junction 11 westbound	44,000	46,151	46,428	277	6,032	4,204	4,353	149
85873_85876_01	A574 at M62 junction 11	9,190	10,326	10,506	180	296	300	347	46

Road ID	Road names	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)	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme	Proposed Scheme alone change (2025 with Proposed Scheme – 2025 without Proposed Scheme)
85873_85879	M62 junction 11 westbound onslip	7,445	8,348	8,576	228	335	341	460	120
85874_81432	M62 junction 11 eastbound onslip	9,193	10,328	10,527	199	304	309	374	65
85874_85877_01	A574 at M62 junction 11	3,517	3,948	4,098	150	214	218	347	130
85876_85874_01	A574 at M62 junction 11	12,781	14,357	14,804	448	515	524	718	194
85877_85873_01	A574 at M62 junction 11	387	435	820	385	14	14	177	163
85880_81432 (e)	M62 junction 11 eastbound	39,822	42,700	42,958	258	5,782	4,022	4,170	148
85880_85876	M62 junction 11 eastbound offslip	3,631	4,076	4,346	270	222	226	374	148

Note: All traffic data reported is as one-way flows.

(a): One-way motorway link paired with 81432_80098.

(b) One-way motorway link paired with 80098_81669.

(c) One-way motorway link paired with 80100_81433.

(d) One-way motorway link paired with 85880_81432.

(e) One-way motorway link paired with 81433_85879.

Table A3: Construction traffic flows on the site haul routes

Road ID	No. 40 tonne ADT	No. 20 tonne HGV	No. 40 tonne ADT (along the route)
ML_289000_1396	0	6	221
ML_289000_1397	0	6	221
ML_289100_1393	0	6	221
ML_289100_1394	0	6	221
ML_289100_1395	0	6	221
ML_289200_1392	0	6	221
ML_289300_1391	0	6	221
ML_289400_1390	0	6	221
ML_289500_1389	0	6	221
ML_289600_1388	0	6	221

5.2 Receptors assessed and background concentrations

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

Table A4 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Figure A1: Map of the site, assessed roads and modelled receptors

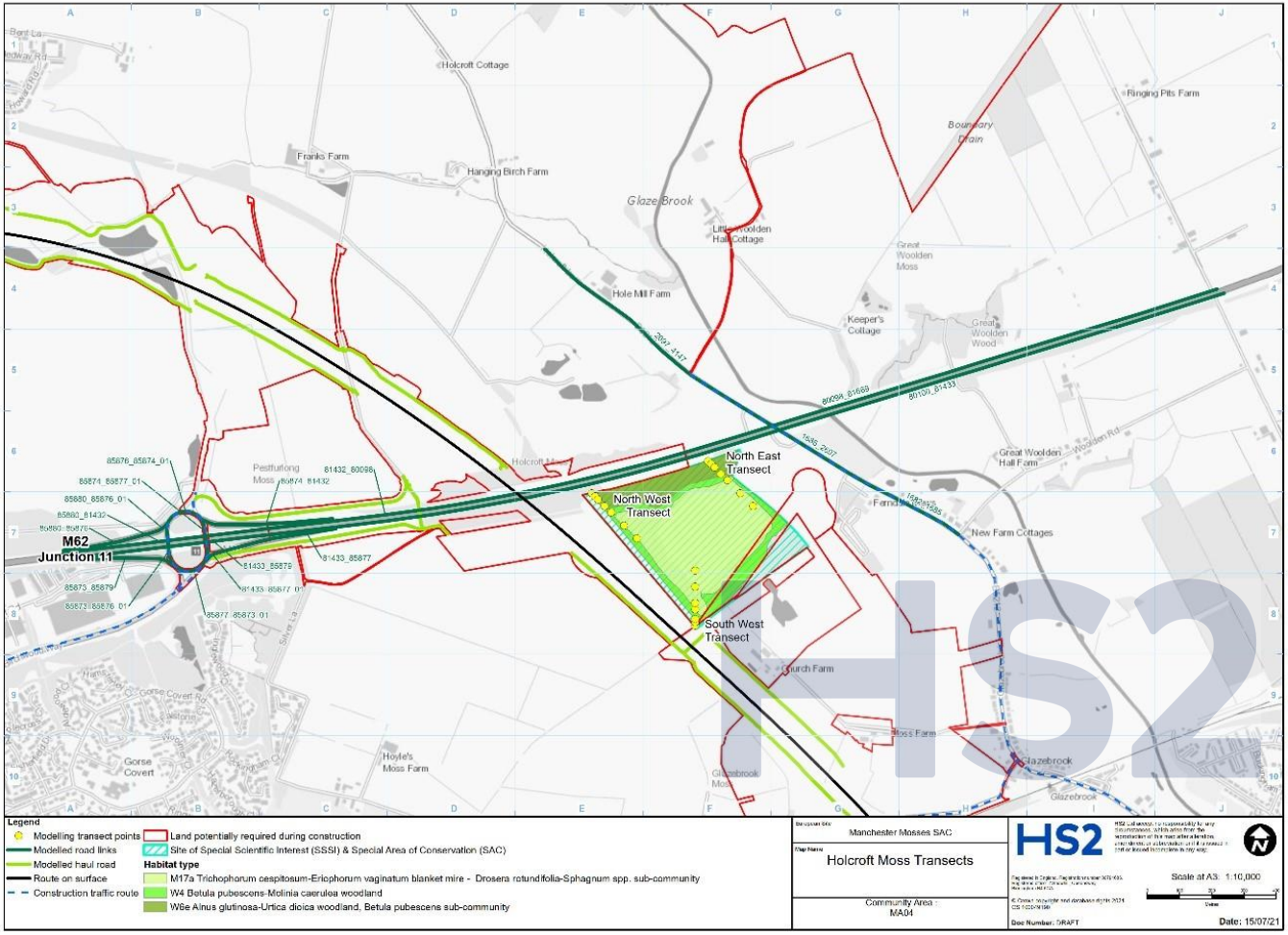


Table A4: Modelled ecological receptor backgrounds, APIS data and critical loads (construction phase)

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2025 NO_x background concentration ($\mu g/m^3$)	APIS data[33] of average total nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)
Manchester Mosses – Holcroft Moss SSSI	Deciduous Woodland	18.4 to 19.9	13.1 to 13.7	35.3	10
	Lowland raised bog	18.4 to 19.9	13.1 to 13.7	21.6	5

5.3 Assessment results

Table A5 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 A6 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A5: Predicted annual mean of NO_x concentrations at ecological sites (construction phase, Proposed Scheme alone)

Ecological Site	Distance to road (m) *	2018 baseline NO_x concentrations (µg/m^3)	NO_x concentrations (µg/m^3)		Change in NO_x concentrations (µg/m^3)	Comparison against air quality standard (30µg/m^3)
			2025 without the Proposed Scheme	2025 with the Proposed Scheme		
Manchester Mosses – Holcroft Moss SSSI (North East Transect)	23	70.79	38.81	39.05	0.24	Above Standard
	35	59.14	32.63	32.82	0.19	Above Standard
	48	52.09	29.01	29.18	0.17	Within Standard
	73	43.83	24.90	25.04	0.14	Within Standard
	98	39.02	22.57	22.70	0.13	Within Standard
	148	33.50	19.99	20.10	0.11	Within Standard
	198	30.37	18.57	18.66	0.09	Within Standard
Manchester Mosses – Holcroft Moss SSSI (North West Transect)	26	67.23	36.98	37.37	0.39	Above Standard
	38	57.24	31.69	32.04	0.35	Above Standard
	50	50.93	28.44	28.77	0.33	Within Standard
	74	43.23	24.61	24.92	0.31	Within Standard
	98	38.63	22.38	22.68	0.30	Within Standard
	146	33.26	19.87	20.17	0.30	Within Standard
	194	30.19	18.47	18.76	0.29	Within Standard
Manchester Mosses – Holcroft Moss SSSI (South West Transect)	34	22.28	14.92	15.50	0.58	Within Standard
	41	22.37	14.96	15.48	0.52	Within Standard
	50	23.95	15.61	16.09	0.48	Within Standard
	77	24.24	15.75	16.12	0.37	Within Standard
	97	24.46	15.85	16.18	0.33	Within Standard
	145	25.09	16.15	16.39	0.24	Within Standard
	195	25.88	16.51	16.72	0.21	Within Standard

*Note: * indicates, distance to nearest road source, including site haul roads for South West Transect.*

Table A6: 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 nitrogen deposition (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			
Manchester Mosses – Holcroft Moss SSSI (North East Transect)	23	42.41	39.03	39.07	0.04	10	0.3%
	35	40.92	38.15	38.18	0.03	10	0.3%
	48	39.98	37.62	37.65	0.03	10	0.2%
	73	38.84	37.01	37.03	0.02	10	0.2%
	98	23.04	22.29	22.30	0.01	5	0.2%
	148	22.63	22.09	22.10	0.01	5	0.2%
	198	22.40	21.98	21.99	<0.01	5	0.1%
Manchester Mosses – Holcroft Moss SSSI (North West Transect)	26	41.97	38.78	38.83	0.05	10	0.5%
	38	40.67	38.01	38.07	0.06	10	0.5%
	50	39.82	37.54	37.58	0.04	10	0.5%
	74	38.75	36.96	37.01	0.05	10	0.5%
	98	23.01	22.27	22.30	0.03	5	0.5%
	146	22.62	22.08	22.11	0.03	5	0.5%
	194	22.39	21.97	22.00	0.03	5	0.5%
Manchester Mosses – Holcroft Moss SSSI (South West Transect)	34	21.90	21.75	21.79	0.04	5	0.9%
	41	21.91	21.75	21.79	0.04	5	0.8%
	50	21.91	21.75	21.79	0.04	5	0.7%
	77	21.94	21.76	21.79	0.03	5	0.6%
	97	21.95	21.77	21.80	0.03	5	0.5%
	145	22.00	21.79	21.81	0.02	5	0.4%
	195	22.10	21.80	21.80	0.02	5	0.3%

*Note: * indicates, distance to nearest road source, including site haul roads for South West Transect.*

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

In all scenarios, at all modelled locations in the south west transect, NO_x concentrations are within the air quality standard. The 2018 baseline annual mean NO_x concentrations are predicted to be above the air quality standard at all other transects. At the north east and north west transects, NO_x concentrations are predicted to be above the standard within approximately 50m of the nearest road, both with and without the Proposed Scheme.

Nitrogen deposition rates at Holcroft Moss SSSI are predicted to be above the relevant critical load at all modelled receptors in the baseline and future scenarios with or without the Proposed Scheme. 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 is presented in Table A3 and Table A7.

The screening process identified a total of three roads in the area exceeding the screening thresholds:

- the M62 junction 11 to junction 12;
- the B5212 Holcroft Lane; and
- on-site construction haul route.

Table A7: Traffic data used in modelling (construction phase, Proposed Scheme in-combination)

Road ID	Road names	Annual Average Daily Traffic (AADT)				Heavy Duty Vehicles (HDV)			
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme in-combination	In-combination change (2025 with the Proposed Scheme – 2018 baseline)	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme in-combination	In-combination change (2025 with the Proposed Scheme – 2018 baseline)
1682_1685	B5212 Glazebrook Lane	7,263	8,242	8,335	**1,072**	343	349	349	6
1685_2697	B5212 Glazebrook Lane	7,263	8,242	8,335	**1,072**	343	349	349	6
2697_4147	B5212 Holcroft Lane	7,263	8,242	8,335	**1,072**	343	349	349	6
80098_81669	M62 junction 11 to junction 12 eastbound	48,357	51,768	52,152	**3,795**	6,330	4,587	4,733	**-1,597**
80100_81433 [(a)] [(b)]	M62 junction 11 to junction 12 westbound	51,726	55,442	55,853	**4,127**	6,636	4,945	5,093	**-1,544**
81432_80098 [(c)]	M62 junction 11 to junction 12 eastbound	48,357	51,768	52,152	**3,795**	6,330	4,585	4,733	**-1,597**
81433_85877	M62 junction 11 westbound offslip	8,149	9,172	9,336	**1,187**	175	178	213	38
81433_85879 [(d)]	M62 junction	44,000	46,151	46,428	**2,428**	6,032	4,204	4,353	**-1,679**

Road ID	Road names	Annual Average Daily Traffic (AADT)				Heavy Duty Vehicles (HDV)			
		2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme in-combination	In-combination change (2025 with the Proposed Scheme – 2018 baseline)	2018 baseline	2025 without the Proposed Scheme	2025 with the Proposed Scheme in-combination	In-combination change (2025 with the Proposed Scheme – 2018 baseline)
	11 westbound								
85873_85876_01	A574 at M62 junction 11	9,190	10,326	10,506	**1,316**	296	300	347	51
85873_85879	M62 junction 11 westbound onslip	7,445	8,348	8,576	**1,131**	335	341	460	125
85874_81432	M62 junction 11 eastbound onslip	9,193	10,328	10,527	**1,334**	304	309	374	70
85874_85877_01	A574 at M62 junction 11	3,517	3,948	4,098	581	214	218	347	133
85876_85874_01	A574 at M62 junction 11	12,781	14,357	14,804	**2,023**	515	524	718	**203**
85877_85873_01	A574 at M62 junction 11	387	435	820	433	14	14	177	163
85880_81432 [(e)]	M62 junction 11 eastbound	39,822	42,700	42,958	**3,136**	5,782	4,022	4,170	**-1,612**
85880_85876	M62 junction 11 eastbound offslip	3,631	4,076	4,346	715	222	226	374	153

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

(a): One-way motorway link paired with 81432_80098.

(b) One-way motorway link paired with 80098_81669.

(c) One-way motorway link paired with 80100_81433.

(d) One-way motorway link paired with 85880_81432.

(e) One-way motorway link paired with 81433_8587.

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.

As noted above, 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. However, the traffic data for 2025 without and with the proposed scheme in-combination does not account for traffic impacts from the M62 junction 10 to junction 12 smart motorway scheme, which began operation in 2021.

An HRA for the M6 junction 21A to 26 smart motorway was produced in 2020[46]. It includes modelling of NO_x and nitrogen deposition impacts at Holcroft Moss from the four North West smart motorway schemes which includes the M62 junction 10 to junction 12 scheme. The impacts presented in that HRA have been used to account for the impact of M62 junction 10 to junction 12 smart motorway in this in-combination assessment. This approach is considered to be conservative as the impacts were predicted for an earlier year of 2020.

Table A8 presents the additional NO_x and nitrogen deposition, due to the smart motorway, which has been included in this assessment.

Table A8: M62 junction 10 to junction 12 Smart Motorway NO_x and nitrogen deposition contributions

Distance from M62 (m)	M62 junction 10 to junction 12 Smart Motorway Contributions	
	2020 NO_x change	2020 nitrogen deposition change
24	4.8	0.2
34	3.8	0.2
49	2.8	0.1
74	2.0	0.1
99	1.5	0.1
149	1.0	0.1
199	0.8	0.1

[46] Highways England (2020), *M6 Junction 21A to 26 Smart Motorway: Environmental Assessment Report P10 Appendices* – Volume 3.

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 A9 presents the details of the receptor assessed, background concentrations, background deposition and relevant critical loads.

Table A9: Modelled ecological receptor backgrounds, APIS data and critical loads (construction phase)

Receptor	Sensitive habitat	2018 NO_x background concentration ($\mu g/m^3$)	2025 NO_x background concentration ($\mu g/m^3$)	APIS data[33] of average total nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)
Manchester Mosses – Holcroft Moss SSSI	Deciduous Woodland	18.4 to 19.9	13.1 to 13.7	35.3	10
	Lowland raised bog	18.4 to 19.9	13.1 to 13.7	21.6	5

6.4 Assessment results

Table A10 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 A11 presents a summary of the modelled nitrogen deposition, change in deposition and percentage change in relation to the lower critical load.

Table A10: Predicted annual mean of NO_x concentrations at ecological sites (construction phase, Proposed Scheme in-combination)

Ecological site	Distance to road (m) *	2018 baseline NO_x concentrations ($\mu g/m^3$)	NO_x concentrations ($\mu g/m^3$)		Change in NO_x concentrations ($\mu g/m^3$)	Comparison against air quality standard ($30\mu g/m^3$)
			2025 do nothing	2025 with the Proposed Scheme in-combination		
Manchester Mosses – Holcroft Moss SSSI (North East Transect)	23	70.79	36.48	43.85	7.37	Above Standard
	35	59.14	31.11	36.62	5.51	Above Standard
	48	52.09	27.89	31.98	4.09	Above Standard
	73	43.83	24.13	27.04	2.91	Within Standard
	98	39.02	21.99	24.20	2.21	Within Standard
	148	33.50	19.57	21.10	1.53	Within Standard
	198	30.37	18.22	19.46	1.24	Within Standard
Manchester Mosses – Holcroft Moss SSSI (North West Transect)	26	67.23	34.85	42.17	7.32	Above Standard
	38	57.24	30.24	35.44	5.20	Above Standard
	50	50.93	27.34	31.57	4.23	Above Standard
	74	43.23	23.86	26.92	3.06	Within Standard
	98	38.63	21.80	24.18	2.38	Within Standard
	146	33.26	19.45	21.17	1.72	Within Standard
	194	30.19	18.14	19.56	1.42	Within Standard
Manchester Mosses – Holcroft Moss SSSI (South West Transect)	34	22.28	14.78	15.50	0.72	Within Standard
	41	22.37	14.81	15.48	0.67	Within Standard
	50	23.95	15.47	16.09	0.62	Within Standard
	77	24.24	15.59	16.12	0.53	Within Standard
	97	24.46	15.69	16.18	0.49	Within Standard
	145	25.09	15.96	16.39	0.43	Within Standard
	195	25.88	16.30	16.72	0.42	Within Standard

*Note: * indicates, distance to nearest road source, including construction haul roads as for South West Transect.*

Table A11: Assessment of nitrogen deposition at ecological sites (construction phase, Proposed Scheme in-combination)

Ecological Site	Distance to road (m) *	2018 baseline N deposition (kg N/ha/yr)	Dry deposition (kg N/ha/yr)		Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	% Change in relation to lower critical load
			2025 do nothing	2025 with the Proposed Scheme in-combination			
Manchester Mosses – Holcroft Moss SSSI (North East Transect)	23	42.41	38.70	39.27	0.57	10	5.6%
	35	40.92	37.93	38.38	0.45	10	4.5%
	48	39.98	37.46	37.75	0.29	10	2.9%
	73	38.84	36.89	37.13	0.24	10	2.4%
	98	23.04	22.24	22.40	0.16	5	3.1%
	148	22.63	22.06	22.20	0.14	5	2.8%
	198	22.40	21.96	22.09	0.13	5	2.7%
Manchester Mosses – Holcroft Moss SSSI (North West Transect)	26	41.97	38.47	39.03	0.56	10	5.6%
	38	40.67	37.80	38.27	0.47	10	4.6%
	50	39.82	37.37	37.68	0.31	10	3.1%
	74	38.75	36.85	37.11	0.26	10	2.6%
	98	23.01	22.23	22.40	0.17	5	3.3%
	146	22.62	22.05	22.21	0.16	5	3.1%
	194	22.39	21.95	22.10	0.15	5	3.0%
Manchester Mosses – Holcroft Moss SSSI (South West Transect)	34	21.90	21.73	21.79	0.06	5	1.2%
	41	21.91	21.74	21.79	0.05	5	1.1%
	50	21.91	21.74	21.79	0.05	5	1.0%
	77	21.94	21.75	21.79	0.04	5	0.8%
	97	21.95	21.76	21.80	0.04	5	0.8%
	145	22.00	21.78	21.81	0.03	5	0.7%
	195	22.10	21.80	21.80	0.03	5	0.6%

*Note: * indicates, distance to nearest road source, including construction haul roads as for South West Transect*

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

In all scenarios, NO_x concentrations are within the air quality standard at all modelled locations in the south west transect. 2018 baseline annual mean NO_x concentrations are predicted to be above the air quality standard at the north east and north west transects. By 2025, in the do nothing and with the Proposed Scheme scenarios, concentrations are predicted to be within the air quality standard beyond approximately 90m from the nearest road.

Nitrogen deposition rates at Holcroft Moss SSSI are predicted to be above the relevant critical load at all modelled receptors in the baseline and future scenarios with or without the Proposed Scheme. Predicted nitrogen deposition rates in 2025, with the Proposed Scheme, are lower than the 2018 baseline rates at all modelled locations. The changes in nitrogen deposition between the 2025 do nothing scenario and with the Proposed Scheme scenario are greater than 1% of the lower critical load in:

- all modelled areas in the North East Transect;
- all modelled areas in the North West Transect; and
- up to approximately 50m from the road in the south west Transect.

Potentially significant effects are therefore predicted within these areas of the SAC, and this is addressed further in Section 3.6 in the main HRA report.

Assessment of operational traffic effects

The Proposed Scheme will not change traffic movements on roads within 200m of Holcroft Moss SSSI in the operation phase of the Proposed Scheme and therefore no further assessment is required.

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