

High Speed Rail (Crewe – Manchester)

Supplementary Environmental Statement 2 and Additional Provision 2 Environmental Statement

Volume 5: Appendix EC-016-00004

Ecology and biodiversity

Designated site assessment for Rochdale Canal
Special Area of Conservation

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Department
for Transport

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

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1 Introduction

1.1 Purpose of this appendix

- 1.1.1 This report is an appendix to the ecology and biodiversity assessment which forms part of Volume 5 of the Supplementary Environmental Statement 2 (SES2) and Additional Provision 2 Environmental Statement (AP2 ES).
- 1.1.2 It provides an assessment to enable the identification of likely significant effects on the Rochdale Canal Special Area of Conservation (SAC).
- 1.1.3 This report provides the background assessment for identifying any likely significant effects on Rochdale Canal SAC as a result of the AP2 revised scheme to be reported under the EIA Regulations 2017 (as amended)¹. This background assessment is provided in Section 3 of this report.
- 1.1.4 The High Speed 2 (HS2) High Speed Rail (Crewe – Manchester) Environmental Statement (ES) was published in 2022² (the main ES). Volume 5 of the main ES included a draft assessment to inform a Habitats Regulations Assessment for Rochdale Canal SAC³. Further and separate assessment is being carried out in line with Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended)⁴. Section 4 of this report provides the emerging results at this current stage of design and assessment, which will be finalised as part of the further and separate assessment.
- 1.1.5 This report should be read in conjunction with the SES2 and AP2 ES Volume 2, Community Area reports: Davenport Green to Ardwick (MA07) and Manchester Piccadilly Station (MA08).
- 1.1.6 In order to differentiate between the original scheme and the subsequent changes, the following terms are used in the SES2 and AP2 ES:
- ‘the original scheme’ – the Bill scheme submitted to Parliament in 2022, which was assessed in the main ES;

¹ *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017*. SI 2017 No. 571. Her Majesty's Stationery Office, London. Available online at: [The Town and Country Planning \(Environmental Impact Assessment\) Regulations 2017 \(legislation.gov.uk\)](https://www.legislation.gov.uk).

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

³ High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Document to inform a Habitats Regulations Assessment for Rochdale Canal Special Area of Conservation*, Volume 5, Appendix: EC-016-00004. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

⁴ *The Conservation of Habitats and Species Regulations 2017* (2017/1012), as amended by *The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019* (2019/579). Her Majesty's Stationery Office, London.

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

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

2 Context

2.1 AP2 revised scheme

- 2.1.1 Rochdale Canal SAC runs northwards from Manchester city centre, roughly parallel with the A663 Broadway and the A627(M) to the M62 and beyond and lies 2.7km and 4.2km north-east of the land required for the construction of the AP2 revised scheme in the MA07 and MA08 community areas, respectively. The AP2 revised scheme will result in changes to traffic flows during construction and operation along, notably, the M60, M62 and A663 Broadway, which at their closest points lie immediately adjacent to Rochdale Canal SAC.
- 2.1.2 These changes will arise mainly from traffic re-distributed from other routes in the area, as well as a small number of workforce vehicles on the M60 and M62. Whilst construction traffic impacts often represent a temporary effect, traffic re-distribution in this area is anticipated to last for a period of several years, with no defined peak. As a result, increased traffic flows in this area are predicted between 2026 to 2039.

2.2 Site description and nature conservation targets

Rochdale Canal SAC

- 2.2.1 The Rochdale Canal SAC was designated in 2000 and occupies a 25.5ha area that extends approximately 20km in length from Failsworth north-east to Littleborough in the Pennines (Figure 1). The citation⁵ and conservation objectives⁶ confirm the sole reason for designation is the 'extensive colonies' of floating water-plantain (*Luronium natans*). England and Wales support a large proportion of the global population of this species.
- 2.2.2 The citation for the underpinning Site of Special Scientific Interest (SSSI)⁷ described the site as moderately nutrient rich (or mesotrophic) but noted water quality varied reflecting the supply of water along its length, from ombrotrophic in the uplands to mesotrophic towards Manchester. Species composition, abundance and distribution varies accordingly but overall, the site is considered to support important and diverse submerged and emergent plant communities that are typical of moderately acidic to moderately alkaline conditions. However, some localised enrichment is apparent.

⁵ Department for Environment, Food and Rural Affairs (2005), *Citation for Special Area of Conservation Rochdale Canal*. Available online at: <https://publications.naturalengland.org.uk/publication/6015060228964352>.

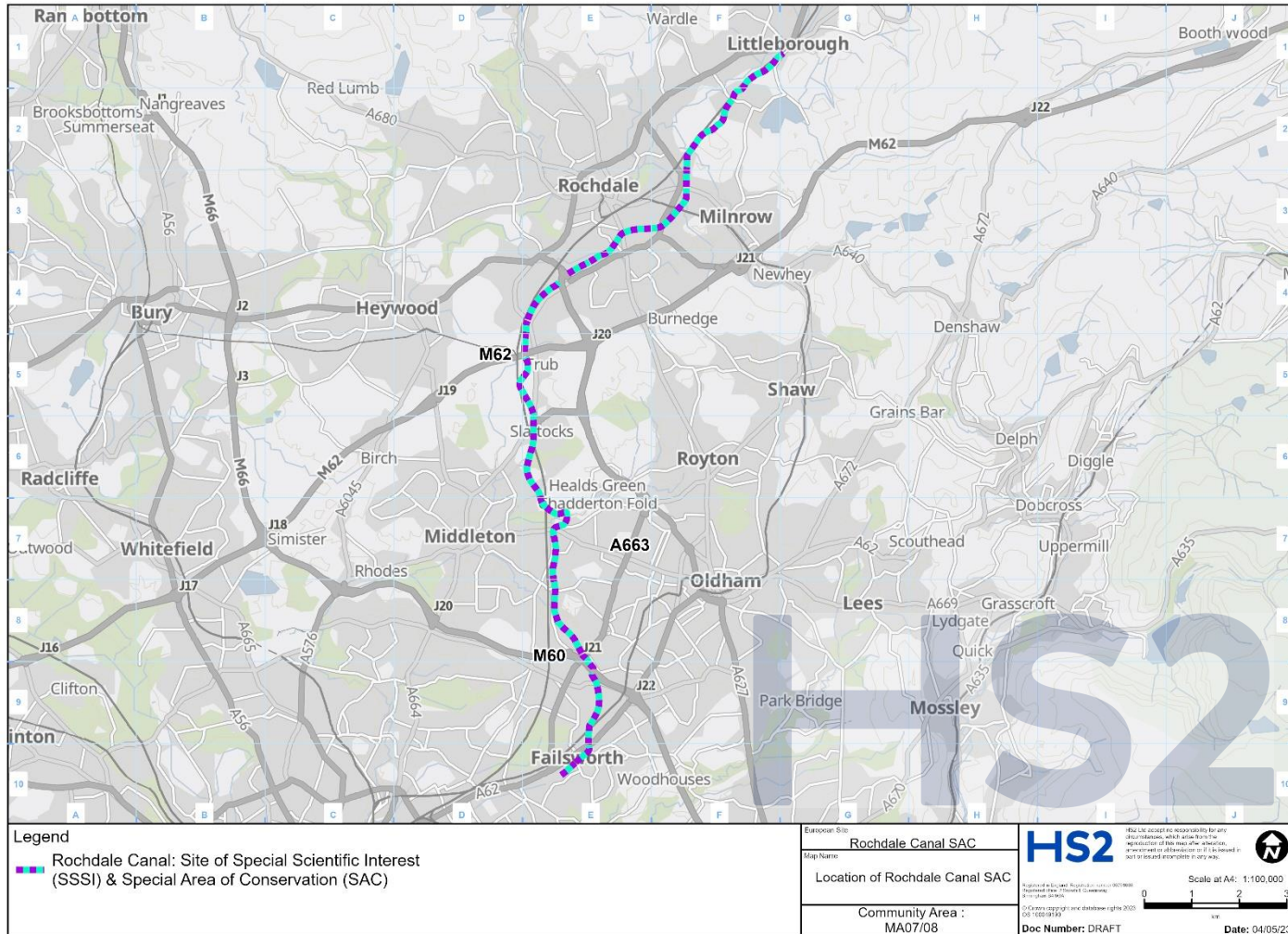
⁶ Natural England (2018), *European Site Conservation Objectives for Rochdale Canal Special Area of Conservation, Version 3*. Available online at: <https://publications.naturalengland.org.uk/publication/6015060228964352>.

⁷ English Nature (2000), *Rochdale Canal Site of Special Scientific Interest Citation*. Available online at: <https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000430.pdf>.

- 2.2.3 Opened in 1804, the Rochdale Canal extended for a distance of over 50km from the centre of Manchester to Sowerby Bridge in West Yorkshire, providing a direct link between the Bridgewater Canal in the west and the Calder and Hebble Navigation in the east. The canal subsequently fell into decline before being officially closed to navigation in 1952. However, following subsequent restoration, which in places involved considerable engineering activities, navigation was fully restored in 2002. Today, it is managed by the Canal & River Trust.
- 2.2.4 The hydrological catchment boundary lies high in the Pennines (183m altitude) approximately 2km north of Littleborough, and there is a modest flow east and west from this point. The canal is supplied with water from a number of sources with different characteristics. Nutrient poor (or oligotrophic) water is provided by Blackstone Edge Reservoir and Hollingworth Lake in the Pennines, whilst more nutrient rich water is provided elsewhere towards Manchester.

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Figure 1: Location of Rochdale Canal SAC



Conservation objectives

2.2.5 The conservation objectives for the Rochdale Canal 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 the habitats of the qualifying species;
- the structure and function of the habitats of the qualifying species;
- the supporting processes on which the habitats of the qualifying species rely;
- the populations of the qualifying species; and
- the distribution of the qualifying species within the site.’

2.2.6 These are given greater expression in the associated Supplementary advice⁸ and Site Improvement Plan (SIP)⁹. Both identify physical modification and air pollution ‘as negative factors. 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...’.

Condition assessment

2.2.7 Natural England’s most recent condition monitoring assessment of Rochdale Canal SSSI was carried out in 2010¹⁰. This found that the entire site was considered to be in ‘unfavourable recovering’ condition. Whilst this suggests the canal was making positive progress towards meeting its conservation objectives, the assessment also noted that ‘vegetation remains much less widespread than at the time of designation’. Whilst this suggests a visible decline in just 10 years, it is noted the assessment was carried out in November when such communities would be more difficult to assess. Overall, though, the assessment is now over a decade old and little reliance can be placed on its findings.

⁸ Natural England (2019), *European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. Rochdale Canal Special Area of Conservation*. Available online at: <https://publications.naturalengland.org.uk/publication/6015060228964352>.

⁹ Natural England (2014), *Site Improvement Plan, Rochdale Canal, Version 1.0*. Available online at: <https://publications.naturalengland.org.uk/publication/6227629417955328>.

¹⁰ Natural England (2014), *SSSI Condition summary for Site Rochdale Canal SSSI*. Available online at: <https://designatedsites.naturalengland.org.uk/SiteFeatureCondition.aspx?SiteCode=S2000430&SiteName=Rochdale%20Canal%20SSSI>.

3 Assessment of the AP2 revised scheme

3.1 Introduction

- 3.1.1 This section provides the background assessment for identifying any likely significant effects on Rochdale Canal SAC to be reported under the EIA Regulations 2017 (as amended). The conclusions of this assessment are summarised in the SES2 and AP2 ES Volume 2, Community Area reports: Davenport Green to Ardwick (MA07) and Manchester Piccadilly Station (MA08).
- 3.1.2 This assessment identifies the likely significant effects as a result of the AP2 revised scheme. In addition, the air quality modelling, from which the impacts and effects reported below are derived, has taken into account cumulative effects from background traffic growth, committed developments¹¹ and impacts related to traffic emissions arising from the SES2 changes and AP2 amendments.

3.2 Scope, assumptions and limitations

- 3.2.1 At its closest, Rochdale Canal lies approximately 2.7km north-east of land required for the construction of the AP2 revised scheme. Given the distance from the site, direct impacts can be ruled out. The only potential impacts that could arise as a result of the AP2 revised scheme are restricted to changes in air quality and hydrology.
- 3.2.2 Rochdale Canal is located approximately 5km upstream of the AP2 revised scheme. No works will take place to the canal infrastructure and therefore there will be no direct impact on the canal. The canal is assumed to be lined (due to its elevated nature) and is not anticipated to be hydraulically connected to local groundwater. Therefore, potential impacts from changes in hydrology can be ruled out.
- 3.2.3 Consequently, the only plausible impact is from air pollution caused by changes in traffic brought about by the AP2 revised scheme, allied with the general growth in traffic in the area. This issue is assessed below.

¹¹ Committed developments relevant to the AP2 revised scheme are reported in Volume 5 Planning data report of the SES2 and AP2 ES (see SES2 and AP2 ES Volume 5, Appendix: CT-004-00000). Committed developments are defined as developments with planning permission and sites allocated for development in adopted development plans, on or close to the land required for the scheme.

Air pollution assessment methodology

- 3.2.4 The assessment of air pollution is informed by established best practice provided by National Highways^{12,13}, Natural England^{14,15}, and the Institute for Air Quality Management (IAQM)¹⁶.
- 3.2.5 These provide evidence that natural or semi-natural habitats can be harmed by vehicle emissions through two intimately linked pathways: via the concentration of nitrogen oxides (NO_x) and ammonia (NH₃) and the subsequent deposition of nitrogen and acid. The assessment of the impact of air pollution therefore comprises the analysis of the dispersal of these compounds.
- 3.2.6 In sufficient concentrations, airborne NO_x and NH₃ can result in direct toxic effects on vegetation. Further, the subsequent deposition of nitrogen compounds can lead to the acidification and nutrient enrichment of land and water. Over time, this may not only hinder the growth, abundance and distribution of plants, and especially, bryophytes and lichens, but can also prompt the growth of ruderal species or algal blooms which can lead to changes in the structure and function of qualifying or supporting habitats. Whilst certain species and communities are less susceptible to harm than others, increases in the airborne concentration of pollutants or the rate of their deposition can also exacerbate the effects of other factors such as climate change or pathogens leading to negative, synergistic effects.
- 3.2.7 The concentrations and/or rates of the deposition of nitrogen compounds fall quickly in the first few metres from the roadside before gradually levelling out; beyond 200m, it becomes difficult to distinguish from background levels. This means that impacts at 10m, 50m or 200m or more can be very different from those at the roadside.
- 3.2.8 The assessment of air pollution impacts for ecologically sensitive sites within 200m of roads is undertaken where one or more of the following Design Manual for Roads and Bridges (DMRB)¹² criteria are met:
- change in road alignment by 5m or more;

¹² Highways Agency (2019), *Design Manual for Roads and Bridges (DMRB), Sustainability and Environmental Appraisal, LA 105 Air Quality*, Highways Agency, London. Available online at: <https://www.standardsforhighways.co.uk/search/10191621-07df-44a3-892e-c1d5c7a28d90>.

¹³ National Highways (2021), *Ammonia N Deposition Tool V2*.

¹⁴ 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>.

¹⁵ Although designed for Habitats Regulations Assessments, Natural England (2018) guidance is applicable for the assessment under the EIA Regulations, 2017 (as amended). Section 1.1.6 states: '...this guidance does not specifically cover nationally significant sites, which are covered by a different regulatory framework. However, the general principles for air quality assessment outlined here for European Sites are likely to be equally relevant for this and other designations...'

¹⁶ 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>.

- change in daily traffic flows by 1,000 vehicles or more as Annual Average Daily Traffic (AADT);
- change in daily flows of Heavy Duty Vehicles¹⁷ (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.

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

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

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

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

3.2.12 Traffic flows are assessed by calculating AADT figures using established models¹⁸. Should increases in traffic be less than 1,000 AADT¹⁹ or 200 HDV, the risk of a significant effect can be ruled out and no further assessment is required. Should flows exceed these values, air quality analysis is necessary.

3.2.13 The air quality analysis typically models any changes at fixed points on a 200m transect extending from the roadside. Impacts identified through the air quality analysis are assessed by calculating the relative contribution of the plan or project in relation to the relevant critical levels for NO_x and NH₃ and the critical loads for the deposition of nitrogen and acid, as described by the Air Pollution Information System (APIS)²⁰, as follows:

- the critical level for NO_x is fixed and is expressed as a concentration: 30µg/m³. It is a precautionary threshold below which there is confidence that harmful effects on vegetation communities will not arise, and further assessment may not be necessary;

¹⁷ HDV are defined as those with an unladen weight of greater than 3.5 tonnes, including: large vans; medium goods vehicles (rigid and artic); heavy goods vehicles (rigid and artic); and, buses/coaches.

¹⁸ It should be noted that traffic data used in the air quality assessment presented in the SES2 and AP2 ES is based on daily peak derived traffic data. The assessment presented in this appendix is based on annualised traffic data which is considered more appropriate for the purposes of the Designated Site Assessment.

¹⁹ These values are utilised as there is evidence to show that these equate approximately to a 1% change in critical loads.

²⁰ UK Centre for Ecology and Hydrology (2021), *Air Pollution Information System*. Available online at: <http://www.apis.ac.uk/>.

- the critical level for NH₃ is also expressed as a concentration and is set at 3µg/m³ for higher plants and at 1µg/m³ where bryophytes or lichens are present and are considered to ‘...form a key part of the ecosystem integrity’²¹;
 - the critical loads for nitrogen deposition vary and are specific to each qualifying feature. These are presented as a range of values (expressed as a rate, e.g. 10kg N/ha/yr – 20kg N/ha/yr) and typically, only the lowest value is used (unless there are compelling reasons to do otherwise) as this will emphasise any negative outcomes; and
 - acid deposition is also assessed via critical loads, though measured in keq/ha/yr.
- 3.2.14 Natural England best practice guidance¹⁴ specifies that should nitrogen deposition increase by less than 1% of the lower critical load or concentrations of NO_x or NH₃ increase by less than 1% of the critical level, likely significant effects can be ruled out. However, should the 1% threshold be exceeded, a likely significant effect cannot be ruled out.
- 3.2.15 The assessment of significance of acid deposition differs. If the total concentration is predicted to be less than the lower critical load, then the effect is considered not to be significant. However, a likely significant effect cannot be ruled out when: the change in concentration is more than 1% of the maximum critical load; and the total for acid deposition is also greater than the maximum critical load.
- 3.2.16 The 1% threshold, set at two orders of magnitude below the critical load or level, is highly precautionary. Account must also be taken of the type of habitats (some are more resilient than others) and the distribution of the designated features as not all will be distributed evenly across sites, and other factors may be at play.

3.3 Assessment of impact and effects

- 3.3.1 In a number of locations, the Rochdale Canal SAC is crossed by major roads including the M60, the A663 Broadway and the M62, which are within the 200m threshold described in Section 3.2. Consequently, an assessment of traffic flows is required.
- 3.3.2 The following assessment utilises relevant traffic and air quality analysis as set out in Annex A and reports any likely significant effects on a precautionary basis. HS2 Ltd is continuing to identify suitable measures to mitigate or compensate for potential significant effects identified on designated sites.

²¹ Air Pollution Information System (2016), *Critical Loads and Critical Levels – a guide to the data provided in APIS*. Available online at: https://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788054.

Assessment of traffic flows and air pollution during construction

- 3.3.3 The traffic analysis (see Section 5.1, Annex A) indicates that the construction of the AP2 revised scheme will exceed the AADT or HDV traffic thresholds described in Section 3.2. Therefore, an air quality assessment is required.
- 3.3.4 The air quality assessment of traffic flows is summarised in Annex A. This has been undertaken in accordance with the Volume 5, Appendix: CT-001-00001, Environmental Impact Assessment Scope and Methodology Report (SMR)²² and the SES2 and AP2 ES Volume 5, Appendix: CT-001-00003 Air quality – Technical note – Updated guidance on the assessment methodology for Phase 2b SES2 and AP2 ES.
- 3.3.5 Given the linear nature of Rochdale Canal SAC, transect points have been modelled at 10m spacing along the boundary of the site to reflect the greatest air quality impact as well as to take account the most sensitive habitat features. The data in Annex A supported by Figures A1 to Figure A5 present the outcomes for the worst case locations.

Critical loads and levels

- 3.3.6 Background NO_x, NH₃ and nitrogen deposition rates were obtained from the APIS, which confirms that the nitrogen critical load for *Luronium natans* is 3kg N/ha/yr – 10kg N/ha/yr, the NO_x critical level is 30µg/m³ and the NH₃ critical level is 3µg/m³. APIS²⁰ does not provide a critical load for rates of acid deposition due to the mesotrophic status of the canal, (which is considered sufficient to buffer the effects of acidification).
- 3.3.7 Following best practice, the lower value of 3kg N/ha/yr for rates of nitrogen deposition has been used in the air quality analysis. This is a precautionary measure that will emphasise any negative outcomes. Key outputs are summarised in Annex A.

Air pollution impacts

- 3.3.8 Table A5 of Annex A shows that predicted NO_x concentrations with the AP2 revised scheme, are lower than the 2018 baseline rates at all modelled receptors (i.e. transect points). However, NO_x concentrations are predicted to be above the air quality standard on the M60 with or without the AP2 revised scheme. Despite this, there is a less than 1% exceedance of the NO_x critical level brought about by the AP2 revised scheme. Therefore, likely significant effects can be ruled out.
- 3.3.9 Table A6 of Annex A shows that predicted NH₃ concentrations with the AP2 revised scheme, are broadly similar to the 2018 baseline rates at all modelled receptors. However, NH₃

²² High Speed Two Ltd (2022), High Speed Rail (Crewe – Manchester), *Environmental Statement, Environmental Impact Assessment Scope and Methodology Report*, Volume 5, Appendix: CT-001-00001. Available online at: <https://www.gov.uk/government/collections/hs2-phase2b-crewe-manchester-environmental-statement>.

concentrations are predicted to be above the relevant air quality standard at some of the modelled receptors with or without the AP2 revised scheme. Despite this, there is a less than 1% exceedance of the critical level brought about by the AP2 revised scheme. Therefore, likely significant effects can be ruled out.

- 3.3.10 Table A7 of Annex A shows that nitrogen deposition rates with the AP2 revised scheme, are lower than the 2018 baseline at all modelled receptors. However, nitrogen deposition rates are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, there is a greater than 1% exceedance of the critical load brought about by the AP2 revised scheme, with a maximum of 5% recorded on the M60. Therefore, likely significant effects cannot be ruled out.

Assessment of traffic flows and air pollution during operation

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

3.4 Mitigation measures

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

3.5 Summary of likely significant effects

- 3.5.1 The air quality assessment demonstrates that, in the absence of mitigation, during construction, the relevant air quality standards are exceeded for nitrogen deposition and in addition, there is a greater than 1% exceedance of the critical load. Therefore, likely significant effects cannot be ruled out as a result of the AP2 revised scheme.
- 3.5.2 During operation, changes to traffic flows do not meet the thresholds described in Section 3.2; therefore, no air quality assessment is required, and likely significant effects can be ruled out.

4 Ongoing work

4.1 Introduction

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

4.2 Air quality assessment of traffic flows in combination

Methodology

- 4.2.1 The same transects and critical loads and levels as described in Section 3, were utilised.
- 4.2.2 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 Rochdale Canal SAC.
- 4.2.3 In combination effects are taken into account in the traffic and the non-traffic related emission sources used for the assessment, which incorporate likely changes brought about by other proposed and committed developments. The approach to this assessment, which has been agreed with Natural England, is provided in Section 2 of Annex A.

Construction phase impacts in combination

- 4.2.4 Table A9 of Annex A shows that predicted NO_x concentrations with the AP2 revised scheme, are lower than the 2018 baseline rates at all modelled receptors. However, NO_x concentrations are predicted to be above the air quality standard on the M60 and A663 Broadway with or without the AP2 revised scheme. In addition to this, there is a greater than 1% exceedance of the NO_x critical level brought about by the AP2 revised scheme. The data show that the maximum change is 10.1% at 11m from the M60. Therefore, likely significant effects in combination cannot be ruled out.
- 4.2.5 Table A9 of Annex A shows that predicted NH₃ concentrations with the AP2 revised scheme, are lower than the 2018 baseline rates at all but one modelled receptor. However, NH₃ concentrations are predicted to be above the relevant air quality standard at some of the

modelled receptors with or without the AP2 revised scheme. In addition, there is a greater than 1% exceedance of the critical level brought about by the AP2 revised scheme on the M60, M62, A663 Broadway and A664 Rochdale Road. The data show that the maximum change is 6.6% at 36m from the M60. Therefore, likely significant effects in combination cannot be ruled out.

- 4.2.6 Table A11 of Annex A shows that nitrogen deposition rates with the AP2 revised scheme in combination, are lower than the 2018 baseline at all modelled receptors. However, nitrogen deposition rates are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, there is a greater than 1% exceedance of the critical load brought about by the AP2 revised scheme on the on the M60, M62, A663 Broadway, A664 Rochdale Road and A6104 Hollinwood Avenue, with a maximum of 40.9% recorded on the M62. Therefore, likely significant effects in combination cannot be ruled out.

Operational phase impacts in combination

- 4.2.7 Table A14 of Annex A shows that predicted NO_x concentrations with the AP2 revised scheme, are lower than the 2018 baseline rates at all modelled receptors. In addition, NO_x concentrations are predicted to be within the air quality standard on the M60 with or without the AP2 revised scheme. However, there is a greater than 1% exceedance of the NO_x critical level brought about by the AP2 revised scheme on the M60, M62 and A664 Rochdale Road. The data show that the maximum change is 9.1% at 11m from the M60. Therefore, likely significant effects in combination cannot be ruled out.
- 4.2.8 Table A15 of Annex A shows that predicted NH₃ concentrations with the AP2 revised scheme, are lower than the 2018 baseline rates at all but one modelled receptor. However, NH₃ concentrations are predicted to be above the relevant air quality standard on the M60 and M62 with or without the AP2 revised scheme. In addition, there is a greater than 1% exceedance of the critical level brought about by the AP2 revised scheme on the M60, M62, A664 Rochdale Road, B6189 Grimshaw Lane and A6104 Hollinwood Avenue. The data show that the maximum change is 8.9% at 36m from the M62. Therefore, likely significant effects in combination cannot be ruled out.
- 4.2.9 Table A16 of Annex A shows that nitrogen deposition rates with the AP2 revised scheme in combination, are lower than the 2018 baseline at all modelled receptors. However, nitrogen deposition rates are predicted to be above the relevant air quality standard at all modelled receptors with or without the AP2 revised scheme. In addition, there is a greater than 1% exceedance of the critical load brought about by the AP2 revised scheme on the on the M60, M62, A663 Broadway, A664 Rochdale Road, B6189 Grimshaw Lane, A627(M) and A6104 Hollinwood Avenue, with a maximum of 50.7% at 36m from the M62. Therefore, likely significant effects in combination cannot be ruled out.

4.3 Current status of the ongoing work

- 4.3.1 At this current stage of design and assessment, it is considered that likely significant effects cannot be ruled out as a result of the construction or operation of the AP2 revised scheme in combination with other plans or projects.
- 4.3.2 Therefore, further and separate assessment of the AP2 revised scheme is being carried out to meet the needs of Regulation 63 of the Habitats Regulations. This will confirm the assessment conclusions at that stage of the design and assessment.

Annex A: Additional air quality information

1 Purpose

This annex provides additional air quality information in relation to impacts from vehicle emissions to support the Rochdale Canal SAC site assessment above.

2 Scope, assumptions and limitations

The scope, assumptions and limitations for the air quality assessment are set out in full in Volume 1 (Section 8) of the SMR (see Volume 5: Appendix CT-001-00001²² of the main ES) and accompanying SMR Technical note – Air quality: Guidance on the assessment methodology and the SES2 and AP2 ES Volume 5, Appendix: CT-001-00003 Air quality – Technical note – Updated guidance on the assessment methodology for Phase 2b SES2 and AP2 ES.

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

- screening of traffic data using the criteria set out in the SMR, which is based on the DMRB criteria¹² to identify where assessment is required;
- these criteria are the following for assessing the impacts of the scheme:
 - change in road alignment by 5m or more;
 - change in daily traffic flows by 1,000 vehicles or more as AADT;
 - change in daily flows of HDV by 200 AADT or more;
 - change in daily average speed by 10kph or more; or
 - change in peak hour speed by 20kph or more.
- the following criteria are used for assessing the impacts of the scheme in combination with other plans and projects:
 - change in daily traffic flows by 1,000 vehicles or more as AADT; or
 - change in daily flows of HDV by 200 AADT or more.
- ecological receptors included in the air quality assessment are designated sites with habitats sensitive to nitrogen. These could include SAC, Special Protection Areas (SPA) and Ramsar sites;
- transects have been used within a designated site with modelled points at 0m, 10m, 20m, 30m, 40m, 50m, 75m, 100m, 150m and 200m from the edge of the road unless the shape of the site and potential impacts require different distances to characterise the impacts; and
- a deposition velocity relevant to the habitat of each site has been used, as detailed in the IAQM ecological guidance¹⁶. Data on ammonia, nitrogen deposition and acid deposition has been taken from the most recent information available on the APIS²⁰ website. No plume depletion for ammonia dispersion modelling has been included. No reduction in future background deposition rates or background pollutant concentrations has been applied to the APIS data.

The following scenarios were assessed:

- baseline;
- selected year(s) within the construction period for the assessment of the effects of construction. The year(s) of assessment were selected based on the worse case annual

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average traffic data, refined from the peak period traffic data, during the construction programme and when significant effects might be expected; and

- a scenario for the first full operational year after construction is completed.

The baseline scenario represents 2018.

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

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

For the assessment of the AP2 revised scheme in combination with other plans and projects, a different 'without' scheme scenario was used and described as the 'do nothing' scenario. This uses traffic data from the 2018 baseline, but background pollutant concentrations, deposition rates and emission factors representing the future year being assessed (with the exception of the APIS data).

The assessment incorporated HS2 Ltd's policy on construction vehicle emissions standards. These standards are published in Information Paper E14²³; Air Quality and include Euro VI for Heavy Goods Vehicles (HGV), and Euro 6 and Euro 4 for diesel and petrol Light Duty Vehicles (LDV) respectively.

The traffic forecasts that underpin the assessment were derived from strategic traffic models that have been sourced from key stakeholders, including Local Highway Authorities and National Highways. In combination, these models cover the areas that are expected to be affected by the AP2 revised scheme and have been used as the basis of assessment for traffic flow analysis. The models have been developed by the relevant stakeholders in accordance with Transport Analysis Guidance (TAG) provided by the Department for Transport, with each model representing a base year position between 2016 and 2018. It is understood that the strategic traffic models supplied to HS2 Ltd take account of the core development growth scenarios set out in the relevant local plan documents, transport strategy documents and model forecasting reports published at that time. Information about these development growth scenarios can be found in the following documents:

²³ High Speed Two Ltd (2022), *High Speed Two Phase 2b Information Paper E14: Air Quality*. Version 2.0. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1084183/E14_Air_quality_v2.pdf.

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- Cheshire East Local Plan Strategy 2010-2030, July 2017²⁴;
- Cheshire West and Chester Local Plan (Part Two) Land Allocations and Detailed Policies, November 2017²⁵;
- Winsford Transport Strategy Recommendations Report, June 2016²⁶;
- Northwich Transport Strategy Recommendations Report, April 2018²⁷;
- Regional Investment Programme (RIP) M6 Junction 19 Improvement PCF Stage 3 Transport Forecasting Report, January 2019²⁸; and
- GMVDM4A Uncertainty Log for NTEM GMSF Full Scenario, Version 2, November 2018.

In all cases, the traffic growth forecasts have been constrained to TEMPro version 7.2 which uses the National Trip End Model (NTEM 7.2 (2017))²⁹ dataset and the National Transport Model (NTM) 2015. TEMPro inherently incorporates future planned development, being based on approved plans, irrespective of whether it is approved, committed, or simply included in approved plans.

Consideration was also given to relevant non-road plans and projects that could contribute to a cumulative increase in air pollution at Rochdale Canal. Searches were carried out for the following non-traffic related emission sources (which were also included in the air quality model) within a 10km radius (unless stated otherwise below). This is considered to be reasonable and proportionate and meets the expectations in Section 4.48 of Natural England's guidance¹⁴:

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

²⁴ Cheshire East Council (2022), *Local Plan Strategy 2010 – 2030*. Adopted 17 July 2017. Available online at: <https://www.cheshireeast.gov.uk/pdf/planning/local-plan/local-plan-strategy-web-version-1.pdf>.

²⁵ Cheshire West and Chester Council (2019), *Local Plan (Part Two) Land Allocations and Detailed Policies*. Adopted 18 July 2019. Available online at: <https://consult.cheshirewestandchester.gov.uk/kse/>.

²⁶ Mott MacDonald (2016), *Winsford Transport Strategy: Recommendations Report*. Available online at: <https://cmttpublic.cheshirewestandchester.gov.uk/documents/s48945/Appendix%20B%20Winsford%20Transport%20Strategy.pdf>.

²⁷ Mott MacDonald (2018), *Northwich Transport Strategy: Recommendations Report*. Available online at: <https://www.cheshirewestandchester.gov.uk/documents/parking-roads-and-travel/public-transport/transport-strategies/northwich-transport-strategy/northwich-transport-strategy-recommendation-report-130318.pdf>.

²⁸ Highways England (2019), *Regional Investment Programme (RIP) M6 Junction 19 Improvement*. Issue Number 1.0. Available online at: <https://assets.highwaysengland.co.uk/roads/road-projects/M6+junction+19/Statement+of+Reasons.pdf>.

²⁹ Department for Transport, *TEMPro version 7.2*. Available online at: <https://www.data.gov.uk/dataset/11bc7aaf-ddf6-4133-a91d-84e6f20a663e/national-trip-end-model-ntem>.

3 Air quality standards

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

Table A1: Air quality standards

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

In the context of air pollution impacts on ecological sites (e.g., in this case SAC, SPA and Ramsar sites), road traffic emits NO_x and ammonia, which both contribute to nitrogen and acid deposition. Therefore, this assessment considers changes in NO_x and ammonia as well as changes in nitrogen and acid deposition. Comparisons have been made against the applicable critical loads³⁰, critical level or relevant standard for the site, as above or as provided by APIS.

³⁰ The critical loads for deposition vary and are specific to each qualifying feature. These are presented as a range of values (expressed as a rate, e.g. 10kg N/ha/yr – 20 kg N/ha/yr) and typically, as a precautionary approach, only the lowest value is used (unless there are compelling reasons to do otherwise) as this will emphasise any negative outcomes.

4 How significance is assessed

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

For the assessment of ammonia (NH₃), if the change is predicted to be less than 1% of the air quality critical level³¹, then the effect is considered to be not significant. However, should the concentration change by more than 1%, then the assessment of significance will be undertaken by an ecologist and reported within the main report.

For the assessment of nitrogen deposition, if the change is predicted to be less than 1% of the lower critical load³⁰, then the effect is considered to be not significant. However, should the deposition change by more than 1%, then the assessment of significance will be undertaken by an ecologist and reported within the main report.

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

³¹ The critical level for NH₃ is 3µg/m³ for low level vegetation and 1µg/m³ high vegetation (e.g., trees).

5 Assessment of construction traffic effects – AP2 revised scheme

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

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

- the M60 between Junctions 21 and 22; and
- the M62 between Junctions 19 and 20.

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

Figure A1 to Figure A7 presents a detailed map of the modelled area including assessed roads (Modelled Road Links in red) and worst case Modelling Transect Points (yellow dots). The Rochdale canal SSSI and SAC has been modelled along the boundary of the canal and only worst case locations have been reported.

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

Road ID	Road name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change
14160_4117, 4117_14160	A62 Oldham Road	19,310	19,688	19,841	153	531	732	745	747	2	15
6567_3820, 3820_6567	A6104 Hollinwood Avenue	16,483	18,142	18,771	629	2,288	317	345	355	11	38
5662_3911, 3911_5662	A6104 Semple Way	10,820	11,124	11,189	64	369	679	643	658	15	-22
5674_5677, 5676_5675	M60 Junction 21 to J22	104,464	111,607	114,520	2,913	10,056	7,275	6,875	6,933	58	-342
3912_5674	M60 J21 southbound on-slip	15,227	15,855	16,628	773	1,401	742	719	719	0	-23
5673_5674, 12858_5672	M60 within Junction 21	72,677	78,732	80,780	2,047	8,103	5,972	5,676	5,692	16	-280
3918_3912, 3912_3918	A663 Broadway over M60 at M60 Junction 21	9,798	10,238	10,480	242	683	617	606	607	0	-10
3912_3819, 3819_3912	A663 Broadway north of M60 Junction 21	47,080	47,200	47,368	169	289	1,992	1,981	1,988	7	-5
3919_8371, 8371_3919	Broadgate	4,858	5,505	5,604	98	745	302	302	303	1	1

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Road ID	Road name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change
3919_1572, 1572_3919	B6189 Foxdenton Lane	8,427	9,368	9,364	-5	936	212	203	203	0	-9
2924_2093, 2093_2924	Grimshaw Lane	12,002	13,093	13,206	114	1,204	514	505	506	1	-8
15234_6847, 6847_15234	Mills Hill Road south of Baytree	17,362	18,513	18,481	-32	1,119	235	225	232	7	-3
15235_15234, 15234_15235	Baytree Lane	2,867	3,017	2,986	-31	119	123	117	116	-1	-7
15234_6946, 6946_15234	Mills Hill Road north of Baytree	14,497	15,497	15,499	2	1,002	112	109	117	8	4
15232_6946, 6946_15232	Laurel Avenue	8,041	8,689	8,684	-5	643	69	72	81	9	12
8319_1826, 1826_8319	Mills Hill Road north of Laurel	4,522	4,672	4,638	-33	116	47	52	53	1	6
4869_2027, 2027_4869	A669 Middleton Road	8,357	8,920	8,900	-19	544	319	296	299	3	-20
15235_1826, 1826_15235	A669 Middleton Road west of Mills Hill	16,712	17,064	17,123	59	411	545	521	527	6	-19

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Road ID	Road name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change
2027_1826, 1826_2027	A669 Middleton Road east of Mills Hill	19,344	19,787	19,852	65	508	562	554	560	6	-2
8320_2027, 2027_8320	B6195 Haigh Lane	17,653	18,519	18,521	1	868	289	303	309	6	20
6175_15236, 15236_6175	Boarshaw Road	26	26	26	0	0	26	26	26	0	0
15463_15384, 15384_15463	Gilford Grove	19	19	19	0	0	19	19	19	0	0
6869_6866, 6866_6869	Whitbrook Way south of Finlan	2,609	3,253	3,250	-3	642	0	0	0	0	0
5292_3740, 3740_5292	A664 Rochdale Road south of the Slattocks Roundabout	26,584	28,014	28,039	25	1,455	989	959	960	1	-28
7491_5293, 5293_7491	A664 Rochdale Road north of the Slattocks Roundabout	12,831	14,437	14,480	43	1,649	520	544	544	0	24
5290_5200, 5289_5291	A627(M)*	24,573	28,487	28,475	-12	3,902	694	677	679	1	-15

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Road ID	Road name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change
6867_6866, 6866_6867	Whitbrook Way north of Finlan	13,297	14,241	14,236	-5	939	219	218	218	0	-1
7492_2482, 2482_7492	A664 Manchester Road	20,489	20,786	20,856	70	368	310	330	330	0	20
14489_2482, 2482_14489	A664 Manchester Road	18,019	18,833	18,872	39	853	281	302	302	0	21
6873_2482, 2482_6873	A664 Manchester Road	3,563	4,006	4,054	47	491	62	61	61	0	-1
14489_6873	A664 Manchester Road	4,138	4,611	4,608	-3	470	42	38	38	0	-4
6874_6873, 6873_6874	A664 Queensway	7,715	8,637	8,662	25	947	116	118	118	0	2
14489_4459, 4459_14489	A664 Manchester Road	22,157	23,444	23,461	17	1,304	323	340	340	0	17
4926_6260, 6259_4927	A627(M) north of M62	38,133	40,729	40,739	10	2,606	2,513	2,441	2,442	1	-71
9019_6259, 6259_9019	A627(M) Rochdale Bypass	23,830	24,937	25,052	116	1,223	786	785	787	2	1

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Road ID	Road name	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change	2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme	AP2 revised scheme change	In combination change
6259_6261	A664 Edinburgh Way	3,319	3,320	3,337	17	18	13	19	19	-1	6
6260_6261	A664 Edinburgh Way Slip-Road	13,370	14,025	14,051	26	681	747	697	697	0	-50
4632_2041, 2041_4632	A664 Rochdale Bypass	23,367	24,374	24,416	43	1,049	698	709	710	1	12
26771_2721, 26775_2720	M62 Junction 19 to 20	119,635	147,080	148,780	1,700	29,145	12,825	13,066	13,102	36	277

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

* Indicates that link does not trigger for in combination assessment as a reduction in traffic emissions is predicted for AP2 revised scheme.

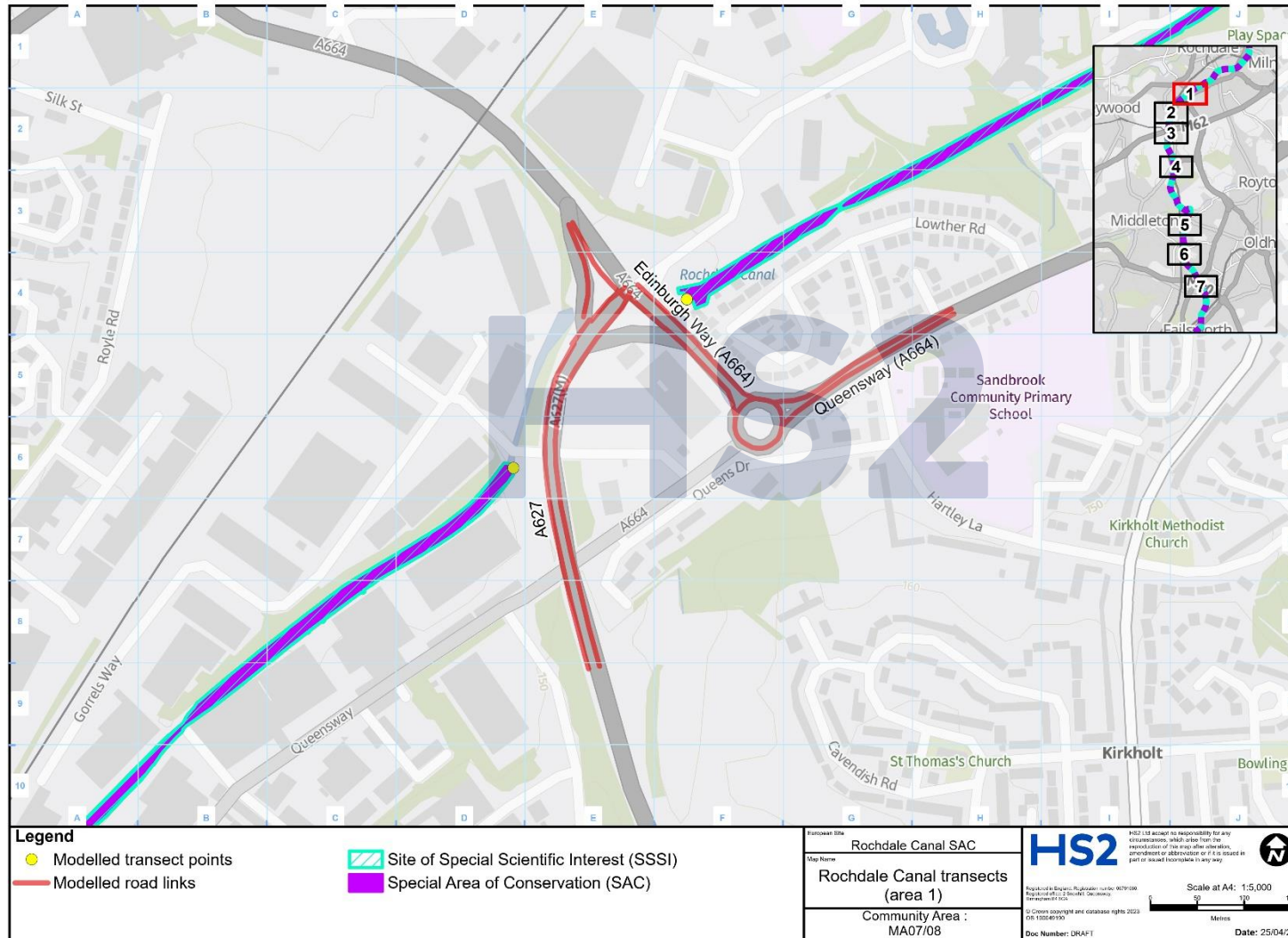
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Figure A1: Map of Rochdale Canal Area 1, including modelled road links; all modelled transect points and the worst case receptor points



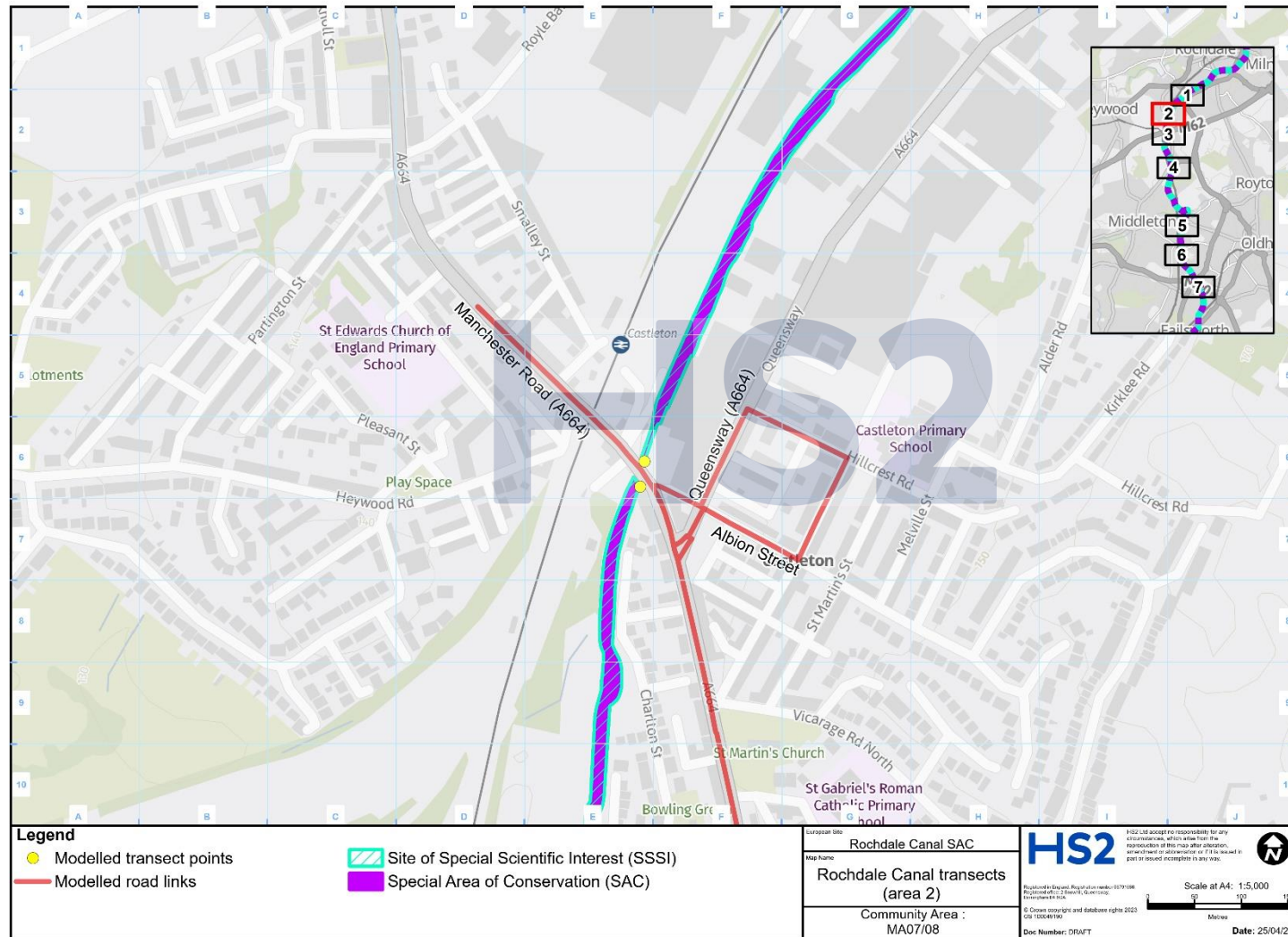
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Figure A2: Map of Rochdale Canal Area 2, including modelled road links; all modelled transect points and the worst case receptor points



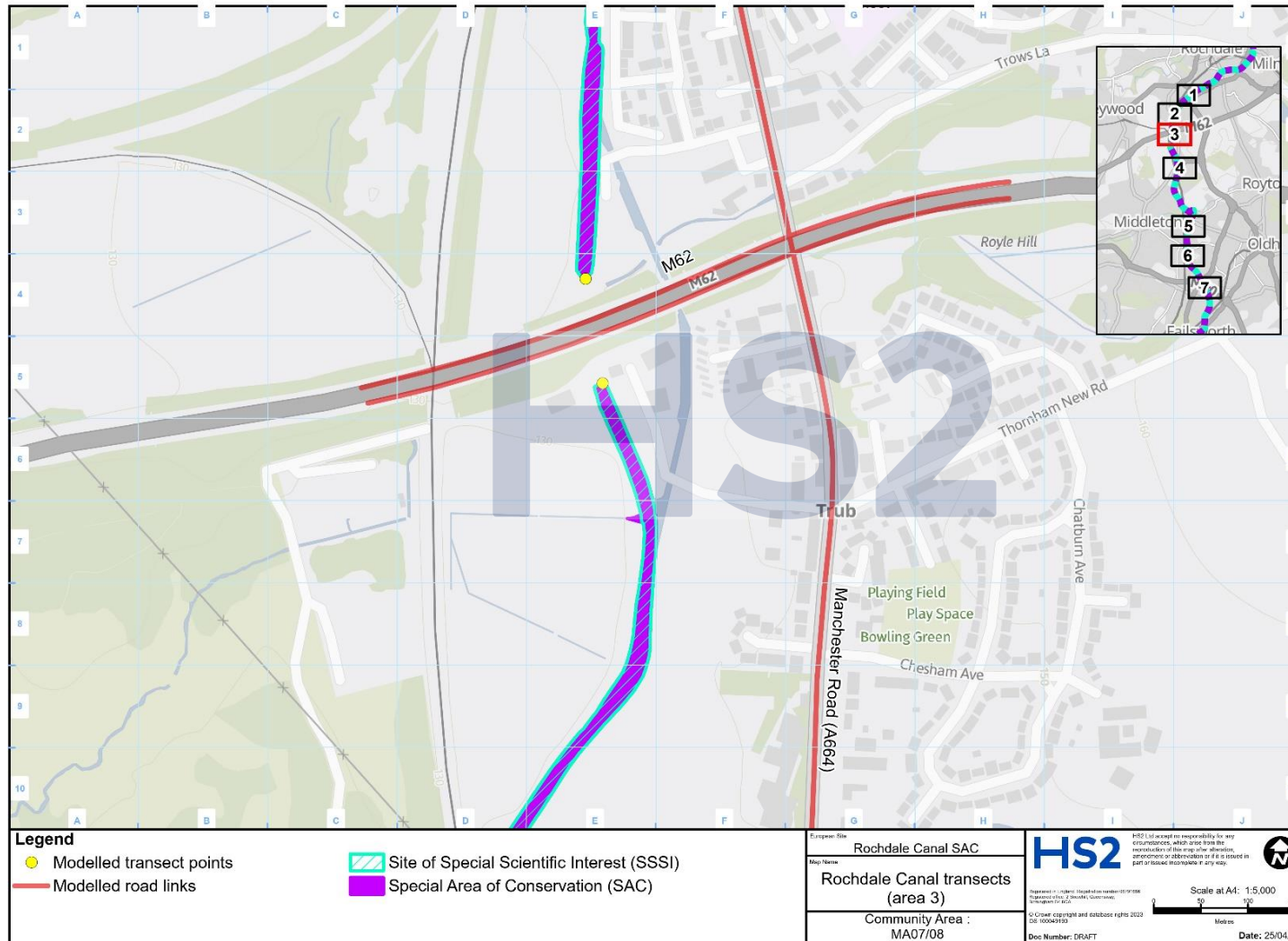
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Figure A3: Map of Rochdale Canal Area 3, including modelled road links; all modelled transect points and the worst case receptor points



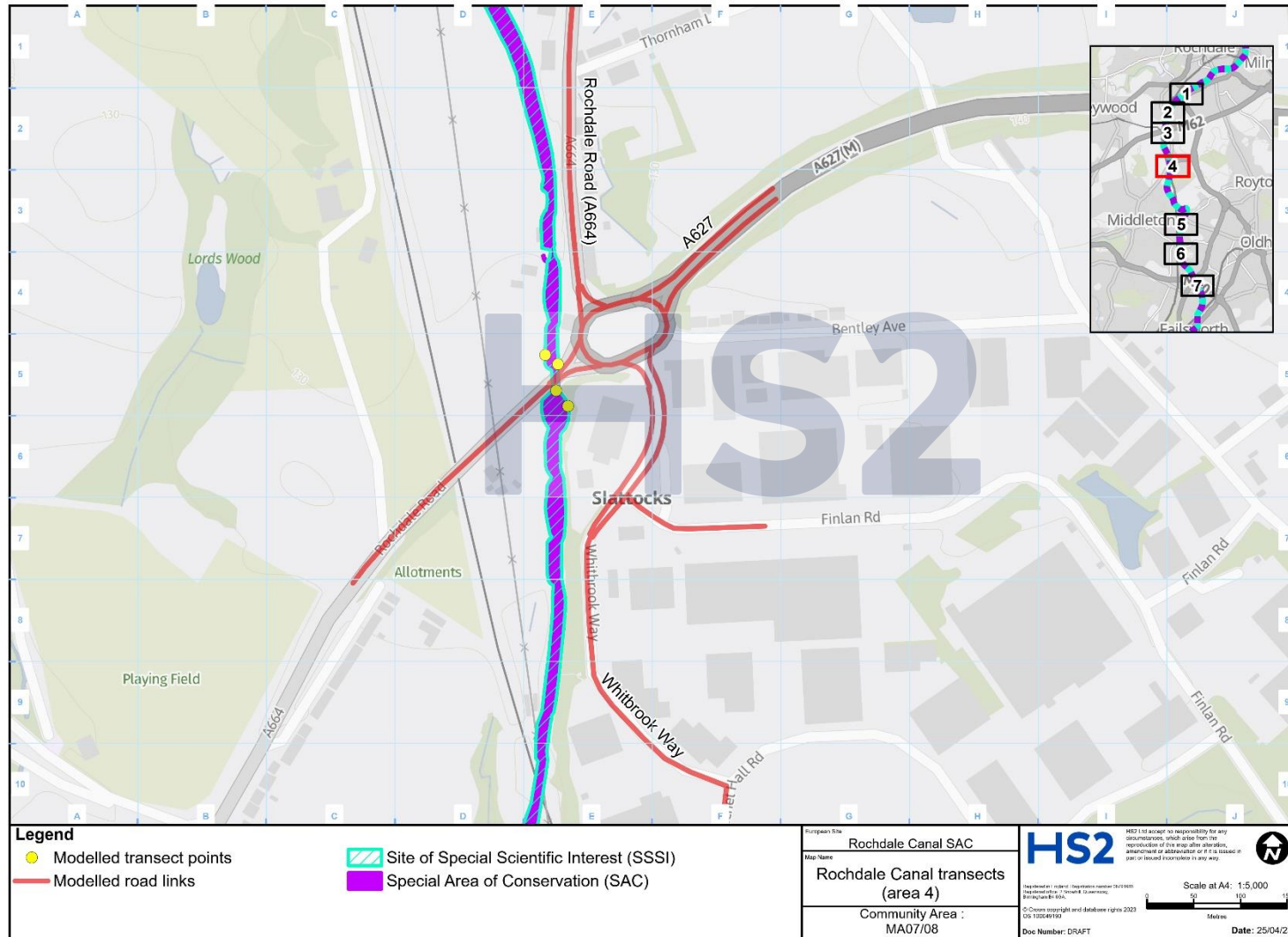
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Figure A4: Map of Rochdale Canal Area 4, including modelled road links; all modelled transect points and the worst case receptor points



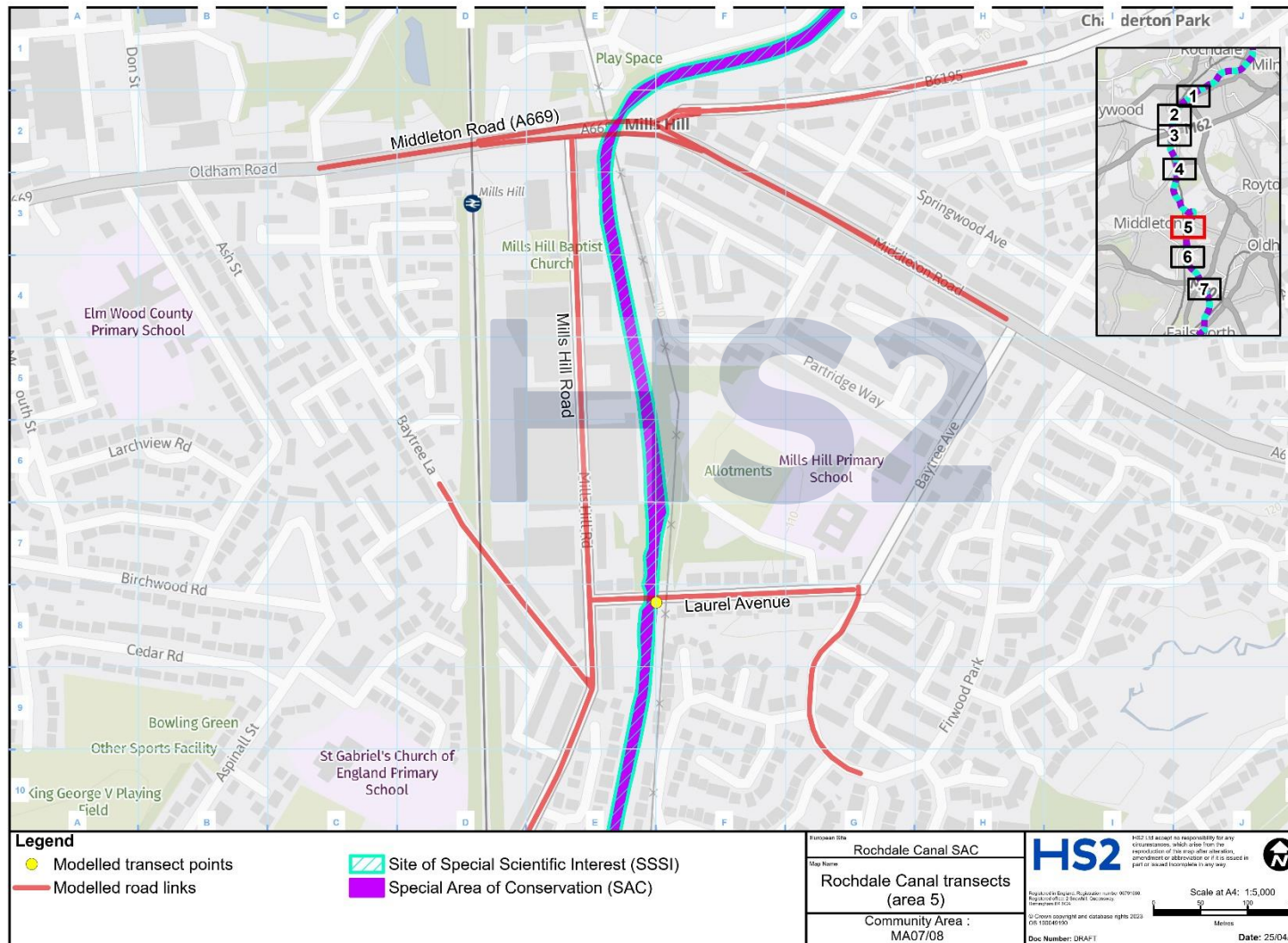
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Figure A5: Map of Rochdale Canal Area 5, including modelled road links; all modelled transect points and the worst case receptor points



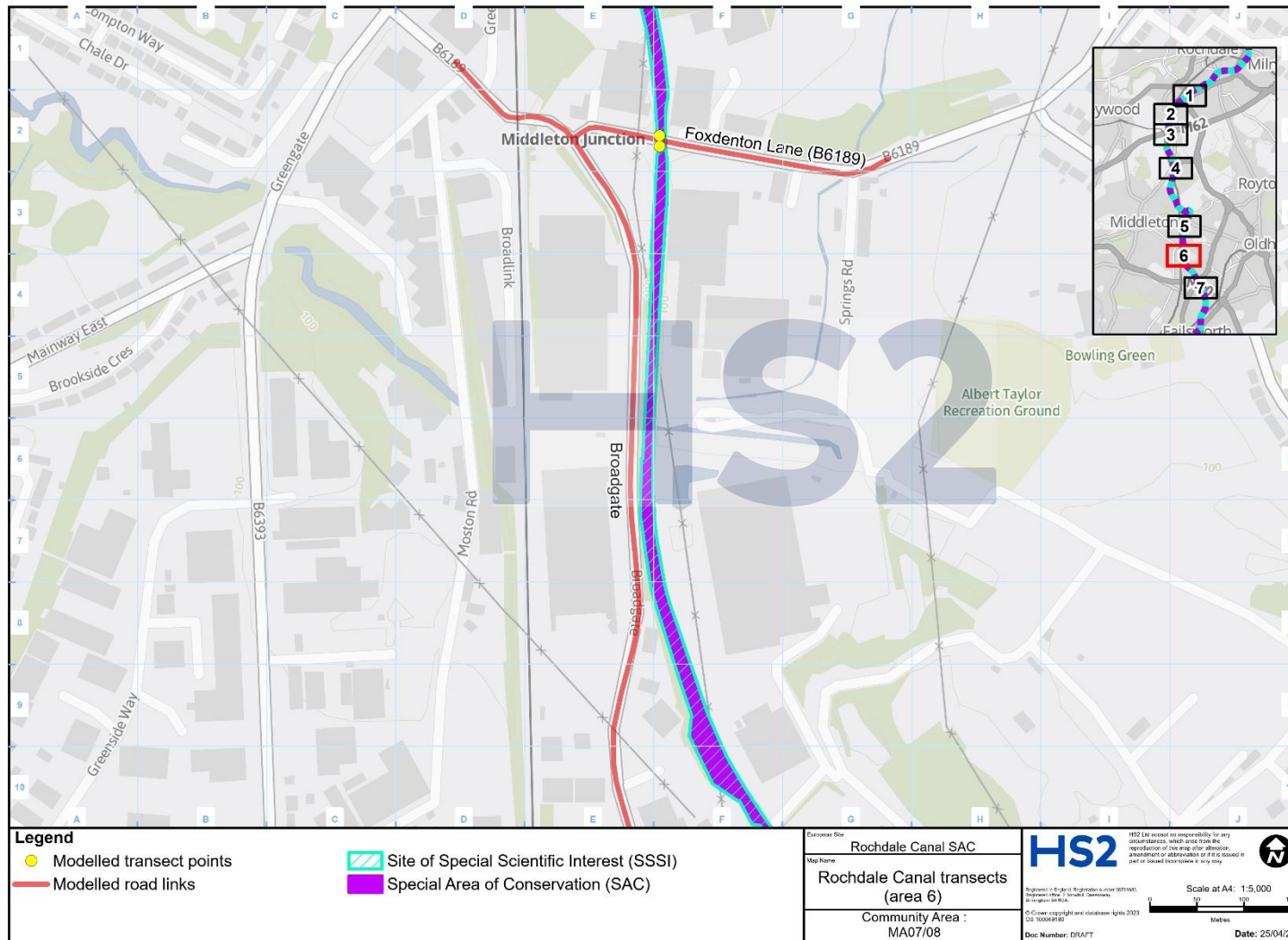
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Figure A6: Map of Rochdale Canal Area 6, including modelled road links; all modelled transect points and the worst case receptor points



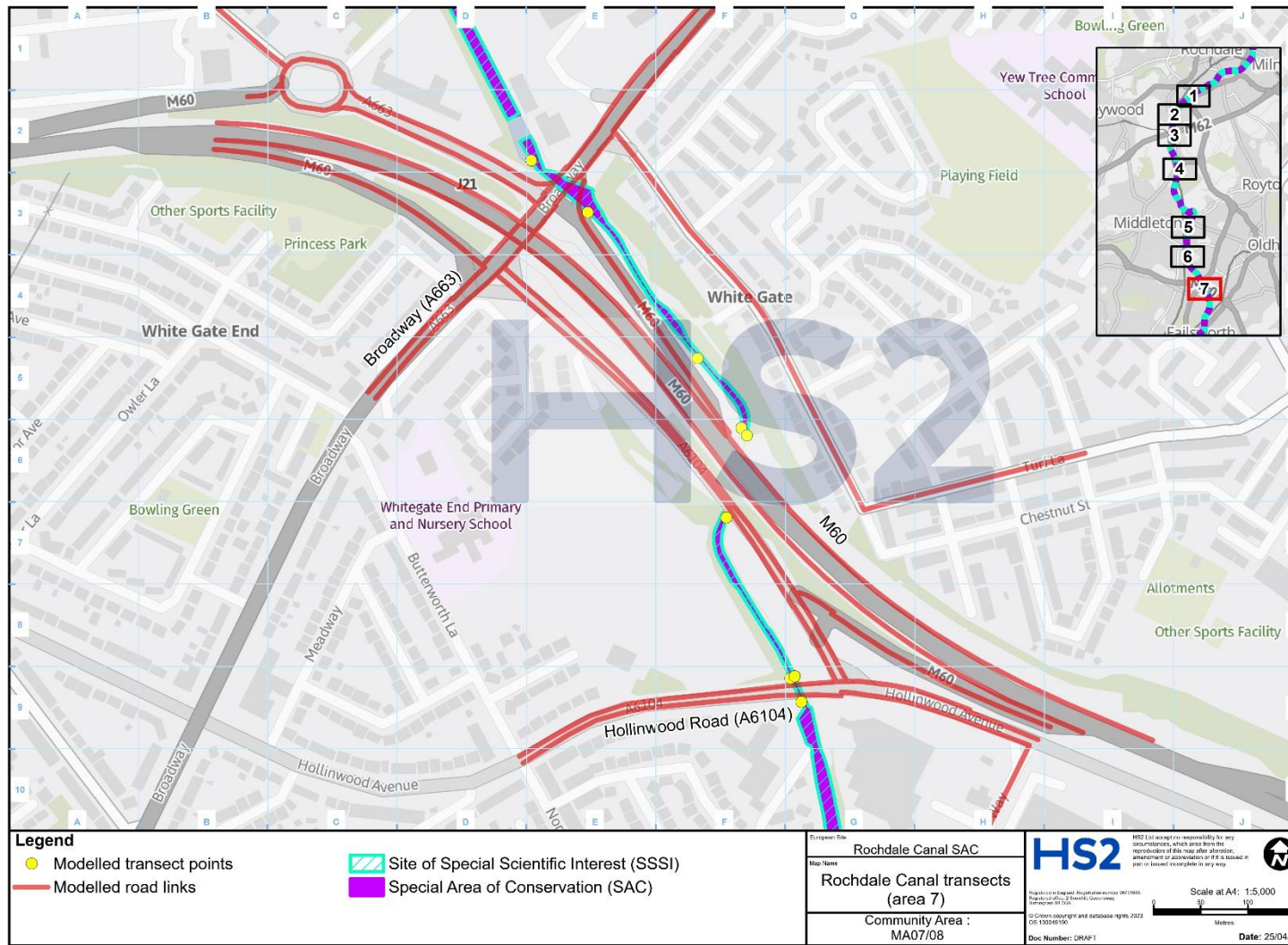
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Figure A7: Map of Rochdale Canal Area 7, including modelled road links; all modelled transect points and the worst case receptor points



5.2 Receptors assessed and background concentrations

Figure A1 to Figure A5 represents the modelled worst case locations at the designation boundary.

Table A3 shows the background concentrations for NO_x, background nitrogen deposition and critical loads. Table A4 shows the background acid deposition, critical loads and background ammonia concentrations. Rochdale Canal SSSI and SAC is not sensitive to acid deposition and has therefore not been assessed for this element. The yellow transect points in Figure A5 represent the modelled worst case locations at the designation boundary.

Table A3: Modelled ecological receptor NO_x and nitrogen deposition backgrounds and critical loads (construction phase)

Receptor	Sensitive habitat	2018 NO _x background concentration (µg/m ³)	2026 NO _x background concentration (µg/m ³)	APIS data ²¹ of average total nitrogen deposition (kg/ N/ha/yr)	APIS Critical load (kg N/ha/yr)
Hollinwood Avenue (1_22)	Fen, Marsh and Swamp	26.6	18.8	24.5	3
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	28.9	20.1	24.6	3
Hollinwood Avenue (8_1)	Fen, Marsh and Swamp	26.6	18.8	24.5	3
A663 Broadway & A663 Broadgate (10_2)	Fen, Marsh and Swamp	28.9	20.1	24.6	3
B6189 Grimshaw Lane (11_1)	Fen, Marsh and Swamp	29.1	21.3	24.7	3
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	29.1	21.3	24.7	3
Laurel Avenue (14_1)	Fen, Marsh and Swamp	25.3	18.2	24.8	3
A664 Rochdale Road (18_1)	Fen, Marsh and Swamp	23.8	16.7	25.2	3
A664 Rochdale Road (19_3)	Fen, Marsh and Swamp	23.8	16.7	25.2	3
A664 Rochdale Road (20_3)	Fen, Marsh and Swamp	23.8	16.7	25.2	3
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	24.7	17.1	25.8	3

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Receptor	Sensitive habitat	2018 NOx background concentration ($\mu\text{g}/\text{m}^3$)	2026 NOx background concentration ($\mu\text{g}/\text{m}^3$)	APIS data ²¹ of average total nitrogen deposition (kg/ N/ha/yr)	APIS Critical load (kg N/ha/yr)
A627(M) Rochdale By-Pass (24_1)	Fen, Marsh and Swamp	24.2	16.6	25.8	3
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	24.2	16.6	25.8	3
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	22.9	15.2	25.5	3
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	22.9	15.2	25.5	3
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	23.8	16.7	25.2	3
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	28.9	20.1	24.6	3
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (41_1)	Fen, Marsh and Swamp	28.9	20.1	24.6	3
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	28.9	20.1	24.6	3

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

Receptor	Sensitive habitat	APIS data of average total acid deposition (k eq/ha/yr)	APIS Critical load nitrogen (k eq/ha/yr) (min)	APIS Critical load nitrogen (k eq/ha/yr) (max)	APIS Ammonia background concentration (µg/m ³)
Hollinwood Avenue (1_22)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.5
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
Hollinwood Avenue (8_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.5
A663 Broadway & A663 Broadgate (10_2)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
B6189 Grimshaw Lane (11_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
Laurel Avenue (14_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
A664 Rochdale Road (18_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
A664 Rochdale Road (19_3)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
A664 Rochdale Road (20_3)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	2.1	Not Applicable	Not Applicable	2.4
A627(M) Rochdale By-Pass (24_1)	Fen, Marsh and Swamp	2.1	Not Applicable	Not Applicable	2.4
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	2.1	Not Applicable	Not Applicable	2.4
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	2.1	Not Applicable	Not Applicable	2.4
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	2.1	Not Applicable	Not Applicable	2.4
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4

Receptor	Sensitive habitat	APIS data of average total acid deposition (k eq/ha/yr)	APIS Critical load nitrogen (k eq/ha/yr) (min)	APIS Critical load nitrogen (k eq/ha/yr) (max)	APIS Ammonia background concentration ($\mu\text{g}/\text{m}^3$)
within Junction 21 (39_10)					
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (41_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	2.0	Not Applicable	Not Applicable	2.4

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 $\mu\text{g}/\text{m}^3$).

Table A6 presents a summary of the ammonia concentration results taken from the National Highways Ammonia N Deposition Tool¹³, change in concentration and percentage change in relation to the critical level.

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

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

Ecological site	Sensitive habitat	Distance to road (m)	NOx concentrations ($\mu\text{g}/\text{m}^3$)			Change in NOx concentrations ($\mu\text{g}/\text{m}^3$)	Comparison against air quality standard ($30\mu\text{g}/\text{m}^3$)	Percent change in relation to air quality standard
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	40.86	25.36	25.47	0.11	Within standard	0.4%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	49.54	28.32	28.48	0.16	Within standard	0.5%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	35.63	21.42	21.50	0.08	Within standard	0.3%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	52.01	30.44	30.69	0.25	Above standard	0.8%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	53.02	30.93	31.20	0.27	Above standard	0.9%

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Table A6: Assessment of ammonia (NH₃) at ecological sites (construction phase, AP2 revised scheme)

Ecological site	Sensitive habitat	Distance to road (m)	NH ₃ concentrations (µg/m ³)			Change in NH ₃ concentrations (µg/m ³)	Comparison against critical level (3µg/m ³ for low and 1µg/m ³ high vegetation)	Percent change in relation to critical level
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	2.89	2.83	2.84	<0.01	Within standard	0.3%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	3.41	3.41	3.42	0.01	Above standard	0.4%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	2.88	2.88	2.88	<0.01	Within standard	0.2%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	3.65	3.42	3.45	0.03	Above standard	0.8%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	3.36	3.26	3.28	0.02	Above standard	0.7%

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

Ecological site	Sensitive Habitat	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent Change in relation to lower critical load
			2018 baseline	2026 without the AP2 revised scheme	2026 with the AP2 revised scheme			
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	27.92	27.15	27.20	0.05	3	1.8%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	32.78	31.81	31.88	0.07	3	2.5%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	29.02	28.51	28.55	0.04	3	1.2%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	32.66	30.57	30.72	0.15	3	5.0%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	31.22	29.80	29.93	0.13	3	4.3%

5.4 Assessment of significance

NO_x concentrations at Rochdale Canal are predicted to be within the air quality standard in all scenarios. Changes in NO_x concentrations are less than 1% of the air quality standard and therefore not significant.

NH₃ concentrations at Rochdale Canal are predicted to be above the air quality critical level at some locations. Changes in NH₃ concentrations are less than 1% of the air quality standard and therefore not significant.

Nitrogen deposition rates are predicted to be above the lower critical load at all modelled receptors in the baseline and future scenarios with or without the AP2 revised scheme. The changes in nitrogen deposition due to the AP2 revised scheme are greater than 1% of the lower critical load at locations in the vicinity of M60 Junction 20 to 21 and M62 Junction 19 to 20. Potentially significant effects are therefore predicted, and this is addressed further in Section 3.3 of the main report.

6 Assessment of construction traffic effects – AP2 revised scheme in combination with other plans and projects

6.1 Screening of traffic data

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

- the M60 at Junction 21;
- the M62 between Junctions 19 and 20;
- the A6104 Hollinwood Avenue;
- the M60 between Junctions 21 and 22;
- the M60 Junction 21 southbound on-slip;
- the M60 within Junction 21;
- Grimshaw Lane;
- Mills Hill Road south of Baytree;
- Mills Hill Road north of Baytree;
- the A664 Rochdale Road south of the Slattocks Roundabout;
- the A664 Rochdale Road north of the Slattocks Roundabout;
- the A627(M);
- the A664 Manchester Road;
- the A627(M) north of M62;
- the A627(M) Rochdale Bypass; and
- the A664 Rochdale Bypass.

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

Table A2 presents the traffic data used in the assessment.

6.2 Non-road plans and projects

The Chadderton Generating Facility, off Broadgate, Oldham has been identified approximately 250m south-west of the Rochdale Canal SAC, close to M60 Junction 21. It received an Environmental Permit in January 2020 which includes for the operation of four 10MWth input engines and one 6MWth engine. The process contribution from these combustion plant to nitrogen deposition have been accounted for within the assessment. This has been achieved by adding the process contributions as reported in the permit application documents³².

³² Clarke Energy Ltd (2019), *Air Quality Assessment Chadderton Generation Facility*, Broadgate, Oldham.

6.3 Receptors assessed and background concentrations

Receptors assessed, and background concentrations are as presented previously in the Assessment of construction traffic effects – AP2 revised scheme section.

6.4 Assessment results

Table A8 presents a summary of the modelled NO_x concentrations for the ecological site, the change in concentration and a comparison against the air quality standard (30µg/m³).

Table A9 presents a summary of the ammonia concentration results taken from the National Highways Ammonia N Deposition Tool¹³, change in concentration and percentage change in relation to the critical level.

Table A10 presents a summary of the modelled nitrogen deposition, with an additional ammonia component applied using the National Highways Ammonia N Deposition Tool, change in deposition and percentage change in relation to the lower critical load.

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Table A8: Assessment of NOx concentrations at ecological sites (construction phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	NOx concentrations ($\mu\text{g}/\text{m}^3$)			Change in NOx concentrations ($\mu\text{g}/\text{m}^3$)	Comparison against air quality standard ($30\mu\text{g}/\text{m}^3$)	Percent change in relation to air quality standard
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme in combination			
Hollinwood Avenue (1_22)	Fen, Marsh and Swamp	4	34.73	22.25	22.6	0.32	Within standard	1.1%
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	40.86	25.06	27.57	2.51	Within standard	8.4%
Hollinwood Avenue (8_1)	Fen, Marsh and Swamp	5	33.62	21.78	22.0	0.27	Within standard	0.9%
A663 Broadway & A663 Broadgate (10_2)	Fen, Marsh and Swamp	13	52.91	30.15	32.8	2.65	Above standard	8.8%
B6189 Grimshaw Lane (11_1)	Fen, Marsh and Swamp	3	33.95	23.36	23.6	0.21	Within standard	0.7%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	35.49	24.06	24.3	0.28	Within standard	0.9%
Laurel Avenue (14_1)	Fen, Marsh and Swamp	1	28.05	19.44	19.5	0.08	Within standard	0.3%
A664 Rochdale Road (18_1)	Fen, Marsh and Swamp	3	30.26	19.52	19.7	0.21	Within standard	0.7%
A664 Rochdale Road (19_3)	Fen, Marsh and Swamp	24	29.28	19.09	19.3	0.19	Within standard	0.6%
A664 Rochdale Road (20_3)	Fen, Marsh and Swamp	21	32.22	20.36	20.6	0.27	Within standard	0.9%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	38.25	23.21	23.7	0.49	Within standard	1.6%

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Ecological site	Sensitive habitat	Distance to road (m)	NOx concentrations ($\mu\text{g}/\text{m}^3$)			Change in NOx concentrations ($\mu\text{g}/\text{m}^3$)	Comparison against air quality standard ($30\mu\text{g}/\text{m}^3$)	Percent change in relation to air quality standard
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme in combination			
A627(M) Rochdale By-Pass (24_1)	Fen, Marsh and Swamp	13	31.08	19.37	19.6	0.19	Within standard	0.6%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	32.87	20.26	20.5	0.20	Within standard	0.7%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	49.54	25.87	28.5	2.61	Within standard	8.7%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	35.63	20.28	21.5	1.22	Within standard	4.1%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	32.34	20.42	20.7	0.29	Within standard	1.0%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	52.01	29.81	32.8	2.98	Above standard	9.9%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (41_1)	Fen, Marsh and Swamp	4	51.40	29.53	32.3	2.76	Above standard	9.2%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	53.02	30.28	33.3	3.02	Above standard	10.1%

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Table A9: Assessment of NH₃ concentrations at ecological sites (construction phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	NH ₃ concentrations (µg/m ³)			Change in NH ₃ concentrations (µg/m ³)	Comparison against critical level (3µg/m ³ for low and 1µg/m ³ high vegetation)	Percent change in relation to critical level
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
Hollinwood Avenue (1_22)	Fen, Marsh and Swamp	4	2.76	2.72	2.74	0.02	Within standard	0.8%
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	2.89	2.81	2.84	0.03	Within standard	1.0%
Hollinwood Avenue (8_1)	Fen, Marsh and Swamp	5	2.72	2.68	2.70	0.02	Within standard	0.7%
A663 Broadway & A663 Broadgate (10_2)	Fen, Marsh and Swamp	13	3.35	3.21	3.26	0.05	Above standard	1.4%
B6189 Grimshaw Lane (11_1)	Fen, Marsh and Swamp	3	2.69	2.64	2.66	0.02	Within standard	0.7%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	2.77	2.71	2.74	0.03	Within standard	0.9%
Laurel Avenue (14_1)	Fen, Marsh and Swamp	1	2.57	2.54	2.55	<0.01	Within standard	0.3%
A664 Rochdale Road (18_1)	Fen, Marsh and Swamp	3	2.71	2.65	2.67	0.02	Within standard	0.7%
A664 Rochdale Road (19_3)	Fen, Marsh and Swamp	24	2.66	2.61	2.62	0.01	Within standard	0.6%
A664 Rochdale Road (20_3)	Fen, Marsh and Swamp	21	2.81	2.73	2.75	0.02	Within standard	0.9%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	3.13	2.98	3.03	0.05	Above standard	1.6%

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Ecological site	Sensitive habitat	Distance to road (m)	NH ₃ concentrations (µg/m ³)			Change in NH ₃ concentrations (µg/m ³)	Comparison against critical level (3µg/m ³ for low and 1µg/m ³ high vegetation)	Percent change in relation to critical level
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme			
A627(M) Rochdale By-Pass (24_1)	Fen, Marsh and Swamp	13	2.62	2.57	2.58	0.01	Within standard	0.5%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	2.68	2.64	2.65	0.01	Within standard	0.5%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	3.41	3.22	3.42	0.20	Above standard	6.6%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	2.88	2.79	2.88	0.09	Within standard	3.1%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	2.81	2.73	2.76	0.03	Within standard	0.9%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	3.65	3.36	3.45	0.09	Above standard	2.9%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (41_1)	Fen, Marsh and Swamp	4	3.29	3.16	3.21	0.05	Above standard	1.7%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	3.36	3.22	3.28	0.06	Above standard	2.3%

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Table A10: Assessment of nitrogen deposition with ammonia at ecological sites (construction phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent Change in relation to lower critical load
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme in combination			
Hollinwood Avenue (1_22)	Fen, Marsh and Swamp	4	26.78	26.21	26.36	0.15	3	5.0%
M60 Junction 21 to 20 & A6104 (1_1)	Fen, Marsh and Swamp	5	27.92	27.01	27.42	0.41	3	13.6%
Hollinwood Avenue (8_1)	Fen, Marsh and Swamp	5	26.47	25.98	26.11	0.13	3	4.3%
A663 Broadway & A663 Broadgate (10_2)	Fen, Marsh and Swamp	13	31.16	29.48	29.95	0.47	3	15.7%
B6189 Grimshaw Lane (11_1)	Fen, Marsh and Swamp	3	26.34	25.88	26.00	0.12	3	4.1%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	26.88	26.28	26.45	0.17	3	5.5%
Laurel Avenue (14_1)	Fen, Marsh and Swamp	1	25.77	25.49	25.54	0.05	3	1.7%
A664 Rochdale Road (18_1)	Fen, Marsh and Swamp	3	27.43	26.83	26.95	0.12	3	4.2%
A664 Rochdale Road (19_3)	Fen, Marsh and Swamp	24	27.10	26.58	26.70	0.12	3	3.7%
A664 Rochdale Road (20_3)	Fen, Marsh and Swamp	21	28.07	27.31	27.47	0.16	3	5.3%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	30.63	29.33	29.61	0.28	3	9.5%

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Ecological site	Sensitive habitat	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent Change in relation to lower critical load
			2018 baseline	2026 do nothing	2026 with the AP2 revised scheme in combination			
A627(M) Rochdale By-Pass (24_1)	Fen, Marsh and Swamp	13	27.68	27.13	27.23	0.10	3	3.0%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	28.17	27.58	27.67	0.09	3	3.1%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	32.78	30.65	31.88	1.23	3	40.9%
M62 Junction 19 to 20 (34_1)	Fen, Marsh and Swamp	43	29.02	27.97	28.55	0.58	3	19.2%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	28.12	27.35	27.51	0.16	3	5.6%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_10)	Fen, Marsh and Swamp	16	32.66	30.21	30.94	0.73	3	24.3%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (41_1)	Fen, Marsh and Swamp	4	30.77	29.16	29.68	0.52	3	17.5%
M60 Junction 21 to 22; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (42_1)	Fen, Marsh and Swamp	11	31.22	29.50	30.14	0.64	3	21.5%

6.5 Assessment of significance

NO_x concentrations at Rochdale Canal exceed the air quality standard in the 2018 baseline scenario and are below the standard in the future scenarios with or without the revised AP2 scheme in combination at the majority of modelled locations. Predicted NO_x concentrations in 2026, with the AP2 revised scheme in combination, are lower than the 2018 NO_x concentrations at all modelled locations. Changes in NO_x concentrations are greater than 1% of the air quality standard at locations in the vicinity of M60 Junction 21 to 22, A663 Broadway, A664 Manchester Road, Hollinwood Avenue, and M62 Junction 19 to 20. Potentially significant effects are therefore predicted, and this is addressed further in Section 4.2 of the main report.

NH₃ concentrations at Rochdale Canal are predicted to be above the air quality critical level at several modelled locations and in all scenarios. Predicted NH₃ concentrations in 2026, with the AP2 revised scheme in combination, are lower than the 2018 NH₃ concentrations at all modelled locations. Changes in NH₃ concentrations are greater than 1% of the air quality standard at locations in the vicinity of M60 Junction 21 to 22, A663 Broadway, A664 Manchester Road, and M62 Junction 19 to 20. Potentially significant effects are therefore predicted, and this is addressed further in Section 4.2 of the main report.

Nitrogen deposition rates are predicted to be above the relevant critical load at all modelled receptors in the baseline and future scenarios with or without the AP2 revised scheme in combination. Predicted nitrogen deposition rates in 2026, with the AP2 revised scheme in combination, are lower than the 2018 baseline rates at all modelled locations. The changes in nitrogen deposition between the 2026 do nothing scenario and with the AP2 revised scheme in combination scenario are greater than 1% of the relevant critical load at locations in the vicinity of M60 Junction 21 to 22, A663 Broadway, A664 Manchester Road, A664 Rochdale Road, Hollinwood Avenue, B6189 Grimshaw Lane, Laurel Avenue, A627(M) Rochdale By-Pass, and M62 Junction 19 to 20. Potentially significant effects are therefore predicted, and this is addressed further in Section 4.2 of the main report.

7 Assessment of operational traffic effects – AP2 revised scheme

7.1 Screening of traffic data

The AP2 revised scheme will not change traffic movements on roads within 200m of Rochdale Canal in the operation phase that meet the DMRB criteria and therefore no further assessment is required.

8 Assessment of operational traffic effects – AP2 revised scheme in combination with other plans and projects

8.1 Screening of traffic data

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

- the A6104 Hollinwood Avenue;
- the M60 Junction 21 to 22;
- the M60 Junction 21 southbound on-slip;
- the M60 within Junction 21;
- the B6189 Grimshaw Lane;
- A664 Rochdale Road (south of the Slattocks Roundabout);
- A664 Manchester Road (between Albion and Queensway);
- A664 Manchester Road (north of Albion);
- A627(M) Rochdale Bypass; and
- M62 Junction 19 to 20.

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

Figure A1 to Figure A7 presents a detailed map of the modelled area including assessed roads (road network in green) and worst case modelled receptors (yellow dots).

Table A11 presents the traffic data used in the assessment.

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Table A11: Traffic data summary (operational phase, AP2 revised scheme in combination)

Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
14160_4117, 4117_14160	A62 Oldham Road	19,310	20,129	20,156	27	846	732	749	746	-3	14
6567_3820, 3820_6567	A6104 Hollinwood Avenue	16,483	18,898	19,011	113	2,528	317	341	339	-2	22
5662_3911, 3911_5662	A6104 Semple Way	10,820	11,281	11,381	100	561	679	660	659	-1	-20
5674_5677, 5675_12858	M60 Junction 21 to 22	87,904	117,353	118,208	855	30,304	6,713	6,879	6,883	4	170
3912_5674	M60 Junction 21 southbound on-slip	15,227	16,279	16,367	88	1,140	742	726	730	4	-12
5673_5674, 12858_5672	M60 within Junction 21	72,677	83,869	84,516	647	11,839	5,972	5,686	5,690	4	-282
3918_3912, 3912_3918	A663 Broadway (over M60 at M60 Junction 21)	9,798	10,416	10,641	225	843	617	615	617	2	0

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
3912_3819, 3819_3912	A663 Broadway north of M60 Junction 21	47,080	47,849	47,630	-219	550	1,992	2,030	2,021	-9	29
3919_8371, 8371_3919	Broadgate*	4,858	6,282	6,232	-50	1,374	302	296	299	3	-3
3919_1572, 1572_3919	B6189 Foxdenton Lane*	8,427	10,145	10,081	-64	1,654	212	207	210	3	-2
2924_2093, 2093_2924	B6189 Grimshaw Lane	12,002	13,814	13,913	99	1,911	514	503	510	7	-4
15234_6847, 6847_15234	Mills Hill Road (south of Baytree)*	17,362	18,976	18,851	-125	1,489	235	248	251	3	16
15235_15234, 15234_15235	Baytree Lane	2,867	2,883	2,822	-61	-45	123	118	116	-2	-7
15234_6946, 6946_15234	Mills Hill Road (north of Baytree)*	14,497	16,095	16,031	-64	1,534	112	131	135	4	23

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
15232_6946, 6946_15232	Laurel Avenue	8,041	9,027	9,002	-25	961	69	94	98	4	29
8319_1826, 1826_8319	Mills Hill Road (north of Laurel)	4,522	4,740	4,704	-36	182	47	52	53	1	6
4869_2027, 2027_4869	A669 Middleton Road	8,357	9,433	9,322	-111	965	319	298	298	0	-21
15235_1826, 1826_15235	A669 Middleton Road (west of Mills Hill)	16,712	17,409	17,425	16	713	545	527	530	3	-15
2027_1826, 1826_2027	A669 Middleton Road (east of Mills Hill)	19,344	20,223	20,202	-21	858	562	559	563	4	1
8320_2027, 2027_8320	B6195 Haigh Lane*	17,653	19,185	19,095	-90	1,442	289	313	315	2	26
6175_15236, 15236_6175	Boarshaw Road	26	26	26	0	0	26	26	26	0	0

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
15463_15384, 15384_15463	Gilford Grove	19	19	19	0	0	19	19	19	0	0
6869_6866, 6866_6869	Whitbrook Way (south of Finlan)	2,609	3,614	3,570	-44	961	0	0	0	0	0
5292_3740, 3740_5292	A664 Rochdale Road (south of the Slattocks Roundabout)	26,584	28,694	28,708	14	2,124	989	913	909	-4	-80
7491_5293, 5293_7491	A664 Rochdale Road (north of the Slattocks Roundabout)*	12,831	15,033	14,985	-48	2,154	520	551	550	-1	30
5290_5200, 5289_5291	A627(M)*	24,573	30,355	30,224	-131	5,651	694	760	756	-4	62

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
6867_6866, 6866_6867	Whitbrook Way (north of Finlan)*	13,297	14,772	14,741	-31	1,444	219	222	222	0	3
7492_2482, 2482_7492	A664 Manchester Road (south of Queensway)	20,489	21,183	21,203	20	714	310	325	325	0	15
14489_2482, 2482_14489	A664 Manchester Road (between Albion and Queensway)	18,019	19,355	19,363	8	1,344	281	297	297	0	16
6873_2482, 2482_6873	A664 Queensway (south west of Albion)	3,563	4,278	4,280	2	717	62	61	61	0	-1
14489_6873	Albion Street	4,138	4,888	4,882	-6	744	42	37	37	0	-5
6874_6873, 6873_6874	A664 Queensway	7,715	9,186	9,182	-4	1,467	116	117	117	0	1

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
	north east of Albion)*										
14489_4459, 4459_14489	A664 Manchester Road (north of Albion)	22,157	24,243	24,245	2	2,088	323	334	334	0	11
4926_6260, 6259_4927	A627(M) north of M62*	38,133	41,531	41,478	-53	3,345	2,513	2,462	2,443	-19	-70
9019_6259, 6259_9019	A627(M) Rochdale Bypass	23,830	25,772	25,834	62	2,004	786	789	771	-18	-15
6259_6261	A664 Edinburgh Way	3,319	3,454	3,453	-1	134	13	24	24	0	11
6260_6261	A664 Edinburgh Way Slip-Road	13,370	14,297	14,250	-47	880	747	711	710	-1	-37
4632_2041, 2041_4632	A664 Rochdale Bypass*	23,367	24,911	24,898	-13	1,531	698	696	676	-20	-22

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Road ID	Road names	Annual Average Daily Traffic (AADT)					Heavy Duty Vehicles (HDV)				
		2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)	2018 baseline	2039 without the AP2 revised scheme	2039 with the AP2 revised scheme	AP2 revised scheme change (2039 with AP2 revised scheme - 2039 without AP2 revised scheme)	In combination change (2039 with the AP2 revised scheme - 2018 baseline)
26771_2721, 26775_2720	M62 Junction 19 to 20	119,635	156,296	156,538	242	36,903	12,825	13,424	13,435	11	610

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

* Indicates that link does not trigger for in combination assessment as a reduction in traffic emissions is predicted for Scheme.

8.2 Non-road plans and projects

The Chadderton Generating Facility, off Broadgate, Oldham has been identified approximately 250m south-west of the Rochdale Canal SAC, close to M60 Junction 21. It received an Environmental Permit in January 2020 which includes for the operation of four 10MWth input engines and one 6MWth engine. The process contribution from these combustion plant to nitrogen deposition have been accounted for within the assessment. This has been achieved by adding the process contributions as reported in the permit application documents³².

8.3 Receptors assessed and background concentrations

Figure A1 to Figure A5 presents detailed maps of the modelled area including assessed roads (road network in blue) and modelled receptors, this includes all the modelled receptors within 200m of triggering links and yellow points representing the worst case ecological points presented in Section 8.5.

Table A12 shows the background concentrations for NO_x, background nitrogen deposition and critical loads. Table A13 shows the background acid deposition, critical loads and background ammonia concentrations. Rochdale Canal SSSI and SAC is not sensitive to acid deposition and has therefore not been assessed for this element.

Table A12: Modelled ecological receptor NO_x and nitrogen deposition backgrounds and critical loads (operational phase)

Receptor	Sensitive habitat	2018 NO _x background concentration (µg/m ³)	2039 NO _x background concentration (µg/m ³)	APIS data of average total nitrogen deposition (kg/ N/ha/yr)	APIS Critical load (kg N/ha/yr)
Hollinwood Avenue (2_20)	Fen, Marsh and Swamp	26.6	17.1	24.5	3
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_1)	Fen, Marsh and Swamp	28.9	18.3	24.6	3
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	29.1	19.7	24.7	3
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	23.8	15.2	25.2	3
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	22.9	13.6	25.5	3
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	24.7	15.4	25.8	3

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Receptor	Sensitive habitat	2018 NOx background concentration ($\mu\text{g}/\text{m}^3$)	2039 NOx background concentration ($\mu\text{g}/\text{m}^3$)	APIS data of average total nitrogen deposition (kg/ N/ha/yr)	APIS Critical load (kg N/ha/yr)
A664 Manchester Road (between Albion and Queensway) (33_1)	Fen, Marsh and Swamp	24.7	15.4	25.8	3
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	24.2	14.8	25.8	3

Table A13: Modelled ecological receptor acid deposition backgrounds, critical loads and ammonia background concentrations (operational phase)

Receptor	Sensitive habitat	APIS data of average total acid deposition (k eq/ha/yr)	APIS Critical load nitrogen (k eq/ha/yr) (min)	APIS Critical load nitrogen (k eq/ha/yr) (max)	APIS Ammonia background concentration ($\mu\text{g}/\text{m}^3$)
Hollinwood Avenue (2_20)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	2.1	Not applicable	Not applicable	2.4
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
A664 Manchester Road (between Albion and Queensway) (33_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	2.0	Not applicable	Not applicable	2.4

8.4 Assessment results

Table A14 presents a summary of the modelled NOx concentrations for the ecological site, the change in concentration and a comparison against the air quality standard ($30\mu\text{g}/\text{m}^3$).

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Table A15 presents a summary of the ammonia concentration results taken from the National Highways Ammonia N Deposition Tool¹³, change in concentration and percentage change in relation to the critical level.

Table A16 presents a summary of the modelled nitrogen deposition, with an additional ammonia component applied using the National Highways Ammonia N Deposition Tool, change in deposition and percentage change in relation to the lower critical load.

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Table A14: Assessment of NOx concentrations at ecological sites (operational phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	NOx concentrations ($\mu\text{g}/\text{m}^3$)			Change in NOx concentrations ($\mu\text{g}/\text{m}^3$)	Comparison against air quality standard ($30\mu\text{g}/\text{m}^3$)	Percent change in relation to air quality standard
			2018 baseline	2039 do nothing	2039 with the AP2 revised scheme			
Hollinwood Avenue (2_20)	Fen, Marsh and Swamp	15	35.06	19.01	19.22	0.21	Within standard	0.7%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_1)	Fen, Marsh and Swamp	11	53.00	23.75	26.49	2.74	Within standard	9.1%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	35.49	21.20	21.47	0.27	Within standard	0.9%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	32.34	17.25	17.48	0.23	Within standard	0.8%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	49.54	19.34	21.03	1.69	Within standard	5.6%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	38.25	18.73	19.11	0.38	Within standard	1.3%
A664 Manchester Road (between Albion and Queensway) (33_1)	Fen, Marsh and Swamp	6	34.07	17.66	17.94	0.28	Within standard	0.9%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	32.87	16.83	16.99	0.16	Within standard	0.5%

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Table A15: Assessment of NH₃ concentrations at ecological sites (operational phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	NH ₃ concentrations (µg/m ³)			Change in NH ₃ concentrations (µg/m ³)	Comparison against critical level (3µg/m ³ for low and 1µg/m ³ high vegetation)	Percent change in relation to critical level
			2018 baseline	2039 do nothing	2039 with the AP2 revised scheme			
Hollinwood Avenue (2_20)	Fen, Marsh and Swamp	15	2.90	2.75	2.78	0.03	Within standard	1.1%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_1)	Fen, Marsh and Swamp	11	3.70	3.27	3.37	0.10	Above standard	3.4%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	2.77	2.68	2.72	0.04	Within standard	1.4%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	2.81	2.69	2.73	0.04	Within standard	1.2%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	3.78	3.27	3.54	0.27	Above standard	8.9%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	3.13	2.91	2.97	0.06	Within standard	2.0%
A664 Manchester Road (between Albion and Queensway) (33_1)	Fen, Marsh and Swamp	6	2.90	2.74	2.78	0.04	Within standard	1.5%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	2.79	2.66	2.69	0.03	Within standard	0.8%

Note: Values above are compared against the 3µg/m³ Critical Level.

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Table A16: Assessment of nitrogen deposition with ammonia at ecological sites (operational phase, AP2 revised scheme in combination)

Ecological site	Sensitive habitat	Distance to road (m)	Dry deposition (kg N/ha/yr)			Change in nitrogen deposition (kg N/ha/yr)	Lower critical load (kg N/ha/yr)	Percent change in relation to lower critical load
			2018 baseline	2039 do nothing	2039 with the AP2 revised scheme			
Hollinwood Avenue (2_20)	Fen, Marsh and Swamp	15	27.51	26.25	26.44	0.19	3	6.4%
M60 Junction 21 to 20; M60 Junction 21 Southbound Onslip & M60 within Junction 21 (39_1)	Fen, Marsh and Swamp	11	33.02	29.42	30.22	0.80	3	26.7%
B6189 Grimshaw Lane (12_1)	Fen, Marsh and Swamp	2	26.88	26.02	26.26	0.24	3	8.2%
A664 Rochdale Road (36_1)	Fen, Marsh and Swamp	4	28.12	27.00	27.21	0.21	3	6.8%
M62 Junction 19 to 20 (31_1)	Fen, Marsh and Swamp	36	34.68	30.52	32.04	1.52	3	50.7%
A664 Manchester Road (north of Albion) (22_1)	Fen, Marsh and Swamp	4	30.63	28.73	29.07	0.34	3	11.2%
A664 Manchester Road (between Albion and Queensway) (33_1)	Fen, Marsh and Swamp	6	29.13	27.78	28.02	0.24	3	8.2%
A627(M) Rochdale By-Pass (27_1)	Fen, Marsh and Swamp	21	28.75	27.56	27.70	0.14	3	4.7%

8.5 Assessment of significance

Changes in NO_x concentrations are less than 1% of the air quality standard for five of the modelled receptor locations. However, changes are greater than 1% of the air quality standard for the points in the vicinity of M60 Junction 21, M62 Junction 19 to 20 and A664 Manchester Road, north of Albion Street. NO_x concentrations at Rochdale Canal are predicted to be within the air quality standard in 2039. Potentially significant effects are therefore predicted in the vicinity of M60 J21, M62 Junction 19 to 20 and A664 Manchester Road, north of Albion Street and this is addressed further in Section 4.2 of the main report.

NH₃ concentrations at Rochdale Canal are predicted to be above the critical level in 2039 at all but one of the worst case Rochdale Canal ecological points. Changes in NH₃ concentrations are greater than 1% of the critical level. Potentially significant effects are therefore predicted, and this is addressed further in Section 4.2 of the main report.

Nitrogen deposition rates with ammonia are predicted to be above the lower critical load at all modelled receptors in the baseline and future scenarios with or without the AP2 revised scheme in combination. The changes in nitrogen deposition between the 2039 do nothing scenario and with the AP2 revised scheme in combination scenario are greater than 1% of the relevant critical load. Potentially significant effects are therefore predicted, and this is addressed further in Section 4.2 of the main report.

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