M60/M62/M66 Simister Island Interchange

TR010064

ENVIRONMENTAL STATEMENT APPENDICES

APPENDIX 8.2 DESIGNATED SITES AIR QUALITY ASSESSMENT

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

VOLUME 6.3

April 2024

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M60/M62/M66 Simister Island Interchange

Development Consent Order 202[ ]

ENVIRONMENTAL STATEMENT APPENDICES
APPENDIX 8.2 DESIGNATED SITES AIR QUALITY ASSESSMENT

Regulation Reference	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010064
Application Document Reference	TR010064/APP/6.3
Author	M60/M62/M66 Simister Island Interchange Costain Jacobs Partnership Project Team & National Highways

Version	Date	Status of Version
P02	April 2024	FOR DCO APPLICATION

CONTENTS

LIST OF TABLES

Appendix 8.2 Designated sites air quality assessment

Executive summary

This document presents the results of an assessment of potential effects of air quality changes at sites of biodiversity importance resulting from the construction and operation of the M60/M62/M66 Simister Island Interchange (the 'Scheme'). The assessment considers statutory and non-statutory designated sites, ancient woodland and veteran trees. This report accords with the requirements of Design Manual for Roads and Bridges (DMRB) standards LA 104 Environmental Assessment and Monitoring (Highways England, 2020a), LA 105 Air Quality (Highways England, 2019) and LA 108 Biodiversity (Highways England, 2020b).

Nitrogen deposition at ecological receptors within 200m of the Affected Road Network (ARN) was modelled, as reported in Chapter 5: Air Quality of the Environmental Statement (TR010064/APP/6.1). Receptors that were screened in for ecological assessment of nitrogen deposition were those that exceeded the following changes in nitrogen deposition thresholds:

- A change in nitrogen deposition of more than 1% of the lower critical load for the applicable habitat
- A change in nitrogen deposition of more than 0.4kg N/ha/yr, as this is indicative of the lowest change in nitrogen deposition likely to lead to the loss of one species

For the construction phase, receptors within Philips Park and North Wood Site of Biological Importance (SBI) and Philips Park Local Nature Reserve (LNR) exceeded these thresholds and were therefore screened in for ecological assessment. These sites were also screened in for assessment in the operational phase. An additional five SBIs and one ancient woodland site were also screened in.

Desk study data and information from detailed site investigations were used to inform the assessment of ecological effects. The extent of the area predicted to be affected by increased nitrogen deposition was calculated and this was used as the focus of the detailed site investigations. The time taken after opening of the Scheme for the Do Something (DS) NO_x emissions to reduce to the Do Minimum (DM) NO_x emissions in the Opening year was calculated to provide an indication of the duration of impact.

For most of the sites, only a small area parallel to the existing road and slip roads is predicted to be affected by increased nitrogen deposition during the operation of the Scheme. In addition, site investigations provided evidence of an absence of species considered sensitive to nitrogen for most sites and frequent invasive non-native species at the woodland sites. These factors contribute to an assessment that concludes that the ecological effects of increased nitrogen deposition on the two sites screened in for construction and operation and the six sites screened in only for operation are not significant.

1 Introduction

1.1.1 This document presents the results of an assessment of potential effects of air quality changes at sites of biodiversity importance resulting from the construction and operation of the M60/M62/M66 Simister Island Interchange (the 'Scheme'). The assessment considers statutory and non-statutory designated sites, ancient woodland and veteran trees within 200m of the Affected Road Network (ARN) for the Scheme where it is predicted that nitrogen (N) deposition would increase beyond threshold levels set out in the Design Manual for Roads and Bridges (DMRB) LA 105: Air Quality (Highways England, 2019).

1.1.2 The methodology followed is described in section 2 of this report and the results of the assessment are presented in section 5. Results of ecological site investigations that inform the assessment are provided in Annex A.

2 Methodology

2.1 Overview

2.1.1 The ecological assessment of the effects of N deposition resulting from the Scheme accords with the requirements of DMRB standards LA 104 Environmental Assessment and Monitoring (Highways England, 2020a), LA 105 Air Quality (Highways England, 2019) and LA 108 Biodiversity (Highways England, 2020b).

2.1.2 The assessment methodology also refers to the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2. The professional judgement of a competent expert for biodiversity has been applied to the overall assessment of impact level and significance, as per DMRB LA 105, DMRB LA 108 and CIEEM (2018).

2.1.3 The assessment comprises the following elements:

- Desk study to identify ecological features for consideration
- Screening assessment to identify sites for assessment of the effects of N deposition
- Site investigation to inform assessment of N deposition
- Assessment of ecological significance of N deposition.

2.2 Desk study

2.2.1 DMRB LA 105 requires an assessment on ecological features of international, national and local nature conservation importance within 200m of the ARN. The ARN is defined in Chapter 5: Air Quality of the Environmental Statement (TR010064/APP/6.1), following application of the scoping criteria within DMRB LA 105. The construction ARN is shown in Figure 5.1: Air Quality Construction Study Area of the Environmental Statement Figures (TR010064/APP/6.2) and the operational ARN is shown in Figure 5.2: Air Quality Operational Study Area of the Environmental Statement Figures (TR010064/APP/6.2).

2.2.2 According to DMRB LA 105, the impact of construction activities on vehicle movements requires assessment if the construction programme is predicted to last longer than two years. The construction of the Scheme is anticipated to last approximately five years and therefore modelling of traffic and N deposition for the worst-case construction year has been undertaken. This is in addition to the modelling for the operational Opening year (2029) scenario.

2.2.3 Ecological features within 200m of the construction and operational ARNs were identified and are shown in Figure 5.5: Modelled Ecological Receptors of the Environmental Statement Figures (TR010064/APP/6.2). The following were included in the air quality screening assessment:

- International importance – Ramsar sites, Special Protection Areas (SPA) and Special Areas of Conservation (SAC) (including candidate and proposed sites)

- National importance – National Nature Reserves (NNR), Sites of Special Scientific Interest (SSSI), Ancient Woodland (AW) and Veteran Trees (VT)
- County importance – Local Nature Reserves (LNR) and locally designated sites i.e. Sites of Biological Importance (SBI) in Greater Manchester.

2.2.4 Statutory designated sites were identified using MAGIC and information about habitats within those sites was taken from site citations. For those SSSIs that overlap with SACs, the relevant Site Improvement Plans were consulted for information relevant to targets for management and N deposition. For SBI, information about habitats was taken from site descriptions from the Greater Manchester Ecology Unit (GMEU). Locations of veteran trees were searched using the Ancient Tree Inventory (Woodland Trust, 2023).

2.2.5 The ecological features included in the assessment are hereafter referred to as ‘sites’.

2.3 Screening

2.3.1 A screening assessment was carried out to identify sites for further consideration of N deposition effects. The modelling that informs the screening process is described in Chapter 5: Air Quality of the Environmental Statement (TR010064/APP/6.1). Screening incorporates the steps in the flow diagram, Figure 2.98, in DMRB LA 105 as follows:

- Calculate the Do-Minimum (DM) and Do-Something (DS) Scheme N deposition[1].
- Is the total N deposition with the Scheme less than the applicable lower critical load (LCL)? (The applicable LCL is for the habitat for which the site is designated and /or that is most sensitive to nitrogen). If yes, then the site is screened out as not significant. If no, then screening proceeds to the next step.
- Is the change in N deposition with and without the Scheme less than 1% of the LCL? If yes, then the site is screened out as not significant. If no, then screening proceeds to the next step.
- Identify whether the site air quality attribute is either restore or maintain[2].
- If 'restore' – use the lowest change in N deposition regardless of background N deposition which would bring about a change of a loss of one species corresponding to the LCL[3].
- Does the change in N deposition associated with the Scheme lead to the loss of one species? If no, then the site is screened out as not significant. If yes, then the next step is to undertake detailed site investigation (section 3.4).

2.3.2 The lowest change in N deposition which would bring about a change of a loss of one species is derived from Table 21 in Caporn *et al.* (2016). This table provides data for a limited range of habitats and therefore DMRB LA 105 instructs to take a figure of 0.4kg N/ha/yr, as the lowest change in N deposition likely to lead to the loss of one species in any of the studied habitats, excluding nutrient impoverished sand dunes. Therefore, sites are screened in for further assessment if the change in N deposition is greater than 0.4kg N/ha/yr.

[1] DM is the predicted values for Scheme Opening year of 2029 but assuming the Scheme was not progressed. DS is the predicted values for scheme Opening year and assuming the Scheme was progressed.

[2] Air quality attributes are not routinely published for sites other than those designated at a European level and therefore, in line with DMRB LA 105, all sites were assumed to have a 'restore' attribute.

[3] The lowest change in N deposition is derived from Table 21 in Caporn *et al.* (2016).

2.3.3 The critical load ranges for specific habitats were obtained from the Air Pollution Information System (APIS) (Centre for Ecology and Hydrology, 2023). Site relevant critical loads are available on APIS for SSSIs and for internationally important sites such as SACs. All ancient woodland sites that are not designated as SSSI were classified as broadleaved deciduous woodland. The habitats for other sites (e.g. SBI) were determined from site citations and aerial imagery in advance of any site visits and the appropriate critical load assigned. There was uncertainty in relation to the habitats present at Clifton Moss South SBI because the citation refers to a '*peat moss land substrate, disturbed by construction of the M61 in the early 1970s, colonised by a very complex mosaic of habitat types'*. Given that bog habitat has a different deposition velocity to scrub and woodland, and has a lower critical load, it was precautionary to model both habitats and the absence of bog habitat was then confirmed at the site visit.

2.3.4 The locations of transects for modelling were agreed with the Air Quality team. Professional judgement was used to position the transects, such that they were located in habitats for which the sites were designated and /or that are most sensitive to nitrogen. The transect locations modelled in this assessment are shown on Figure 5.5: Modelled Ecological Receptors and 5.11: Operational Ecological Assessment Results of the Environmental Statement Figures (TR010064/APP/6.2). Each transect was formed of lines of model receptor points at 10m intervals extending into the habitat, as required by DMRB LA 105.

2.3.5 Background nitrogen deposition rates were obtained from the Air Pollution Information System website (APIS; UK Centre for Ecology and Hydrology, 2023). Modelled DM (predicted for scheme Opening year of 2029 but assuming the Scheme was not progressed) and DS (predicted for scheme Opening year and assuming the Scheme was progressed) road NO_2 concentrations (verification and Defra LTT adjusted) were converted to the dry nutrient N deposition rate (kg N/ha/yr). The following conversion rates were used as recommended by DMRB LA 105:

- Grassland and similar habitats: 1µg/m^3 of NO_2 = 0.14kg N/ha/yr
- Forests and similar habitats: 1µg/m^3 of NO^2 = 0.29kg N/ha/yr

2.3.6 In accordance with a recent National Highways recommendation, the ammonia (NH_3) contribution to the total nitrogen deposition was calculated for all modelled ecological receptors using the Draft Ammonia N Deposition Tool (v3) (National Highways, 2022), as described in Chapter 5: Air Quality of the Environmental Statement (TR010064/APP/6.1).

2.3.7 The total nitrogen deposition rate at each modelled ecological receptor was then calculated by combining the nitrogen deposition rates derived from NO_2 and NH_3 sources with the relevant background N deposition.

2.3.8 Sites were screened in for further assessment where the N deposition in the DM and DS scenarios was greater than 1% of the relevant lower critical load for the site and greater than 0.4kg N/ha/yr, as explained above.

2.4 Site investigation

2.4.1 Figure 2.98 of DMRB LA 105 states that the purpose of the site investigation is to determine whether there are *'species located in the area where the assessment has determined an increase in N deposition that could lead to loss of one species'*. This is interpreted as identification of ecological features potentially sensitive to N deposition that could be impacted as a result of the Scheme.

2.4.2 Sites within 200m of the ARN where the predicted N deposition exceeded the 1% of LCL and 0.4kg N/ha/yr thresholds during construction are as follows (see Section 3.1 of this appendix and Figure 8.2.2: Designated Sites Affected by Nitrogen Deposition in Annex C of this appendix):

- Philips Park LNR
- Philips Park & North Wood SBI

2.4.3 Sites within 200m of the ARN where the predicted N deposition exceeded the 1% of LCL and 0.4kg N/ha/yr thresholds during operation are as follows (see Section 3.2 of this appendix and Figure 8.2.2: Designated Sites Affected by Nitrogen Deposition in Annex C of this appendix):

- Clifton Moss (South) SBI
- Clifton Wood AW
- Clifton Country Park SBI
- Rhodes Farm Sewage Works SBI
- Philips Park LNR
- Philips Park & North Wood SBI
- Hazlitt Wood SBI
- Rochdale Canal (Scowcroft to Warland) SBI

2.4.4 There was only one VT identified within 200m of the ARN, within Philips Park AW. The modelled transect for this site was considered representative of the N deposition experienced by the VT. Philips Park AW and the related VT were screened out of the ecological assessment.

2.4.5 It is of note that Rochdale Canal (Scowcroft to Warland) SBI does not overlap with Rochdale Canal SAC and SSSI. This internationally important site is not considered in this assessment because the change in N deposition (DS-DM) is lower than 0.4kg N/ha/yr. However, the change is greater than 1% of the LCL and therefore, in line with Natural England guidance, is screened in to the Habitats Regulations Assessment (HRA) (Appendix 8.13: Habitat Regulations Assessment Report of the Environmental Statement Appendices (TR010064/APP/6.3)). The HRA concludes no adverse effect on site integrity.

2.4.6 The screened-in sites listed above were subject to ecological site investigation. The purpose of the site investigation was to identify and record:

- Vegetation composition, structure and condition, and record of any vegetation gradients
- Vascular plant species sensitive to N deposition
- Site management
- Habitat condition and pressures and threats determining current habitat condition.

2.4.7 Within each site, the area investigated was that predicted to be exposed to an increase in N deposition greater than 0.4 kg N/ha/yr (the nitrogen-affected area (NAA)). The calculation of this extent is explained in Section 3.6 below. Adjacent areas were also included where considered relevant, such as to fully investigate vegetation gradients or other trends, or plant population sizes. Sites were visited in May 2023.

2.4.8 Vegetation composition and species abundance were recorded using the DAFOR scale ('dominant', 'abundant', 'frequent', 'occasional' or 'rare') to provide a relatively rapid characterisation of the vegetation in the NAA. Particular note was made of invasive non-native species, ancient woodland indicator species, species that are reasons for designation and species that are known to be sensitive to nitrogen. Habitats were recorded at Level 4 of the UK Habitat Classification (UKHab) (Butcher *et al.*, 2020).

2.4.9 One quadrat was then sampled in each UKHab Level 4 habitat type using the Domin scale, as described in Rodwell (2006). This provides quantitative measure of cover/abundance of every higher plant in the sampled area. The quadrat size sampled depended on the structural variation in the plant community, with 50 x 50m quadrats for woodland canopy and shrub layers and 2 x 2 m for short herbaceous vegetation. Bryophytes and lichens were recorded where these formed a significant proportion of the vegetation and/or were likely to form nitrogen sensitive assemblages. However, epiphytic bryophytes and lichens were not surveyed in detail. The combination of DAFOR and quantitative sampling of quadrats was considered sufficient to provide a comprehensive list of the higher plants present in the NAA and their relative abundances.

2.4.10 Evidence of any obvious vegetation gradients was noted, indicated by changes in vegetation structure and composition with distance from the woodland edge with an existing road which may indicate whether any existing factors such as site management or nutrification/pollution from external sources have influenced or are influencing the habitat.

2.4.11 Evidence of site management and pressures and threats were recorded (e.g. recreation, fly-tipping, encroaching development). Surveyors also made notes of the potential for beneficial management.

2.4.12 Site condition in the NAA was recorded using Defra's Biodiversity Metric 4 (Panks *et al.*, 2022), with additional notes on justification of the score and on features of interest. Note was made on whether habitats are degraded versions of habitats the site is important for (as detailed in the citation), or if they have been replaced by a different habitat type.

2.4.13 Vegetation composition was recorded using lists of vascular plant species together with a record of their abundance using the DAFOR scale ('dominant', 'abundant', 'frequent', 'occasional' or 'rare'). Where a quantitative record of vegetation was considered to be required, quadrats were recorded following the method of the National Vegetation Classification (Rodwell, 2006).

2.4.14 The results of the site investigations and representative photographs to illustrate the features recorded are presented in Annex A.

2.5 Variables used to describe baseline

2.5.1 Site-specific information gathered from desk study and detailed site investigation was used to describe the baseline and to inform the assessment of level of impact. Published information and site-specific variables considered were:

- Citation / reason for site designation (where available)
- Aerial imagery of designated site / habitat to help inform habitat distribution
- Species composition (using species-specific Ellenberg values to indicate the existing degree of nutrient enrichment and species sensitive to nitrogen)
- Habitat condition, using Natural England Biodiversity Metric v4 methodology and professional judgement
- Evidence of gradients in vegetation composition, structure and condition to provide an indication of exist influences on site/habitat
- Existing site management and pressures and threats e.g. over/under-grazing; significant recreation pressure leading to impacts such as trampling, soil compaction, increased nutrient loading, evidence of existing degradation due to N deposition from external sources such as adjacent land use.

Species composition and Ellenberg values

2.5.2 The plant species recorded during the transect and quadrat sampling in the detailed site investigations were compiled into a single list of species for each site.

2.5.3 The Ellenberg indicator value for nitrogen was obtained for each species from tables in Hill *et al.* (1999). Ellenberg indicator values are a way of numerically describing the ecological niche of different plant species, with respect to species' tolerance to a range of physical conditions such as light, moisture, soil pH and temperature. The Ellenberg indicator value for nitrogen (hereafter abbreviated to nitrogen EV) is used in this assessment to provide an indication of existing nutrient status and to identify species that are potentially sensitive to N deposition and therefore could be at risk of loss due to a Scheme-related increase in N deposition.

2.5.4 The nitrogen EV gives a general indication of preference for soil fertility, with low values corresponding to species with high stress tolerance to nutrient/nitrogen levels (Grime *et al.*, 1997). It is closely correlated with the stress values of Grime (2001). As there is limited evidence for the actual response and degree of sensitivity of individual species to N deposition, those species with a nitrogen EV of 1-4 are considered to be 'potentially sensitive to N deposition'. Nitrogen EVs are given in Table 2.1.

Table 2.1 Ellenberg N indicator values

Nitrogen EV	Explanation
1	Indicator of extremely infertile sites
2	Between 1 and 3
3	Indicator of more or less infertile sites
4	Between 3 and 5
5	Indicator of sites of intermediate fertility
6	Between 5 and 7
7	Plant often found in richly fertile places
8	Between 7 and 9
9	Indicator of extremely rich situations, such as cattle resting places or near polluted rivers

2.5.5 Nitrogen EVs have been used on local and regional scales to detect the impact of N deposition on species composition (reported in Pitcairn *et al.* 2006). Previous authors have considered them a useful tool for detecting floristic shifts consistent with increased nutrient availability and ecosystem eutrophication (Sutton *et al.* 2004, Pitcairn *et al.*, 2006).

2.5.6 Research has shown that nitrogen EVs correlate well with atmospheric N deposition, confirming the validity of the method in indicating enhanced N deposition. They can also provide a useful assessment of the N status of a site, particularly along known gradients in N deposition (Leith *et al.*, 2005).

2.5.7 The evaluation of nitrogen sensitivity of the species recorded in the site investigations in this assessment has referred to work by Pitcairn *et al.* (2006), which categorised species typical of different habitats, including woodlands and grasslands, as nitrophobes or nitrophiles, depending on their response to enhanced N deposition. Although many species characteristic of more fertile sites such as mixed deciduous woodlands may have quite high nitrogen EVs, they are sensitive to high levels of N deposition and hence can be referred to as nitrophobes. Nitrophiles include those species of a high nitrogen EV, known to exist in the habitat type and species which can be classed as potential nitrophiles. Potential nitrophiles may be species with a low nitrogen EV but known to respond rapidly to increased nitrogen. In some cases, the potential nitrophiles may be constant or common species in that vegetation community but research has shown the potential for these species to respond to increased nitrogen (Pitcairn *et al.*, 2006).

Habitat condition

2.5.8 Site specific surveys provide an assessment of habitat condition following the Natural England Biodiversity Metric 4.0 methodology (Panks *et al.*, 2022). The metric provides an assessment of habitat quality, with the condition element considering the value of habitats relative to other habitats of the same type / distinctiveness. This provides a consistent and comparable approach to considering habitat condition as part of this assessment. The assessment of condition is being used only to describe the quality of the habitat and not as a benchmark against which to measure future vegetation change.

Evidence of gradients in vegetation composition, structure and condition

2.5.9 The assessment of effects on the integrity of a site or habitat needs to consider the area's structure, function, composition, and connectivity. To inform this, evidence for the presence of vegetation gradients (changes in vegetation structure and composition along a linear transect) are considered to indicate whether any existing factors such as site management or nutrification/pollution from external sources may have influenced the area's development towards its current structure. The impact of any additional nitrogen loading on habitats needs to consider these baseline conditions and how they may influence the habitat response to increased nitrogen loading.

Existing pressures and threats

2.5.10 Evidence of any pressures on, or threats to, an area's condition is also used to inform the baseline condition for the site. Factors include grazing intensity leading to habitat succession or changes in species composition and site structure; recreational use leading to vegetation trampling, soil compaction, littering, nutrient enrichment from dogs; adjacent land use where activities such as farming can be significant sources of N deposition. Such factors can strongly influence vegetation structure and composition and will inform how additional nitrogen loading may affect it.

2.6 Assessment

Determination of importance

2.6.1 The importance of the designated habitats has been determined using Table 3.9 in DMRB LA 108.

2.6.2 The following geographic levels of importance have been assigned:

- International importance – SAC
- National importance – SSSI and irreplaceable habitats, including AW and VT
- County importance – LNR and SBI.

Characterisation of impacts

2.6.3 The range of variables described in Section 2.5 which influence an area's structure, function and composition, as well as the connectivity of associated habitats both within and out with its boundaries, highlight the complex adaptive nature of these ecosystems. When considering the characterisation of the impact of increased N deposition on an area, it is critical that the conditions which influence its structure, function, composition, and connectivity are assessed on a site-specific basis.

2.6.4 Table 3.11 of DMRB LA 108 describes the different levels of impact (from major to no change) and the key criteria are in relation to the permanence / reversibility of the impact and whether or not there is considered to be an effect on integrity or on the key characteristics of the ecological resource (as determined by assessment of duration, reversibility, extent, magnitude, frequency and/or timing of the impact).

2.6.5 According to DMRB LA 108, and in line with CIEEM guidance (2018), level of impact is determined by assessment of the following characteristics:

- Positive or negative (e.g., adverse/beneficial)
- Duration (e.g., permanent/temporary)
- Reversibility (e.g., irreversible/reversible)
- Extent
- Magnitude
- Frequency and timing.

2.6.6 These are addressed in turn below.

Positive or negative impacts

2.6.7 Air quality modelling generates values for N deposition for DM and DS scenarios, as explained in Section 3.3 above. It is possible that modelling might predict that some sites will experience a DS N deposition that is lower than DM and therefore a potential beneficial effect. However, these receptors are not screened in for ecological assessment and so are not considered here. In accordance with DMRB LA 105, only sites with the potential to be negatively impacted as a result of the increase in N deposition from the Scheme have been screened in for further ecological assessment.

Duration and reversibility

2.6.8 The time taken after opening of the Scheme for the Do Something (DS) NO_x emissions to reduce to the Do Minimum (DM) NO_x emissions in the Opening year was calculated to provide an indication of the duration of impact. Further details are provided in Annex B.

2.6.9 The road vehicle fleet transitions to electric, particularly cars and vans, will mean that emissions of NO_x and NH_3 from road transport (and the associated impact) will reduce in the future.

2.6.10 The effect of the DS scenario is therefore to delay rather than reverse the future predicted decreases in the road contribution. Given that the effects of increases in N deposition are not always detectable in terms of changes in vegetation composition and habitat structure and require long-term exposure to generate change (Caporn *et al.*, 2016), it is possible that even a long-term increase in N deposition may not result in a permanent effect on the integrity of a designated habitat.

2.6.11 Many ecosystem changes due to long-term elevated levels of N deposition are theoretically reversible but may require intervention through habitat management to remove biomass, nutrient loading and competition from dominant species from the system (Dise *et al.*, 2011). Recovery from long-term N deposition is ill-understood (Clark *et al.*, 2013) and it is unclear to what extent recovery from long-term deposition is possible. Research on the recovery of grassland and heathland habitats after experimental changes in N deposition is reported in UKREATE (2007).

2.6.12 In view of the above and given that critical loads for nitrogen deposition are based on an assumed exposure over a period of 20 – 30 years, for this assessment it is considered that impacts of duration of 15 years or more are permanent and irreversible because it is not known how much longer beyond 15 years the impact is likely to persist. Impacts of less than 15 years are considered temporary and could result in effects that are reversible. However, it is recognised that the magnitude of N deposition could influence the reversibility of an effect, although this will also be influenced by factors such as background N deposition loading (Caporn *et al.*, 2016), baseline site condition and management and external pressures (Bobbink *et al.*, 2010, Dise *et al.*, 2011).

2.6.13 Where information is limited or there is any uncertainty in terms of impact level, a precautionary approach is adopted and it is assumed that the impact is irreversible.

Extent

2.6.14 For designated sites and habitats, the extent of impact (the NAA) has been estimated by using modelled transects, which extend up to 200m from the ARN. For each transect, the first point at which N deposition falls below 0.4kg/N/ha/yr was identified and a habitat parcel generated within the site, parallel to the road within the ARN, which provided an estimate of the extent of the site which would be affected by a change in N deposition above the 0.4kg N/ha/yr threshold. The percentage of the site affected was calculated by dividing the affected area extent by the total area of the site.

2.6.15 Examination of aerial imagery of the whole site and detailed site investigation of the NAA at each site contributed to the assessment of the distribution of sensitive habitats within the wider site and which habitat types are within the affected area.

2.6.16 This approach is considered suitably precautionary as the magnitude of N deposition within the affected area is not constant across the whole area because deposition decreases with distance from the emission source. Therefore, the calculated area represents a worst case, with any effects due to increased N deposition most likely to be evident closer to the road. The assessment considers the potential for changes in vegetation composition (the loss of one species in accordance with DMRB LA 105) within the affected areas and if there is a risk of habitat loss (e.g. a change from one habitat type to another).

2.6.17 The extent of area affected with respect to the net area in hectares and the proportion of the site affected is a key factor in identifying possible impacts on site integrity, in terms of a site's structure, function, composition and connectivity. This therefore has to consider the site-specific baseline when considering how integrity may be affected. For example, if the site investigation determines that there are existing edge effects or degradation of habitat due to an existing high N deposition baseline or management practices, then an adverse effect on integrity of the site from additional N deposition may be less likely.

2.6.18 The potential for an effect on site integrity is also dependent on the magnitude of the predicted increase in N deposition and the duration, as higher increases in N deposition for an extended period are more likely to result in changes in vegetation composition that may constitute an effect on integrity. The interaction between the different factors influencing site integrity is assessed on a site-specific basis using professional judgement.

Magnitude

2.6.19 The output of the air quality modelling helps to quantify the magnitude of impact. Although the thresholds of 1% of the lower critical load and 0.4kg/N/ha/yr are used to screen designated sites and habitats for further ecological consideration by a competent expert in biodiversity (in line with DMRB LA 105), the predicted quantities of nitrogen deposited on the sites under consideration vary, as does the baseline N deposition.

2.6.20 The Natural England commissioned report NECR210 (Caporn *et al.*, 2016) on the effects of increments of N deposition on semi-natural habitats reported that the habitats studied showed strong curvi-linear responses to increased deposition at varying background nitrogen loads, indicating a more rapid species loss at lower levels of deposition. Where levels of N deposition are at or above the upper end of a habitat's critical load, any additional increments of long-term nitrogen are associated with further declines in species-richness, affecting site structure and composition. However, the incremental effect of long-term N deposition reduces as deposition levels increase above the upper end of the critical load for a habitat. Less polluted sites were therefore more sensitive to increases in N deposition, whereas sites already receiving high levels of N deposition had already experienced a loss in species diversity. The magnitude of N deposition at affected sites is therefore considered in relation to the baseline, DM and DS values.

2.6.21 This key relationship between extent and magnitude of impact, and the influence of baseline habitat condition on this impact is critical at a site-specific level in considering how the site's integrity may be affected. The narrative around these considerations, based on the air quality modelling data and site baseline, and the professional judgement of a competent expert in biodiversity, is set out in the conclusions section of this document. This will consider whether the structure and function of the affected area is maintained, whether connectivity between the affected area and the wider designated site or habitat is maintained, and whether the quality of the habitat within the affected area and the wider designated site or habitat is comparable to baseline conditions (Balla *et al.*, 2013).

Frequency

2.6.22 Given that N deposition is ongoing and is measured in units of kg per hectare per year, frequency is categorised as 'annual' for all designated habitats.

Timing

2.6.23 As described above under frequency, N deposition continues throughout the operational phase of the Scheme. Therefore, timing is described as 'ongoing' for all designated habitats.

Determination of impact level and significance

Impact level

2.6.24 Impact level is defined in Table 3.11 of DMRB LA 108, reproduced below in Table 2.2. In order to make assessments of effects on integrity or key characteristics of a resource, it is critical to define what these terms mean.

2.6.25 Integrity is defined as *'the coherence of a site's ecological structure and function across its whole area'* (European Commission, 2000). In assessing the potential for effects on integrity, it is essential to understand the processes and interactions on which the biodiversity features of the site depend. Ecological interactions are multiple and complex and therefore the assessment of effect on integrity relies heavily on professional judgement.

2.6.26 Key characteristics are considered to be the reasons for which a site is designated. For statutory designated sites the reasons for designation are described in the site citation but for non-statutory designations such as SBI the key characteristics may be less obvious and require determination through further desk study or site survey. The key characteristics of ancient woodland sites depend on the vegetation community that the site supports and factors such as its geology, soils and management history. Therefore, these are considered on a site-specific basis.

2.6.27 The existing coherence of ecological structure and function of area of designated habitat is relevant to the assessment of potential effects on integrity. For example, previous agricultural intensification or infrastructure development may have resulted in fragments of habitat that are surrounded by development and no longer considered of sufficient size to support the typical ecosystem processes and functioning of that habitat type. Various minimum viable sizes for woodland have been suggested, ranging between 5 and 50ha (reported in JNCC, 2004). Research on edge effects in ash and oak woodland suggests that the edge effect extends to approximately 90m (McCollin *et al.*, 2017) and therefore a woodland patch would need to more than 180m wide to support 'core habitat' that supports the typical ecosystem processes. In this assessment, the size of woodland patches and connectivity in the landscape are part of the consideration of integrity, but all AW sites, whatever their size, are valued as nationally important, in accordance with DMRB LA 108.

Table 2.2 Level of impact descriptions (from DMRB LA 108 Table 3.11)

Level of impact (change)		Typical description
Major	Adverse	1) Permanent/irreversible damage to a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Moderate	Adverse	1) Temporary/reversible damage to a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
	Beneficial	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.

Level of impact (change)		Typical description
Minor	Adverse	1) Permanent/irreversible damage to a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	Adverse	1) Temporary/reversible damage to a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
	Beneficial	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and
		2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
No change		No observable impact, either positive or negative.

Significance

2.6.28 A matrix for determining the significance of effects is presented in Table 3.13 of DMRB LA 108 and reproduced below in Table 2.3. In accordance with the approach adopted in the EIA for the Scheme (see Chapter 4: Environmental Assessment Methodology of the Environmental Statement (TR010064/APP/6.1) for further details), effects that are moderate, large or very large are considered to be significant effects.

Table 2.3 Significance matrix (from DMRB LA 108 Table 3.13)

		Level of impact				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Resource importance	**International or European importance**	Neutral	Slight	Moderate or large	Large or very large	Very large
	UK or national importance	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Regional importance	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	County or equivalent authority importance	Neutral	Neutral or slight	Neutral or slight	Slight	Slight to moderate
	Local importance	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

2.7 Precautionary approach

2.7.1 The precautionary approach has been adopted throughout the assessment, with key points being:

- Precautionary measures built into the N deposition model described in Chapter 5: Air Quality of the Environmental Statement (TR010064/APP/6.1).
- The ‘restore’ approach has been adopted throughout, using the conservative 0.4kg N/ha/yr threshold for screening sites in for assessment (in accordance with DMRB LA 105).
- The use of the maximum magnitude of the increase in N deposition for assessment purposes. The maximum magnitude is the modelled N deposition at the point closest to the road and deposition rates decline with distance from the road.
- Where nitrogen sensitive species have been recorded, the assessments assume a risk of loss of these species. This is a worst case, and subtle changes in relative abundances of different species, rather than loss of individual species are a possible outcome.
- Where there is a choice of more than one significance category (Table 3.13 of DMRB LA 108), the presumption is to assume the lower level category, on account of all the precautionary measures already adopted and listed here. However, on occasions where it is considered appropriate to select the higher level category, rationale is given. Where the choices are ‘neutral or slight’ the selection makes no difference to the outcome of the

assessment of 'not significant'. Similarly, where the choice is between 'moderate or large' or 'large or very large' the resulting assessment will be 'significant'. However, where the choice is between 'slight or moderate' (for minor impact levels on resources of national importance or major impact levels on resources of county importance) the selection influences whether or not the impact is significant.

2.8 Limitations

2.8.1 The method used to calculate duration of Scheme-related increase in N deposition produces a maximum duration of 15 years and, if the modelled emissions have not reduced to, or below, the Opening years DM emission value in that timeframe, the output is given as greater than 15 years and is assumed to be permanent. This approach is precautionary, as it is possible that durations of greater than 15 years could result in temporary or reversible effects.

2.8.2 The interpretation of modelling results and assessment of impacts was thorough but acknowledges the lack of quantitative data on how specific habitats (especially woodland) respond to N deposition. A comprehensive literature review in Section 5 provides contextual information for the habitats being assessed.

3 Results of screening

3.1 Construction

3.1.1 The results, as presented in Appendix 5.2: Air Quality Results of the Environmental Statement Appendices (TR010064/APP/6.3), indicate that the predicted (NO_2 and NH_3) total deposition rate exceeds 1% of the minimum critical load and the 0.4kg N/ha/year threshold at four receptors in transects within Philips Park LNR and Philips Park and North Wood SBI. These receptors are located next to the on-slip road heading west at M60 J17 (see Figure 5.9: Construction Ecological Assessment Results of the Environmental Statement Figures (TR010064/APP/6.2)).

3.1.2 All other receptors were screened out for potential impacts during the construction phase. A summary of the sites and the modelling outputs is provided in Table 3.1 (also see Figure 8.2.2: Designated Sites Affected by Nitrogen Deposition in Annex C of this appendix, and Figure 5.11: Operational Ecological Assessment Results of the Environmental Statement Figures (TR010064/APP/6.2)).

3.2 Operation

3.2.1 The results, in Appendix 5.2: Air Quality Results of the Environmental Statement Appendices (TR010064/APP/6.3), predict that 32 of the modelled receptors, across eight ecological sites, have a predicted combined total deposition rate, in the DS scenario, above the LCL with both a predicted change (between the DS and DM) in nitrogen deposition of more than 1% of the LCL and of more than 0.4kg N/ha/year. No VTs were screened in for assessment. A summary of the sites and the modelling outputs is provided in Table 3.2 (also see Figure 8.2.2: Designated Sites Affected by Nitrogen Deposition in Annex C of this appendix, and Figure 5.11: Operational Ecological Assessment Results of the Environmental Statement Figures (TR010064/APP/6.2)).

Table 3.1 Summary of sites screened in for further assessment during construction (single highest values given only)

Site Name	Transect ID	Modelled Habitat Type	LCL for modelled habitat type (kg/N/ha/yr)	N deposition rate with NH_3 (kg/N/ha/yr) - DM	N deposition rate with NH_3 (kg/N/ha/yr) - construction	Change in N deposition – DS-construction (kg/N/ha/yr)	% of LCL
Philips Park LNR	LNR_PP2	Broadleaved, Mixed and Yew Woodland	10	64.8	65.7	0.87	8.7
Philips Park and North Wood SBI	LWS_PPNW2	Broadleaved, Mixed and Yew Woodland	10	64.6	65.5	0.86	8.6

Table 3.2 Summary of sites screened in for further assessment during operation (single highest values given only)

Site Name	Transect ID	Modelled Habitat Type	LCL for modelled habitat type (kg/N/ha/yr)	N deposition rate with NH_3 (kg/N/ha/yr) - DM	N deposition rate with NH_3 (kg/N/ha/yr) - DS	Change in N deposition – DS-DM (kg/N/ha/yr)	% of LCL
Clifton Moss (South) SBI	LWS_CMS	Broadleaved, Mixed and Yew Woodland	10	75.87	76.37	0.50	5.0
Clifton Wood	AW_CW	Broadleaved, Mixed and Yew Woodland	10	52.67	53.66	0.99	9.9
Clifton Country Park SBI	LWS_CCP	Broadleaved, Mixed and Yew Woodland	10	56.28	57.41	1.13	11.3
Rhodes Farm Sewage Works SBI	LWS_RFSW2	Broadleaved, Mixed and Yew Woodland	10	87.56	88.15	0.58	5.8

Site Name	Transect ID	Modelled Habitat Type	LCL for modelled habitat type (kg/N/ha/yr)	N deposition rate with NH_3 (kg/N/ha/yr) - DM	N deposition rate with NH_3 (kg/N/ha/yr) - DS	Change in N deposition – DS-DM (kg/N/ha/yr)	% of LCL
Philips Park LNR	LNR_PP2	Broadleaved, Mixed and Yew Woodland	10	64.09	65.28	1.18	11.8
Philips Park and North Wood SBI	LWS_PPNW2	Broadleaved, Mixed and Yew Woodland	10	63.86	65.02	1.16	11.6
Hazlitt Wood SBI	LWS_HW	Broadleaved, Mixed and Yew Woodland	10	50.22	50.88	0.66	6.6
Rochdale Canal (Scowcroft to Warland) SBI	LWS_RC1	Floating Water Plantain (S1831)	3	63.12	63.78	0.66	21.9

4 Literature review

4.1 Introduction

4.1.1 This section presents the current knowledge of the potential effects of N deposition on the habitats present within the sites screened in for assessment. Scientific research on the effects of N deposition on terrestrial ecosystems has been ongoing in Europe for decades and underpins the determination of critical loads for different habitats. There are a number of published papers and reports that review the current scientific understanding, both in general e.g., Bobbink *et al.* (2010), Clark *et al.* (2013) and UKREATE (2007) and with particular reference to roads, e.g., Bignal *et al.* (2004) and Natural England (2016). Reports published by the Institute of Air Quality Management (IAQM) (2020) and CIEEM (2021) provide guidance on the ecological assessment of air quality impacts.

4.1.2 N deposition affects terrestrial biodiversity and vegetation through four primary mechanisms:

- Eutrophication (nutrient enrichment)
- Acidification of soil
- Exacerbation of secondary stresses such as frost, drought tolerance and herbivory
- Direct toxicity at high concentrations close to emissions sources (particularly bryophytes and lichens).

4.1.3 The effects of N deposition are mediated through complex interactions between biotic and abiotic factors. Clark *et al.* (2013) explains that the magnitude and nature of effects on ecosystems are extremely variable and depend on interactions between other factors such as climate, disturbance and vegetation composition. This means that attributing observable vegetation change to N deposition alone is extremely difficult. In line with DMRB LA 105, the focus of this assessment is the potential for change in vegetation composition and therefore does not specifically address the mechanisms listed above, although these may themselves be the cause of changes in vegetation composition.

4.2 Potential effects of nitrogen deposition on woodland

4.2.1 Most of the designated habitats under consideration in this assessment are woodland of the broad habitat type ‘broadleaved, mixed and yew woodland’ with a critical load for N deposition of 10-20kg N/ha/yr.

4.2.2 The critical load takes into account the sensitive lower plant communities often present in woodlands and the changes in soil chemistry associated with acidification and eutrophication which can lead to nitrogen leakage, either though leaching (nitrate) or emissions of the greenhouse gases NO or NO_2.

4.2.3 A summary of the scientific research on the potential effects on this type of woodland habitat is provided on the APIS website (CEH, 2022) and the following text is based on the information therein. N deposition is not believed to have a direct, major effect on tree growth in the UK, but it has a variety of indirect effects. Nitrogen can affect woodlands through eutrophication and acidification which can make the habitat vulnerable to a range of indirect injurious effects. The different components of woodland ecosystems have different sensitivities to nitrogen and respond in different ways. Tree species form the canopy layer, with an under storey of woody shrubs and a ground layer of forbs and grasses, often with lower plants such as mosses and lichens carpeting the forest floor. Below ground there are mycorrhizal fungi associated with plant roots which are especially sensitive to N deposition (but the effects won't be seen unless specialist surveys are undertaken). In addition, the trees may support epiphytic communities of bryophytes and algae. The structural complexity of woodlands means that they provide a diverse habitat for wildlife, especially insects, birds and small mammals. N deposition can compromise this biodiversity value through changes in cover (protection), food type, quantity and quality, changes in the overall environment for predators, and timing of food source availability via effects on phenology (bud burst, bud set, flowering).

4.2.4 Woodlands tend to intercept larger amounts of both dry and wet N deposition than less rough surfaces, e.g., grasslands (Bobbink *et al.*, 2010). This is particularly the case for woodland edges, which experience the highest N deposition, especially where there is a local source of gaseous nitrogen, e.g., roads and / or intensive agricultural areas. Therefore, there is often a gradient of N deposition declining from the woodland edge (Spangenberg and Kölling, 2004).

4.2.5 It is widely recognised that the effect of N deposition on woodland vegetation communities is poorly understood and that there are knowledge gaps in the literature (Jones *et al.*, 2018; Caporn *et al.*, 2016). This is due to many factors complicating the study of woodlands. The canopy can have a strong influence and can intercept rainfall, pollution and light before it reaches the ground flora. Variables such as woodland management and browsing pressure are also considerable factors (Caporn *et al.*, 2016). A study looking at N deposition on woodlands compared the same sites three decades apart and found little to no change in species richness but noted minor compositional changes with nitrogen-loving species such as cleavers and common nettle responding positively to nitrogen. It was also noted that woodland plants occupy a middle to upper zone on the Ellenberg nitrogen value scale and therefore may be better adapted to increases in available nitrogen than other plant communities (Caporn, 2016; Kirby *et al.*, 2005).

4.2.6 Attributing possible effects seen in the field to N deposition is not always possible as some of the effects are not easily distinguished from the effects of management (Jones *et al.*, 2018), especially where this involves changing light levels e.g., thinning or over-grazing. Inappropriate or insufficient management and wind throw can simulate the effects of increased nitrogen and may result in very similar outcomes to eutrophication, e.g., an increase in grass growth.

4.2.7 Furthermore, not all indicators of exceedance of the critical load as listed on APIS are easily recorded in the field, such as: changes in soil processes; nutrient imbalance; altered composition of mycorrhiza; changes in soil nutrient levels; and increases in tree foliar and litter N concentrations and P/N ratio. The indicators of nitrogen enrichment most likely to be noticeable on field survey are changes in ground vegetation composition towards dominance by nitrophilic species (De Vries *et al.*, 2007) and an increased likelihood of algal growth (Achermann & Bobbink, 2003).

4.3 Potential effects of nitrogen deposition on floating water plantain

4.3.1 The following text is summarised from Lansdown and Wade (undated) and Lansdown and Wade (2003). Floating water plantain appears to have a very wide range of chemical and substrate tolerances. In lowland and mesotrophic or eutrophic waterbodies, floating water plantain functions as a series of dynamic meta-populations where, although it will be lost from some sites, it will persist at others and will also colonise new sites.

4.3.2 The influence of species competition and ecosystem succession is likely to be a major limiting factor in the distribution and abundance of floating water plantain, which must, to some extent, is dependent upon factors that suppress colonisation by more aggressive plant species e.g. large rush (*Juncus*) species and coarse grasses. Nutrient enrichment may exacerbate succession (and exclusion of floating water plantain) by eutrophication from agriculture.

4.3.3 Most lowland populations of the species are likely to be parts of dynamic metapopulations, developing and declining in response to natural and anthropogenic changes in habitat suitability. The main cause of decline in these populations in recent years is through direct habitat loss, where waterbodies have been drained for development or conversion to agriculture. Additional losses have occurred in remaining sites through acidification and eutrophication. There is no strong evidence to demonstrate that other factors are implicated. There is no obvious, proven, immediate threat to UK populations.

4.3.4 The species summary provided on APIS (CEH, 2023) confirms sensitivity to nitrogen with exceedance impacts related to a shift in macrophyte community (as discussed above) but also an increased algal productivity and shift in nutrient limitation of phytoplankton from nitrogen to phosphate.

4.3.5 In summary, atmospheric N deposition could feasibly contribute to eutrophication and the subsequent development of dense aquatic macrophyte communities that outcompete the floating water plantain.

4.4 Responses to increased nitrogen deposition above the critical load

4.4.1 Although UK emissions of nitrogen oxides have fallen in the last two decades (Defra, 2022), it is likely that sites in the study area of the Scheme have been subject to historic levels of deposition above the critical load. Given that the current background deposition at all the sites screened in for ecological assessment already exceeds the higher critical load for the relevant habitat type, it is possible that changes in nutrient cycling, vegetation composition and ecosystem function have already occurred at these sites. These sites are likely to already be showing symptoms of N deposition throughout and increased graminoid and nitrophilous species cover may already be apparent in affected areas (De Vries *et al.*, 2007). This shifted baseline could make further changes in vegetation from incremental additions of nitrogen difficult to recognise in the field. Therefore, it is important to understand the evidence (if any) of further changes that could be the result of additional nitrogen above the critical load.

4.4.2 At levels of N deposition at and above the upper end of the critical load, additional long-term increments of nitrogen are generally associated with further declines in species richness. However, the incremental effect of long-term N deposition reduces as deposition levels increase above the upper end of the critical load for a habitat. Caporn *et al.* (2016) found that less polluted sites were therefore more sensitive to increases in N deposition, whereas sites already receiving high levels of N deposition had already experienced a loss in species diversity. In addition, some species, especially graminoids (grasses, sedges, rushes) increase their cover in high N deposition scenarios and this can result in further losses of species that are sensitive to enrichment (Caporn *et al.,* 2016).

4.4.3 Some of the N deposition studies on vegetation change in woodlands have contradictory outcomes around which species were found to respond to N deposition (see Pitcairn *et al.*, 1998; Kirby *et al.*, 2005). This lack of a clear relationship between species richness and N deposition makes assuming a dose-response relationship difficult (Caporn *et al.*, 2016).

5 Assessment

5.1 Introduction

5.1.1 The baseline descriptions and impact assessments for sites screened in for operational stage N deposition assessment are presented in Tables 5.1 to 5.16 below.

5.1.2 The only sites with predicted effects during construction are Philips Park LNR and Philips Park and North Wood SBI. Both sites are only affected for the final year of the construction phase and the magnitude of increase in N deposition (DS-DM) during the final year of construction is smaller than the magnitude of change during operation. The impact duration of construction alone is so short-lived (1 year) that no effect on species composition would be anticipated and therefore the impact level would be no change and the significance of effect would be **neutral** (not significant).

5.2 Clifton Moss (South) SBI

Baseline

5.2.1 The baseline for Clifton Moss (South) SBI is shown in Table 5.1.

Table 5.1 Clifton Moss (South) SBI: Baseline

Resource importance	County
Overlapping Site(s)	None
Site in Order Limits?	No
Site Area (ha)	16.2
Citation	Peat moss land substrate, disturbed by construction of the M61 in the early 1970s, colonised by a very complex mosaic of habitat types. The majority of the site is covered by dense scrub and developing woodland with pockets of marsh, acidic and neutral grassland together with several small areas of open water associated with localised swamp and bog pools. Some of the habitats are Greater Manchester Biodiversity Habitats.

	The scrub and woodland include areas of alder plantation. Other species present in the canopy in these areas include pedunculate oak, planted cherry, birch and hawthorn with some beech regeneration. The invasive Japanese knotweed is also present. The ground flora is dominated by the invasive Himalayan balsam with areas of locally dominant creeping soft-grass. Ferns are abundant across the site and include male fern, scaly male fern and broad buckler fern. Other species present include bramble, rosebay willowherb, common sorrel, creeping buttercup, nettle and occasional bluebell. The areas of dense scrub and developing woodland are dominated by willows with occasional alder, birch, hawthorn and elder. The ground flora is again dominated by Himalayan balsam with cow parsley, broad buckler fern, meadow foxtail, rough-stalked meadow grass, bush vetch, red campion, reed canary-grass, nettle and creeping buttercup also being present. The open areas on the site are a mosaic of neutral and acid grassland which supports a transition to areas of marsh and degraded bog. The neutral grassland supports a diverse range of grasses, sedges and rushes including meadow foxtail, sweet vernal-grass, crested dog's-tail, cocksfoot, smooth-stalked meadow grass, red fescue, Yorkshire fog, reed canary-grass, field woodrush, common sedge, oval sedge, hairy sedge, false fox sedge and glaucous sedge with occasional hard and soft rush. Herbs present include ribwort plantain, meadow buttercup, common knapweed, creeping buttercup, bush vetch, zig-zag clover, cow parsley, meadow vetchling, common spotted orchid, southern marsh orchid, Russian comfrey, common sorrel, field woodrush, lady's smock and bird's-foot trefoil. Scattered scrub of willows, hawthorn and gorse occurs. The marshy grassland supports species such as hemp agrimony, soft rush, hard rush, marsh bedstraw, marsh woundwort, sneezewort, water mint, great hairy willowherb, southern marsh orchid, common spotted orchid, lady's smock, yellow sedge and carnation sedge together with the other sedge species mentioned above. The wettest areas are dominated by soft rush with locally dominant common sedge. Other species present include common fleabane, male fern, common spiked rush, field and marsh horsetail, angelica, creeping cinquefoil, broad buckler fern, butterbur, cocksfoot, lady's smock, various *Sphagnum* species, marsh thistle, lesser reedmace, bulrush, common cotton grass, flote grass, common water plantain and lesser spearwort. Creeping willow is also present, an uncommon species in Greater Manchester. There is some limited acid grassland in the centre of the site featuring purple moor grass, heather and star moss (*Polytrichum*). The northern arm of the site which did support large areas dominated by purple moor grass has been removed from the SBI because at the time of the previous survey it had been sprayed with herbicide and was dominated by Japanese knotweed.

	A number of ponds occur around the site. The northern-most pond supports abundant yellow flag iris and broadleaved pondweed with occasional water plantain, branched bur-reed, soft rush, marsh bedstraw, bog stitchwort, great hairy willowherb, water forget-me-not, common duckweed and yellow water lily. The pond adjacent to this supports yellow flag iris and lesser spearwort. It is a toad-breeding area. Smooth newts have also been recorded from the whole site. The main pond in the centre of the site is stocked with fish. The boundary ditches in the west of the site supports water plantain, spiked rush, bulrush, yellow flag iris, oval sedge, soft rush, marsh woundwort and lady's smock.
Dates Surveyed	23/5/2023
Field survey habitat parcel descriptions	Central grid ref: SD 76673 03238. The NAA of Clifton Moss was divided into two broad habitat types, which are described as follows: The woodland and scrub consists of alder, pedunculate oak, silver birch and goat willow with hawthorn and elder. The topography is undulating with raised areas tending to be drier and lower areas wetter with some evidence of water pooling in winter. Some open spaces are evident in the woodland. There are stands of invasive non-native (INNS) Japanese knotweed and Himalayan balsam, the latter being prolific throughout the NAA. Other ground flora included nettle, cleavers, meadow buttercup, bush vetch, common hogweed, creeping buttercup, soft rush, colt's-foot, cow parsley, broad buckler fern, meadow foxtail, cocksfoot, common sorrel and bramble. Neutral grassland was recorded in the west of the NAA. A footpath provided access and a gentle slope was observed towards the west providing drier ground. Management for overhead power lines had kept this area open and free of trees. The neutral grassland supports a diverse range of grasses, sedges and forbs, including meadow foxtail, sweet vernal-grass, crested dog's-tail, Yorkshire fog, reed canary-grass, field wood rush, grey sedge, common spike rush, common sedge, hairy sedge. Forbs included red clover, meadow buttercup, creeping buttercup, bush vetch, broadleaved plantain, ribwort plantain, common mouse-ear, field horsetail and common thistle. There are stands of invasive non-native Himalayan balsam. The neutral grassland contained an area of marshy grassland at the base of the gentle slope. Species included reedmace, soft rush, hard rush, ladies smock, reed canary-grass, greater willowherb, field and marsh horsetail, marsh woundwort, butterbur, buckler fern species, southern marsh orchid, common sedge, common spike rush, cock's-foot and frequent young alder.
Lichens	None recorded.

Vegetation Gradient	None identified. Species indicative of nutrient enrichment such as nettle and cleavers were observed away from the road edge.
Notes on active management (field survey observations)	Management for the overhead lines had removed larger trees and prevented shading of the neutral and marshy grasslands.
Notes on required or beneficial management (field survey observations)	Removal of Japanese knotweed and prolific Himalayan balsam. Removal of alder from neutral and marshy grassland area.
Pressures and threats	Offroad motorcycle activity
Ellenberg values	Woodland Min 3 Max 7 Mean 5.6. Grassland Min 2 Max 7 Mean 5.1
Ellenberg value score 4 and below	Woodland: Pedunculate oak, silver birch, meadow buttercup, soft rush, sorrel, cuckoo flower, ribwort plantain and common mouse ear are EV4. Sweet vernal grass and creeping soft grass EV3. Grassland: ribwort plantain, sorrel, meadow buttercup, crested dogs tail, common spike rush, common mouse ear, soft rush, cuckoo flower are EV4. Sweet vernal grass, creeping soft grass, marsh horsetail and southern marsh orchid are EV3. Black sedge and field wood rush are EV2.
Habitat type (UKHab category)	Other Broadleaved Woodland - w1g, neutral grassland - g3c
Habitat condition - area affected by Ndep:	w1g - poor, g3c - moderate.
Limitation(s):	None.

Assessment

5.2.2 The assessment for Clifton Moss (South) SBI is shown in Table 5.2.

Table 5.2 Clifton Moss (South) SBI: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 75.87 DS: 76.37
Nitrogen deposition increase (max for site)	0.50
Increase as % LCL	5.0
Increase over 0.4	0.10
Impact extent (ha)	0.35
Impact extent (% of site)	2.16
Duration (years until emissions DS = DM at Opening year)	1

5.2.3 Clifton Moss SBI supports a mosaic of habitats which have developed on disturbed peat. According to the information gathered during the desk study and site survey, there is no evidence of bog habitats persisting at the site. The site survey recorded neutral grassland and the citation refers to a limited area of acid grassland in the centre of the site which is more than 200m from the edge of the road. Therefore, nitrogen deposition was modelled for the most sensitive habitat present within 200m of the road, which is broadleaved, mixed and yew woodland with a critical load range of 10-20 kg N/ha/yr.

5.2.4 The DM and DS nitrogen deposition both greatly exceed this critical load range. The average background nitrogen deposition is estimated at 32.98 kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.2.5 The area affected by increased nitrogen deposition as a result of the Scheme is 2.16% of the designation area.

5.2.6 The area surveyed is larger than the NAA as it was based on a superseded model output. The area surveyed comprises woodland which supports some species with EV of 4, which may be sensitive to nitrogen. The species with EV3 included sweet vernal grass which is a nitrophobe and could therefore decline due to increased nitrogen deposition. However, creeping soft-grass, also EV3 is considered a nitrophile as it has been noted to increase in response to nitrogen deposition (Pitcairn *et al.*, 2006). Species that are indicative of increased nutrient levels, that could further increase in response to increased nitrogen deposition, are frequent in the field layer and include common nettle, cleavers and hogweed. The invasive non-native species Japanese knotweed and Himalayan balsam are both present and abundant in places.

5.2.7 The grassland also supported species that could be sensitive to nitrogen including sweet vernal-grass, marsh horsetail and southern marsh orchid (all EV3) and black sedge and field wood rush with EV2. Although these species are not listed as nitrophobes in Pitcairn *et al.* (2006), they could be expected to decline or be lost in response to increased nitrogen deposition. However, there are several species that have high Ellenberg values and are tolerant of higher nutrient levels, such as creeping buttercup, reed canary-grass and bulrush. The mean EV of the grassland vegetation is 5.1, suggesting some existing nutrient enrichment.

5.2.8 It is possible that an increase in nitrogen deposition could enable the more nutrient tolerant species in both the woodland and grassland areas to expand at the expense of the species that may be more sensitive to increased nitrogen. The NAA is small, only extending between 10 and 20m into the site and does not support any acid grassland, which is the most sensitive habitat for which the SBI is designated. Therefore, it is unlikely that there would be an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.2.9 Therefore, the impact level has been assessed as negligible adverse. The effect of a negligible impact level on a site of county importance could be either neutral or slight. Given the precautionary approach adopted throughout this assessment, and that the habitats affected within the site are already affected by high nutrient levels and invasive non-native species, the effect is assessed as **neutral (not significant)**.

5.3 Clifton Wood AW

Baseline

5.3.1 The baseline for Clifton Wood AW is shown in Table 5.3.

Table 5.3 Clifton Wood AW: Baseline

Resource importance	National
Overlapping Site(s)	Clifton Country Park SBI (larger and closer to road)
Site in Order Limits?	No
Site Area (ha)	3.7
Citation	No citation
Dates Surveyed	23/5/2023
Field survey habitat parcel descriptions	Central Grid ref: 77730 03432. The woodland sits on a deep, steep sided stream valley. The woods were bound to the west by housing and the east by what appears to be a capped tip with impenetrable vegetation. The canopy layer of the woodland consisted of mature sycamore, ash and pedunculate oak, with hawthorn, elder and holly in the shrub layer. The field layer consisted of creeping soft-grass, bracken, creeping buttercup, goosegrass, soft rush, broad buckler fern, wood avens, bluebell, enchanters nightshade and pendulous sedge. Himalayan balsam and Japanese knotweed were abundant.
Lichens	None recorded.
Vegetation Gradient	None.
Notes on active management (field survey observations)	No evidence of management
Notes on required or beneficial management (field survey observations)	Removal of INNS, selected felling to provide to light to field layer. Bird and bat boxes
Pressures and threats	Building material and other waste has accumulated over time. INNS are prolific.
Ellenberg values	Min 3 Max 8 Mean 5.8
Ellenberg value score 4 and below	Pedunculate oak and soft rush EV4. Creeping soft grass and bracken EV3.

Habitat type (UKHab category)	Lowland Mixed Deciduous Woodland w1f
Habitat condition - area affected by Ndep:	Moderate
Limitation(s):	Accessibility due to steep gradients

Assessment

5.3.2 The assessment for Clifton Wood AW is shown in Table 5.4.

Table 5.4 Clifton Wood AW: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 52.67 DS: 53.66
Nitrogen deposition increase (max for site)	0.99
Increase as % LCL	9.9
Increase over 0.4	0.59
Impact extent (ha)	0.68
Impact extent (% of site)	18.4
Duration (years until emissions DS = DM at Opening year)	5

5.3.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.87 kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.3.4 The area affected by increased nitrogen deposition is 18.4% of the AW and is also designated SBI. The part of the NAA closest to the road is designated SBI but is not AW.

5.3.5 The woodland habitat had ground flora with species tolerant of high nutrient levels including buttercup, and cleavers. Bluebell, a typical woodland species, is also frequent and could further expand under increased nitrogen deposition. The only species with low Ellenberg values were creeping soft-grass and bracken. However, creeping soft-grass is a typical woodland species that could increase in response to increased nitrogen deposition (Pitcairn et al, 2006). Bracken could be negatively affected by increased nitrogen deposition but dense stands of bracken are not desirable in woodland as it out-competes other species.

5.3.6 Given the existing vegetation composition, and the absence of woodland species sensitive to nitrogen, there is no loss of species predicted and therefore unlikely to be an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.3.7 Therefore, the impact level has been assessed as negligible adverse, which results in a **slight adverse effect (not significant)**.

5.4 Clifton Country Park SBI

Baseline

5.4.1 The baseline for Clifton County Park SBI is shown in Table 5.5.

Table 5.5 Clifton Country Park SBI: Baseline

Resource importance	County
Overlapping Site(s)	Clifton Country Park LNR and Clifton Wood AW
Site in Order Limits?	No
Site Area (ha)	49.4

Citation	A diverse site supporting a range of habitats on former industrial land in the Irwell Valley. Habitats include broadleaved woodland, small areas which are identified as Ancient Woodland (Natural England 2018), broadleaved plantation, man-made lake, ponds, continuous bracken, grassland and scrub. Lowland broadleaved woodland is a UK Biodiversity Priority Habitat and ponds and lodges are a Greater Manchester Biodiversity Habitat and a UK Biodiversity Priority Habitat where they support protected species. One pond supports great crested newt (UK Biodiversity Priority Species). The site north of the railway was formerly a colliery, which closed in 1928. The woodland on the slopes on this part of the site has largely regenerated naturally with abundant oak and silver birch and frequent sycamore. Other canopy species include locally dominant beech along the upper slopes and locally abundant goat willow in wetter areas. Ash and horse chestnut are occasional with lime and crack willow also present. The understorey includes frequent hawthorn and hazel with occasional elder and wych elm. Guelder rose is recorded. Regeneration of sycamore, beech, horse chestnut, rowan, holly and hawthorn is present. The woodland along the river and Fletcher Canal includes abundant oak, with frequent downy birch, sycamore, goat willow and alder. Grey willow is present in the understorey with gorse rare. The woodland south of the railway includes oak and birch with bracken locally abundant along the boundary with the railway. An area of broadleaved woodland detached from the main part of the SBI is present, on the steep slopes adjacent to Unity Brook, a tributary of the River Irwell. This woodland supports pedunculate oak, sycamore and silver birch. Some of the woodland canopy is relatively young. The understorey includes rowan, hawthorn, goat willow, elder, holly and hazel with regeneration of ash and horse chestnut. The invasive rhododendron is also present. The ground flora is sparse and supports abundant bryophytes. Other species include bramble, creeping soft-grass, broad buckler-fern, bluebell and lesser celandine. The invasive Himalayan balsam occurs along the streamside. Scrub habitats support abundant willow and young birch. Several areas of broadleaved plantation are present, dominated by ash and silver birch, Norway maple, beech and willow and grey alder.

	An area of managed neutral grassland is present between the woodland north of the railway and Fletcher Canal. Yorkshire fog is abundant together with cock's-foot, crested dog's-tail, sweet vernal-grass, rye grass and false oat-grass. Soft rush is also present. Herbs include common bird's-foot-trefoil, knapweed, meadow vetchling, creeping buttercup, meadow buttercup, ribwort plantain and creeping thistle. Yarrow, southern marsh-orchid, common spotted-orchid and common century are recorded. There is some regeneration of oak with bramble and hawthorn scrub around the edges of the field. Scrub is also present beneath the pylons. The matrix of grassland and scrub provides a valuable habitat for warblers and other bird species of woodland edge habitats.
Dates Surveyed	23/5/2023
Field survey habitat parcel descriptions	A section of woodland west of the rail track and to the north of the M60. Clifton Wood is to the west. Steep slopes give way to flatter topography towards the rail track. One woodland habitat parcel is present. The woodland is composed of mature and semi mature sessile and pedunculate oak, ash, European lime, sycamore, beech with hawthorn, rowan, goat willow, silver birch and alder. Rhododendron was also observed. The ground flora was dominated by bluebell, with frequent Himalayan balsam and broad buckler fern. Wild garlic, bramble, pendulous sedge, and creeping soft-grass were all occasional.
Lichens	Suitable trees were located with one N sensitive species recorded (*Ochrolechia androgyna*).
Vegetation Gradient	None.
Notes on active management (field survey observations)	No evidence of management.
Notes on required or beneficial management (field survey observations)	Removal of invasive species, selective thinning of trees to allow ground flora to grow.
Pressures and threats	Invasive non-native species.
Ellenberg values	Min 3 Max 8 Mean 5.8
Ellenberg value score 4 and below	Pedunculate oak and soft rush EV4. Creeping soft-grass and bracken EV3.
Habitat type (UKHab category)	Lowland Mixed Deciduous Woodland w1f

Habitat condition - area affected by Ndep:	Moderate
Limitation(s):	Accessibility due to steep gradients

Assessment

5.4.2 The baseline for Clifton County Park SBI is shown in Table 5.6.

Table 5.6 Clifton Country Park SBI: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 56.28 DS: 57.41
Nitrogen deposition increase (max for site)	1.13
Increase as % LCL	11.3
Increase over 0.4	0.73
Impact extent (ha)	1.86
Impact extent (% of site)	3.76
Duration (years until emissions DS = DM at Opening year)	5

5.4.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.87kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.4.4 The area affected by increased nitrogen deposition as a result of the Scheme is 3.8% of the SBI designation area.

5.4.5 The NAA in Clifton Country Park SBI supports woodland, with bluebell dominant in the ground flora. Bluebell is a nitrophile which responds positively to increased nitrogen deposition (Pitcairn *et al.*, 2006). The only species with low Ellenberg values were creeping soft-grass and rhododendron. Creeping soft-grass is likely to increase in response to increased nitrogen deposition (Pitcairn et al, 2006) and rhododendron is an INNS. Other INNS are present.

5.4.6 Given the existing vegetation composition, there is no loss of species predicted or any discernible change in vegetation composition. The NAA is small relative to the total site area and therefore there is unlikely to be an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.4.7 Therefore, the impact level has been assessed as negligible adverse. The effect of a negligible impact level on a site of county importance could be either neutral or slight. Given the small proportion of the site affected, and the precautionary measures adopted throughout the assessment, the effect is assessed as **neutral (not significant)**.

5.5 Rhodes Farm Sewage Works SBI

Baseline

5.5.1 The baseline for Rhodes Farm Sewage Works SBI is shown in Table 5.7.

Table 5.7 Rhodes Farm Sewage Works SBI: Baseline

Resource importance	County
Overlapping Site(s)	None
Site in Order Limits?	No
Site Area (ha)	69.7
Citation	A disused sewage treatment works. The site's primary interest is for birds. Habitats present include large areas of open water, swamp, tall ruderal, shallow water, scrub and woodland. In addition, great crested newt, water vole and bats occur on the site, all UK Biodiversity Priority Species. The large lagoon supports common duckweed, reed canary-grass, great hairy willowherb, short-fruited willowherb, nodding bur-marigold, celery-leaved buttercup, bittersweet and bulrush. The invasive Himalayan balsam is also present. Crack and grey willow occur around the lagoon.

	Invertebrates recorded include the water boatmen *Corixa punctata* and *Notonecta glauca*. The smaller lagoon (SD782039) is dominated by ivy-leaved duckweed with water starwort, reed canary-grass, bulrush and bittersweet. The lagoon may support five species of amphibians. Breeding great crested newt, toad and frog were recorded in 2004 together with adult palmate newt. There are older records of smooth newt. Habitats on the embankments between the lagoons and beds is a mosaic of species poor neutral grassland, tall ruderal, scrub and scattered trees. Grassland species include abundant cock's-foot and Yorkshire fog with ribwort plantain, broad-leaved dock, creeping thistle and creeping buttercup, with *Dactylorhiza* orchids and common centaury recorded. Tall ruderal species include locally abundant rosebay willowherb, with scrub primarily locally abundant bramble. Young oak, sycamore rowan, hawthorn, goat willow, aspen and silver birch are occasional with birch and oak also locally abundant. Other frequent species include scaly male-fern, broad buckler-fern, cow parsley, hogweed, garlic-mustard, hedge woundwort, red campion, foxglove and bush vetch. Mature woodland is present on the northern boundary. The canopy is dominated by sycamore with oak and horse chestnut also present. Privet and the invasive rhododendron are locally abundant in the shrub layer with hazel rare. Bracken is locally abundant in the field layer. Other species include broad buckler-fern, lady fern, bluebell, wood avens, enchanter's-nightshade and ramsons.
Dates Surveyed	24/05/2023 and 13/07/2023
Field survey habitat parcel descriptions	The southern section of the LWS, to the south of the M60,is open to the public and was readily accessible. The NAA in this part of the site is broadleaved woodland and consists of common alder, pedunculate oak, ash, bird cherry, aspen, hazel and hawthorn.
Lichens	None recorded.
Vegetation Gradient	None.
Notes on active management (field survey observations)	None observed.
Notes on required or beneficial management (field survey observations)	Removal of invasives.
Pressures and threats	Invasive species

Ellenberg values	Min 4 Max 8 Mean 6.0
Ellenberg value score 4 and below	Pedunculate oak, meadow buttercup, ribwort plantain, common mouse ear and common bent at EV4.
Habitat type (UKHab category)	Other broadleaved woodland - w1g
Habitat condition - area affected by Ndep:	w1g - moderate
Limitation(s):	NAA too small for 50x50m woodland quadrat

Assessment

5.5.2 The assessment for Rhodes Farm Sewage Works SBI is shown in Table 5.8.

Table 5.8 Rhodes Farm Sewage Works SBI: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 87.56 DS: 88.15
Nitrogen deposition increase (max for site)	0.58
Increase as % LCL	5.8
Increase over 0.4	0.18
Impact extent (ha)	0.03
Impact extent (% of site)	0.04
Duration (years until emissions DS = DM at Opening year)	<1

5.5.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.88kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.5.4 The area affected by increased nitrogen deposition as a result of the Scheme is 0.04% of the designated site.

5.5.5 The NAA incorporates woodland habitat between the River Irwell and the Outwood Trail, the trail itself and some woodland on the other side of the trail. The woodland is in moderate condition, with the ground flora supporting species that are tolerant of nutrient-enriched conditions such as common nettle, cow parsley, creeping buttercup and bramble. The INNS Himalyan balsam was occasional. The only species with Ellenberg values of 4 that are noted as nitrophobes in Pitcairn *et al.* (2006) were ribwort plantain and common bent, both of which are common and widely distributed grassland species.

5.5.6 Given the existing vegetation composition and the absence of woodland species sensitive to nitrogen, there is no loss of species predicted and no effect on overall site integrity. The duration is temporary.

5.5.7 Therefore, the impact level has been assessed as negligible adverse. The effect of a negligible impact level on a site of county importance could be either neutral or slight. Given the lack of nitrogen-sensitive species, the very small area affected and the precautionary measures adopted throughout the assessment, the effect is assessed as **neutral (not significant)**.

5.6 Philips Park LNR

Baseline

5.6.1 The baseline for Philips Park LNR is shown in Table 5.9.

Table 5.9 Philips Park LNR: Baseline

Resource importance	County
Overlapping Site(s)	Philips Park and North Wood SBI
Site in Order Limits?	No
Site Area (ha)	69.82

Citation	Semi-natural woodland with wildflowers characteristic of ancient woodlands. Some open glades have remnant heathland. Species rich meadows with willow scrub. There are 4 mill lodges, 2 mill ponds and some seasonal ponds. The woodland is dominated by oak, sycamore, birch, hawthorn and holly with willow and alder in the valley bottom. The species rich meadows include cuckoo flower, common spotted orchid, black knapweed, tufted vetch, and bird's foot trefoil. Butterflies such as orange tip and meadow brown are abundant.
Dates Surveyed	24/05/2023
Field survey habitat parcel descriptions	The NAA is adjacent to the slip road at the eastern end of the designated site and supports broadleaved woodland and dense scrub.
Lichens	None recorded.
Vegetation Gradient	None.
Notes on active management (field survey observations)	A small section of the woodland (just outside the NAA) had been cleared for power lines but no other management was observed.
Notes on required or beneficial management (field survey observations)	Control of invasive species.
Pressures and threats	Invasive species
Ellenberg values	Min 3 Max 9 Mean 5.7
Ellenberg value score 4 and below	Pedunculate oak, silver birch, meadow buttercup, common vetch, common thistle, common bent and soft rush at EV4. Bracken and wavy hair-grass at EV3.
Habitat type (UKHab category)	w1g
Habitat condition - area affected by Ndep:	w1g - moderate
Limitation(s):	Narrow area for woodland quadrat.

Assessment

5.6.2 The assessment for Philips Park LNR is shown in Table 5.10.

Table 5.10 Philips Park LNR: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 64.09 DS: 65.28
Nitrogen deposition increase (max for site)	1.18
Increase as % LCL	11.8
Increase over 0.4	0.78
Impact extent (ha)	0.33
Impact extent (% of site)	0.47
Duration (years until emissions DS = DM at Opening year)	1 (plus the final year of construction)

5.6.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.90 kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.6.4 The area affected by increased nitrogen deposition as a result of the Scheme is 0.47% of the designated site. The NAA within the LNR is also designated SBI but the SBI extends further eastwards towards the A56.

5.6.5 The woodland habitat had ground flora dominated by species that are tolerant of nutrient-enriched conditions such as cleavers and common nettle.

5.6.6 Although there were species recorded that have low EVs and could be sensitive to nitrogen, these tend to be species more typical of grassland and are not indicators of high quality woodland habitat. The area affected is a very small proportion of the designated area and therefore is not predicted to result in an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.6.7 Therefore the impact level is assessed as negligible adverse. A negligible adverse impact on a site of county importance could be either neutral or slight. Given the small proportion of the site affected, and the precautionary measures adopted throughout the assessment, the effect is assessed as **neutral (not significant)**.

5.7 Philips Park and North Wood SBI

Baseline

5.7.1 The baseline for Philips Park and North Wood SBI is shown in Table 5.11.

Table 5.11 Philips Park and North Wood SBI: Baseline

Resource importance	County
Overlapping Site(s)	Philips Park LNR (south side of M60) and North Wood AW (north side of M60).
Site in Order Limits?	No
Site Area (ha)	64.7
Citation	Semi-natural woodland with wildflowers characteristic of ancient woodlands. Some open glades have remnant heathland. Species rich meadows with willow scrub. There are 4 mill lodges, 2 mill ponds and some seasonal ponds. The woodland is dominated by oak, sycamore, birch, hawthorn and holly with willow and alder in the valley bottom. The species rich meadows include cuckoo flower, common spotted orchid, black knapweed, tufted vetch, and bird's foot trefoil. Butterflies such as orange tip and meadow brown are abundant.
Dates Surveyed	24/05/2023 and 25/05/23

Field survey habitat parcel descriptions	The NAA is adjacent to the slip road at the eastern end of the designated site and supports broadleaved woodland and dense scrub.
Lichens	None recorded.
Vegetation Gradient	None.
Notes on active management (field survey observations)	A small section of the woodland (just outside the NAA) had been cleared for power lines but no other management was observed.
Notes on required or beneficial management (field survey observations)	Control of invasive species.
Pressures and threats	Invasive species.
Ellenberg values	Min 3 Max 9 Mean 5.7
Ellenberg value score 4 and below	Pedunculate oak, silver birch, meadow buttercup, common vetch, common thistle, common bent and soft rush at EV4. Bracken and wavy hair-grass at EV3.
Habitat type (UKHab category)	w1g
Habitat condition - area affected by Ndep:	w1g moderate
Limitation(s):	Narrow area for woodland quadrat.

Assessment

5.7.2 The assessment for Philips Park and North Wood SBI is shown in Table 5.12.

Table 5.12 Philips Park and North Wood SBI: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 63.86

	DS: 65.02
Nitrogen deposition increase (max for site)	1.16
Increase as % LCL	11.6
Increase over 0.4	0.76
Impact extent (ha)	1.18
Impact extent (% of site)	1.82
Duration (years until emissions DS = DM at Opening year)	1 (plus the final year of construction)

5.7.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.90 kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.7.4 The area affected by increased nitrogen deposition as a result of the Scheme is 1.82% of the designated site and is the eastern-most corner of the site close to the M60/A56 interchange. Part of the NAA is also designated as LNR. The part of the SBI to the north of the motorway that overlaps with North Wood AW is not screened in.

5.7.5 The woodland habitat had ground flora dominated by species that are tolerant of nutrient-enriched conditions such as cleavers and common nettle. Although there were species recorded that have low EVs and could be sensitive to nitrogen, these tend to be species more typical of grassland and are not indicators of high quality woodland habitat. The area affected is a very small proportion of the designated area and therefore is not predicted to result in an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.7.6 Therefore the impact level is assessed as negligible adverse. The effect of a negligible impact level on a site of county importance could be either neutral or slight. Given the small proportion of the site affected, and the precautionary measures adopted throughout the assessment, the effect is assessed as **neutral (not significant)**.

5.8 Hazlitt Wood SBI

Baseline

5.8.1 The baseline for Hazlitt Wood SBI is shown in Table 5.13.

Table 5.13 Hazlitt Wood SBI: Baseline

Resource importance	County
Overlapping Site(s)	None
Site in Order Limits?	No
Site Area (ha)	12.3
Citation	A matrix of habitats including different woodland types with a variety of ground flora communities, a lake and stream with associated marshes/swamp. Lowland broadleaved woodland is a UK Biodiversity Priority Habitat and marsh and ponds and lodges are Greater Manchester Biodiversity Habitats. The woodland to the south of the fishing pond is predominantly sessile oak and birch with occasional rowan and some sycamore. Elder, hawthorn and holly are also present in the understorey. The ground flora is dominated by creeping soft-grass with abundant bracken and bramble. Woodland herbs include bluebell, male and broad buckler fern and foxglove. Downy birch, alder and willow species occur more frequently on the wetter lower slopes, in more open canopied woodland. Here the ground flora is dominated by purple moor-grass and occasional soft rush with wild angelica and marsh violet amongst the herbs. The invasive Himalayan balsam is locally dominant with the invasive rhododendron abundant in places, particularly on the margins of the site. The invasive Japanese knotweed is recorded to the east of the brook adjacent to the tip and extending into the SBI. The woodlands to the north include: a beech plantation in the east with very little ground flora and much bare ground. To the west is dry oak wood of an even age structure with an understorey including rowan and holly. The ground flora of includes locally abundant creeping soft-grass with wavy hair-grass, hard fern, soft rush and tufted hair-grass. Birch polypore and Turkey tail occur in addition to fly agaric, brown birch bolete, common earthball, grey spotted amanita, leopard-spotted earthball and onion earthball being recorded. The stream through the southern area does not have a clear channel for much of its length but runs through marsh/swamp communities. The marsh adjacent to Blackfish Pond is dominated by water horsetail and branched bur-reed. The invasive Himalayan balsam is also present in this area. Wild angelica, great hairy willowherb and soft rush occur frequently. Further

	upstream the marsh/swamp area is more diverse with only occasional water horsetail and branched bur-reed together with abundant reed canary-grass, purple moor-grass, broadleaved willowherb and great hairy willowherb. Flora grass is also present. Other herbs include marsh pennywort, skullcap, marsh bedstraw, cuckoo flower and marsh thistle. Sphagnum mosses occur frequently with S. recurvum most abundant. S. squarrosum and S. fimbriatum are also recorded. The two streams through the northern woodland have much bare ground on their banks and no in-channel vegetation. Broad buckler and hard fern occur frequently along the banks, as do extensive mats of thaloid liverworts.
Dates Surveyed	25/05/23
Field survey habitat parcel descriptions	A small section of young vegetation bordering mature beech woodland. Growth is self-set and dense and abuts the boundary wall of Heaton Park. Topography is flat with no undulations. Canopy species include beech, goat willow, oak, rowan and sycamore. Understorey comprises hawthorn and elder with a field layer of Himalayan balsam, buckler fern, bramble, raspberry, nettle, cleavers and bluebell.
Lichens	None recorded.
Vegetation Gradient	Nettle and herbs towards the boundary wall but this could be enrichment from the construction of the boundary wall itself.
Notes on active management (field survey observations)	None.
Notes on required or beneficial management (field survey observations)	Removal of invasive species, thinning of beech growth for field layer diversity.
Pressures and threats	Invasive non-native species: Himalayan balsam is locally dominant with rhododendron abundant in places, particularly on the margins of the site.
Ellenberg values	Min 4 Max 8 Mean 6
Ellenberg value score 4 and below	Rowan and oak at EV4
Habitat type (UKHab category)	Other broadleaved woodland - w1g

Habitat condition - area affected by Ndep	Moderate
Limitation(s):	None

Assessment

5.8.2 The assessment for Hazlitt Wood SBI is shown in Table 5.14.

Table 5.14 Hazlitt Wood SBI: Assessment

Habitat used for calculation of LCL	Broadleaved, mixed and yew woodland
LCL associated with site (worst case used in AQ model)	10
Nitrogen deposition DM and DS (max for site)	DM: 50.22 DS: 50.88
Nitrogen deposition increase (max for site)	0.66
Increase as % LCL	6.60
Increase over 0.4	0.26
Impact extent (ha)	0.20
Impact extent (% of site)	1.61
Duration (years until emissions DS = DM at Opening year)	1

5.8.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 32.91 kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.8.4 The woodland habitat included ground flora supporting species that are tolerant of nutrient-enriched conditions such as common nettle, cleavers and bramble. There were no species in the field layer with Ellenberg values of 4 or below.

5.8.5 The existing vegetation composition and the absence of species sensitive to nitrogen suggests that there would be no loss of species or any discernible change in vegetation composition due to increased nitrogen deposition. The area affected is a very small proportion of the designated area and therefore is not predicted to result in an effect on the key characteristics of the site or overall site integrity. The duration is temporary.

5.8.6 Therefore, the impact level has been assessed as negligible adverse. The effect of a negligible impact level on a site of county importance could be either neutral or slight. Given the small proportion of the site affected and the precautionary measures adopted throughout the assessment, the effect is assessed as **neutral (not significant)**.

5.9 Rochdale Canal (Scowcroft to Warland) SBI

Baseline

5.9.1 The baseline for Rochdale Canal (Scowcroft to Warland) SBI is shown in Table 5.15.

Table 5.15 Rochdale Canal (Scowcroft to Warland) SBI: Baseline

Resource importance	County
Overlapping Site(s)	None
Site in Order Limits?	No
Site Area (ha)	35.3
Citation	The Rochdale Canal runs through Manchester, Oldham and Rochdale and passes out of the county of Greater Manchester over the Pennines. The site was restored to a navigable waterway which opened in summer 2002. The canal supports important populations of floating water plantain (*Luronium natans*) and part of it is designated as SAC and SSSI. Floating water plantain is regularly recorded south of Littleborough, near Gorrells Way, upstream of Manchester Rd and downstream of the M62 and has been recorded in other sections of the canal.

	Fringed water-lily is dominant along sections of the canal and subject to management where it impedes navigation and competes with floating water-plantain. The invasive New Zealand pigmyweed (*Crassula helmsii*) is also recorded in several locations and is subject to management. The bankside vegetation provides suitable habitat for water voles (UK Biodiversity Priority Species) and good populations of this species have been recorded in Rochdale in the past. Evidence of the species was observed on the northern section of the canal during the 2008 survey. The SBI includes additional woodland and grassland habitats associated with canal embankments, as well as the bankside vegetation along the towpath. In many places the towpath is bounded by hedgerows and scrub. Hawthorn is the predominant hedgerow species, but elder, ash and sycamore are also present. Scrub includes grey and goat willow and young alder. Bankside grassland is generally species-poor neutral grassland dominated by Yorkshire fog. However, smaller areas of both richer neutral grassland and acidic grassland also occur. At the northern end of the site the acid grassland supports purple moor-grass, wavy hair-grass, heath bedstraw and lemon-scented fern. Stands of bilberry and heather occur rarely within the grassland
Dates Surveyed	25/05/23
Field survey habitat parcel descriptions	Canal with concrete and stone sides, no floating vegetation or marginal vegetation observed.
Lichens	N/A
Vegetation Gradient	None
Notes on active management (field survey observations)	None.
Notes on required or beneficial management (field survey observations)	Removal of invasive species.
Pressures and threats	Invasive New Zealand pigmyweed
Ellenberg values	n/a
Ellenberg value score 4 and below	n/a

Habitat type (UKHab category)	r1e
Habitat condition - area affected by Ndep	n/a
Limitation(s):	None

Assessment

5.9.2 The assessment for Rochdale Canal (Scowcroft to Warland) SBI is shown in Table 5.16.

Table 5.16 Canal (Scowcroft to Warland) SBI: Assessment

Habitat used for calculation of LCL	Floating water plantain
LCL associated with site (worst case used in AQ model)	3
Nitrogen deposition DM and DS (max for site)	DM: 63.12 DS: 63.78
Nitrogen deposition increase (max for site)	0.66
Increase as % LCL	21.90
Increase over 0.4	0.26
Impact extent (ha)	0.01
Impact extent (% of site)	0.03
Duration (years until emissions DS = DM at Opening year)	<1

5.9.3 The DM and DS nitrogen deposition both greatly exceed the critical load range for floating water plantain. broadleaved deciduous woodland. The average background nitrogen deposition is estimated at 20.55kg N/ha/yr (APIS; UK Centre for Ecology and Hydrology, 2023).

5.9.4 The site survey recorded no emergent or marginal aquatic vegetation and therefore there is no predicted effect on the aquatic vegetation of the SBI as a result of the predicted increase in nitrogen deposition.

5.9.5 The area affected is a negligible proportion of the designated area and therefore is not predicted to result in an effect on the key characteristics of the site or overall site integrity. The duration is temporary and in the absence of vegetation, no effect is predicted.

5.9.6 Therefore, the impact level has been assessed as no change, which results in a **neutral effect (not significant)**.

6 Summary

6.1.1 Table 6.1 provides a summary of the assessment. For most of the sites, only a small area parallel to the existing road and slip roads is predicted to be affected by increased nitrogen deposition during the operation of the Scheme. In addition, site investigations provided evidence of an absence of species considered sensitive to nitrogen for most sites and frequent invasive non-native species.

6.1.2 These factors contribute to an assessment that concludes that the ecological effects of increased nitrogen deposition on the two sites screened in for construction and operation and the six sites screened in for operation only are not significant.

Table 6.1 Summary of designated sites operational air quality assessment

Site Name	Importance	Impact Level	Effect	Significance
Clifton Moss (South) SBI	County	Negligible	Neutral	Not significant
Clifton Wood AW	National	Negligible	Slight adverse	Not significant
Clifton Country Park SBI	County	Negligible	Neutral	Not significant
Rhodes Farm Sewage Works SBI	County	Negligible	Neutral	Not significant
Philips Park LNR	County	Negligible	Neutral	Not significant
Philips Park and North Wood SBI	County	Negligible	Neutral	Not significant
Hazlitt Wood SBI	County	Negligible	Neutral	Not significant
Rochdale Canal SBI	County	No change	Neutral	Not significant

Acronyms and initialisms

Acronym or initialism	Term
APIS	Air Pollution Information System
ARN	Affected Road Network
AW	Ancient Woodland
CIEEM	Chartered Institute of Ecology and Environmental Management
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DM	Do Minimum
DS	Do Something
EIA	Environmental Impact Assessment
EV	Ellenberg Value
GMEU	Greater Manchester Ecology Unit
ha	Hectare
HRA	Habitats Regulations Assessment
INNS	Invasive Non Native Species
LNR	Local Nature Reserve
N	Nitrogen
NAA	Nitrogen Affected Area
NGR	National Grid Reference
NNR	National Nature Reserve
NO_x	Nitrogen Oxides
SAC	Special Area of Conservation
SBI	Site of Biological Interest
SoS	Secretary of State
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
UKHab	UK Habitat Classification

Glossary

Term	Definition
Affected Road Network (ARN)	All roads that trigger the traffic screening criteria from DMRB LA 105 and adjoining roads within 200m.
Ancient Woodland Inventory site	The Ancient Woodland Inventory identifies over 52,000 ancient woodland sites in the UK. Ancient woodland in England is defined as woodland that has existed since 1600 or before.
Local Nature Reserve (LNR)	Sites that are designated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation, which have wildlife or geological features that are of special interest locally.
Nitrogen deposition	The transfer of reactive nitrogen from the atmosphere to the biosphere.
Ramsar	Wetlands of international importance designated under the Ramsar Convention 1971.
Site of Biological Importance (SBI)	A Site of Biological Importance (or SBI) is a non-statutory designations used locally by the Greater Manchester Council to protect locally valued sites of biological diversity which are described generally as Local Wildlife Sites by the UK Government. The SBI system is designed to establish and highlight to planners, landowners and site managers where areas of high biodiversity interest occur so that appropriate decisions on planning applications, land use and land management can be made.
Site of Special Scientific Interest (SSSI)	Site designated as being of special interest for its flora, fauna or geological or physiographical features and protected under the Wildlife and Countryside Act 1981.
Special Area of Conservation (SAC)	An area which has been identified as being important for a range of vulnerable habitats, plant and animal species within the EU and is designated under the Habitats Directive.
Special Protection Area (SPA)	A site designated under the Birds Directive due to its international importance for the breeding, feeding, wintering, or the migration of, rare and vulnerable species of birds.
Veteran tree	A tree that by recognised criteria shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.

References

Achermann & Bobbink (2003). Expert Workshop on Empirical Critical Loads for Nitrogen Deposition on (Semi-)Natural Ecosystems: summary report / prepared by the organizers. (online) Available at: https://digitallibrary.un.org/record/498388?ln=en. (Accessed November 2023).

Balla, S., Uhl, R., Schlutow, A., Lorentz, H., Forster, M., Becker, C. (2013). Investigation and evaluation of road traffic-related nutrient inputs into sensitive biotopes. Estuary, UK, and adjacent coastal zones. Marine Pollution Bulletin 37: 247-260.

Bignal, K., Mike Ashmore, M., Power, S. (2004). The ecological effects of diffuse air pollution from road transport. English Nature Research Report No. 580. English Nature, Peterborough.

Bobbink, R., Hicks, K., Galloway, J., Spranger, T., Alkemade, R., Ashmore, M., Bustamante, M., Cinderby, S., Davidson, E., Dentener, F., Emmett, B., Erisman, J., Fenn, M., Gilliam, F., Nordin, A., Pardo, L., De Vries, W. (2010). Global assessment of nitrogen deposition effects on terrestrial plant diversity: A synthesis. Ecological Applications 20: 30-59.

Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J. (2020). The UK Habitat Classification User Manual Version 1.1.

Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G.,Power, S., Sheppard, L., Stevens, C. (2016). Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on seminatural habitats of conservation importance. Natural England Commissioned Reports, Number 210.

Centre for Ecology and Hydrology (CEH) (2023). Air Pollution Information System. Accessed May 2023.

Chartered Institute of Ecology and Environmental Management (CIEEM). 2018. Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester.

Chartered Institute of Ecology and Environmental Management (CIEEM). 2021. Advice on ecological assessment of air quality impacts. Chartered Institute of Ecology and Environmental Management, Winchester.

Clark, C., Bai, Y., Bowman, W., Cowles, J., Fenn, M., Gilliam, F., Phoenix, G., Siddique, I.Stevens, C., Sverdrup, H., Throop, H. (2013). Nitrogen deposition and terrestrial biodiversity. Encyclopedia of Biodiversity (Second Edition) pp. 519-536.

Defra. (2022). Annual emissions of nitrogen oxides in the UK: 1970 - 2020 - GOV.UK.(online) assets.publishing.service.gov.uk. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1054228/Figure06_NO_x_time_series.csv/preview (Accessed November 2023).

De Vries, W., Kros, H., Reinds, G.J., Bobbink, R., Smart, S. and Emmett, B. (2007). Developments in deriving critical limits and modelling critical loads of nitrogen for terrestrial ecosystems in Europe. Bilthoven: Alterra, Wageningen and CCE.

Dise, N., Ashmore, M., Belyazid, S., Bleeker, A., Bobbink, R., de Vries, W., Erisman J.,Spranger, T., Stevens, C., van den Berg, L. (2011). Nitrogen as a threat to European terrestrial biodiversity. In: Sutton, M., Howard, C., Erisman, J., Billen, G., Bleeker, A.,Grennfelt, P., van Grinsven, H., Grizzetti, B. (eds.). The European Nitrogen Assessment.Cambridge University Press, Cambridge.

European Commission, (2000). Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission, pp.73.Grime, J. 1979. Plant strategies and vegetation processes. John Wiley, Chichester.

Grime, J. P. (2001). Plant strategies, vegetation processes, and ecosystem properties. Wiley, Chichester.

Grime, J., Thompson, K., Hunt, R., Hodgson, J., Cornelissen, J., Rorison, I., Hendry, G., Ashenden, T., Askew, A., Band, S., Booth, R., Bossard, C., Campbell, B., Cooper, J., Davison, A., Gupta, P., Hall, W., Hand, D., Hannah, M., Hillier, S., Hodkinson, D., Jalili, A.,Liu, Z., Mackey, J.., Matthews, N., Mowforth, M., Neal, A., Reader, R., Reiling, K., RossFraser, W., Spencer, R., Sutton, F., Tasker, D., Thorpe, P. and Whitehouse, J. (1997). Integrated screening validates primary axes of specialisation in plants. Oikos 79: 259-281.

Hall, J.; Curtis, C.; Dore, T.; Smith, R. (2015). Methods for the calculation of critical loads and their exceedances in the UK. Bangor, UK, NERC/Centre for Ecology & Hydrology,108pp. (CEH Proposed Scheme no. C04913).

Highways England. (2019). Design Manual for Roads and Bridges: LA 105 Air Quality.

Highways England. (2020a). Design Manual for Roads and Bridges: LA 104 Environmental Assessment and Monitoring.

Highways England. (2020b). Design Manual for Roads and Bridges: LA 108 Biodiversity.

Hill, M., Mountford J., Roy D., Bunce R. (1999). Ellenberg's indicator values for British plants. ECOFACT Volume 2, Technical Annex. ITE Monkswood, Huntingdon. London: Department of the Environment, Transport and the Regions.

Hill, M.O., Preston, C.D. & Roy, D.B. (2004) PLANTATT Attributes of British and Irish Planta: Status, size, life history, geography and habitats. Centre for Ecology and Hydrology. UK.

Hill, M.O. Preston, C. D. Bosanquet, S.D.S & Roy, D.B. (2007) BRYOATT: Attributes of British and Irish mosses, liverworts and hornworts with information on native status, size, life form, life history, geography and habitat. NERC Centre for Ecology and Hydrology and Countryside Council for Wales.

Institute of Air Quality Management (IAQM) 2020. A guide to the assessment of air quality impacts on designated nature conservation sites, version 1.1. Institute of Air Quality Management, London/

Joint Nature Conservation Committee. (2004). Common Standards Monitoring Guidance for Woodland Habitats. JNCC, Peterborough. https://data.jncc.gov.uk/data/6df1057b-5357-400b-a363-c8748298180a/CSM-WoodlandHabitats-2004.pdf. Accessed November 2023.

Jones, L.; Banin, L.; Bealey, B.; Field, C.; Caporn, S.; Payne, R.; Stevens, C.; Rowe, E.; Britton, A.; Mitchell, R.; Pakeman, R., Dise, N.; Robinson, E.; Tomlinson, S. (2018) Botanical benchmarks: application of single assessment site-based vegetation survey data in habitats regulations assessment for regulatory decision-making. Stirling, Scottish Environment Protection Agency (SEPA), 65pp. (SEPA Commissioned Report no. DK1605, CEH Proposed Scheme no. C06198) (Unpublished).

Kirby, K., Smart, S., Black, H., Bunce, R. Corney, P., Smithers, R. (2005). Long-term ecological change in British woodland (1971-2001). English Nature Research Report 653.

Lansdown, R.V. & Wade, P.M. (undated) Ecological Requirements. Floating water-plantain (*Luronium natans*).

Lansdown RV & Wade PM (2003). Ecology of the Floating Water-plantain *Luronium natans*. Conserving Natura 2000 Rivers Ecology Series No. 9. English Nature, Peterborough

Leith, I. van Dijk N., Pitcairn, C., Wolseley, P., Sutton, M. (2005). Refinement and testing of biomonitoring methods, and development of protocols, for assessing impacts of atmospheric nitrogen deposition or concentrations on statutory nature conservation sites.JNCC report. Peterborough. December 2005. 294 pp.

McCollin, D, Crossley, C., Gilbert, J., Irving, A., Marjoram, J., McCall, J., McFadyen, S., Mohamud, A., Storey, E., Thompson-Poyser, T., Wood, D., 2017. The distribution of woodland flora in relation to edge effects: a UK woodland case study. Poster at IALE conference, June 2017.

Multi-Agency Geographic Information for the Countryside (MAGIC). (2023). Available at:https://magic.defra.gov.uk/magicmap.aspx. Accessed November 2023.

National Highways (2022). Draft Ammonia N Deposition Tool v3.

Natural England (2016). The ecological effects of air pollution from road transport: an updated review. Natural England Commissioned Report 199. Natural England, Peterborough.

Panks, P., White, N., Newsome, A., Nash, M., Potter, J., Heydon, M., Mayhew, E., Alvarez, M., Russell, T., Cashon, C., Goddard, F., Scott, S., Heaver, M., Scott, S., Treweek, J., Butcher, B., and Stone, D. (2022). Biodiversity metric 3.1: Auditing and accounting for biodiversity – user guide. Natural England.

Pitcairn, C., Leith, I., Sheppard, L., Sutton, M., Fowler, D., Munro, R., Tang, S. and Wilson,D. (1998). The relationship between nitrogen deposition, species composition and foliar nitrogen concentrations in woodland flora in the vicinity of livestock farms. Environmental Pollution, 102: 41–48.

Pitcairn, C., Leith, I., Sheppard, L., and Sutton, M. (2006). Development of a nitrophobe/nitrophile classification for woodlands, grasslands and upland vegetation in Scotland. Centre for Ecology and Hydrology report for SEPA, Edinburgh.

Rodwell, J.S. (2006) National Vegetation Classification: User's handbook. Joint Nature Conservation Committee, Peterborough, UK.

Spangenberg, A. and Kolling, C. (2004). Nitrogen deposition and nitrate leaching at forest edges exposed to high ammonia emissions in southern Bavaria. Water Air Soil Pollution 152: 233–255.

Sutton, M., Pitcairn, C., Whitfield, C., Leith, I., Sheppard, L., van Dijk, N., Tang, S., Skiba,U., Smart, S., Mitchell, R., Wolsley, P., James, P., Purvis, W., Fowler, D. (2004). Bioindicator and biomonitoring methods for assessing the effects of atmospheric nitrogen on statutory nature conservation sites. Peterborough, JNCC, 230pp. (JNCC Report, 356).

UKREATE (2007) Terrestrial Umbrella: Effects of Eutrophication and Acidification on Terrestrial Ecosystems CEH Contract Report. Defra Contract No. CPEA 18.

Woodland Trust (2023) Ancient Tree Inventory. https://ati.woodlandtrust.org.uk/tree-search/. Accessed June 2023.

Annex A Site Investigations

A.1 Clifton Moss (South) SBI

A.1.1 Woodland transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Salix capri	F	7
Quercus robur	O	4
Betula pendula	F	4
Alnus glutinosa	F	6
Understorey		
Crataegus monogyna	O	6
Sambucus nigra	O	7
Field layer		
Reynoutria japonica	R	6
Impatiens glandulifera	A	7
Ranunculus acris	O	4
Ranunculus repens	O	7
Heracleum sphondylium	F	7
Urtica dioica	F	8
Galium aparine	F	8
Vicia sepium	F	6
Juncus effusus	F	4
Tussilago farfara	O	6
Rumex acetosa	O	4
Rubus spp. Agg	F	6
Epilobium montanum	R	6
Alopecurus pratensis	O	7
Cardamine pratensis	R	4
Plantago lanceolata	F	4
Plantago major	O	7

Scientific name	DAFOR	Ellenberg Value
Dactylis glomerata	F	6
Cerastium fontanum	F	4
Anthoxanthum odoratum	O	3
Poa annua	O	7
Holcus mollis	F	3
Anthriscus sylvestris	O	7
Dryopteris dilatata	O	5
Holcus lanatus	O	5

A.1.2 Woodland quadrat

Scientific name	DAFOR	Ellenberg Value
Canopy		
Betula pendula	4	4
Alnus glutinosa	7	6
Salix caprea	6	7
Quercus robur	1	4
Understorey		
Crataegus monogyna	4	6
Sambucus nigra	1	7
Field layer		
Impatiens glandulifera	5	7
Ranunculus acris	4	4
Ranunculus repens	4	7
Urtica dioica	2	8
Galium aparine	3	8
Juncus effusus	1	4
Rubus spp. agg	2	6
Holcus mollis	6	3
Dryopteris dilatata	4	5
Alopecurus pratensis	4	7

A.1.3 Condition assessment: Woodland

Woodland Criteria	Score	Comments
1	2	Old trees absent
2	3	No browsing
3	1	INNS present
4	2	Four species across woodland parcel
5	3	Canopy and scrub layer native
6	1	Less than 10% temporary space
7	2	Two age classes
8	2	Moderate dieback
9	1	No ground NVC
10	2	Two stories in parcel
11	1	No veteran trees
12	1	Limited dead wood
13	2	Evidence of nettle and motorbikes
Total:	Poor	

A.1.4 Grassland transect

Scientific name	DAFOR	Ellenberg Value
Holcus lanatus	F	5
Dactylis glomerata	O	6
Plantago lanceolatum	O	4
Plantago major	O	7
Trifolium pratense	O	5
Alopecurus pratensis	O	7
Rumex acetosa	O	4
Ranunculus repens	F	7
Ranunculus acris	O	4
Anthoxanthum odoratum	F	3
Cynosurus cristatus	O	4
Holcus mollis	O	3

Scientific name	DAFOR	Ellenberg Value
Phalaris arundinacea	O	7
Luzula campestris	O	2
Carex divulsa	O	6
Eleocharis palustris	O	4
Carex nigra	O	2
Carex hirta	O	6
Vicia sepium	O	6
Impatiens glandulifera	F	7
Cerastium fontanum	O	4
Equisetum arvense	O	6
Cirsium vulgare	R	6
Typha sp.	R	7
Juncus effusus	O	4
Juncus inflexus	O	5
Cardamine pratensis	O	4
Epilobium hirsutum	R	7
Equisetum palustre	R	3
Stachys palustris	O	7
Petasites sp.	R	7
Dryopteris sp	O	5
Rubus spp	O	6
Dactylorhiza praetermissa	R	3
Alnus glutinosa	F	6
Rumex crispus	O	6

A.1.5 Grassland Quadrat

Scientific name	DAFOR	Ellenberg Value
Impatiens glandulifera	6	7
Ranunculus repens	4	7
Holcus mollis	4	3

Scientific name	DAFOR	Ellenberg Value
Dactylis glomerata	3	6
Holcus lanatus	4	5
Rumex crispus	1	6
Plantago major	1	7
Cerastium fontanum	2	4
Juncus effusus	5	4
Rubus sp	1	6
Equisetum arvense	3	6
Cirsium vulgare	2	6

A.1.6 Condition Assessment: Grassland

Grassland Criteria	Score	Comments
1	Y	Good example of habitat type
2	Y	Variable sward height
3	Y	Limited bare ground
4	N	Some bramble cover
5	N	INNS present
6	Y	10 or more sp/m2
Condition:	Moderate	

A.1.7 Photographs illustrating the habitats recorded on the site

Photograph 1	Photograph 2
	

Photograph 3	Photograph 4
	

A.2 Clifton Wood AW

A.2.1 Woodland transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Acer pseudoplatanus	F	6
Fraxinus excelsior	O	6
Quercus robur	F	4
Understorey		
Crataegus monogyna	O	6
Sambucus nigra	O	7
Ilex aquifolium	O	5
Field layer		
Holcus mollis	F	3
Pteridium aquilinum	F	3
Ranunculus repens	O	7
Galium aparine	O	8
Juncus effusus	O	4
Dryopteris dilatata	F	5
Hyacinthoides non-scripta	F	6
Reynoutria japonica	F	6

Scientific name	DAFOR	Ellenberg Value
Impatiens glandulifera	F	7
Geum urbanum	O	7
Circaea lutetiana	O	6
Carex pendula	O	6
Urtica dioica	O	8

A.2.2 Woodland canopy quadrat

Scientific name	DAFOR	Ellenberg Value
Acer pseudoplatanus	7	6
Fraxinus excelsior	5	6
Quercus robur	5	4
Crataegus monogyna	4	6
Sambucus nigra	2	7
Ilex aquifolium	2	5

A.2.3 Field layer quadrat

Scientific name	DAFOR	Ellenberg Value
Dryopteris dilatata	7	5
Impatiens glandulifera	5	7
Holcus mollis	8	3
Hyacinthoides non-scripta	4	6

A.2.4 Woodland condition assessment

Woodland Criteria	Score	Comments
1	3	Mature, semi-mature and saplings
2	3	No damage observed
3	1	INNS prolific
4	3	More than five native trees
5	3	Canopy is all native trees
6	3	No open spaces
7	3	Age classes present
8	3	Tree health good

Woodland Criteria	Score	Comments
9	1	Bluebell only
10	2	Two stories
11	1	No veteran trees
12	1	Less than 25% dead wood
13	2	Nettle indicates N enrichment
Condition:	Moderate	

A.2.5 Photographs illustrating habitat recorded on the site

Photograph 1	Photograph 2
	

A.3 Clifton Country Park SBI

A.3.1 Woodland transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Quercus robur	F	4
Quercus petraea	O	4
Tilia cordata	O	5

Scientific name	DAFOR	Ellenberg Value
Acer pseudoplatanus	O	6
Fagus sylvatica	O	5
Sorbus aucuparia	O	4
Alnus glutinosa	O	6
Salix caprea	O	7
Betula pendula	O	4
Fraxinus exclesior	O	6
Understorey		
Crataegus monogyna	F	6
Rhododendron sp.	O	3
Field layer		
Hyacinthoides non-scripta	A	6
Allium ursinum	O	7
Dryopteris dilatata	F	5
Impatiens glandulifera	F	7
Rubus sp.	O	6
Carex pendula	O	6
Holcus mollis	O	3
Circaea lutetiana	O	6

A.3.2 Woodland quadrat

Scientific name	DAFOR	Ellenberg Value
Quercus robur	7	4
Fraxinus exclesior	5	6
Tilia cordata	4	5
Betula pendula	5	4

A.3.3 Field layer quadrat

Scientific name	DAFOR	Ellenberg Value
Hyacinthoides non-scripta	8	6
Dryopteris dilatata	7	5

Scientific name	DAFOR	Ellenberg Value
Impatiens glandulifera	5	7
Circaea lutetiana	4	6
Rubus sp.	1	6

A.3.4 Woodland condition assessment

Woodland Criteria	Score	Comments
1	2	Two age classes
2	3	No browsing damage
3	1	INNS prolific
4	3	Five or more native trees
5	3	Cover is 80% native trees
6	3	Limited temporary open space
7	2	Two classes of regeneration
8	3	No signs of tree mortality or ill health
9	3	Abundant bluebell
10	2	Two stories observed
11	1	No veteran trees
12	1	Limited deadwood
13	2	No significant signs of N enrichment
Condition:	Moderate	

A.4 Rhodes Farm Sewage Works SBI

A.4.1 Woodland Transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Anus glutinosa	F	6
Fraxinus excelsior	R	6
Prunus padus	R	7
Quercus robur	O	4
Corylus avellana	O	6

Scientific name	DAFOR	Ellenberg Value
Populus tremulus	R	6
Understorey		
Crataegus monogyna	O	6
Field layer		
Ranunculus acris	F	4
Ranunculus repens	f	7
Rubus Spp Agg.	O	6
Anthriscus sylvestris	O	7
Urtica dioica	F	8
Jacobaea vulgaris	R	7
Plantago lanceolata	A	4
Galium aparine	O	8
Centaurea nigra	O	5
Rumex crispus	O	6
Rumex obtusifolius	O	9
Cerastium fontanum	O	4
Potentilla anserina	O	6
Equisetum arvense	R	6
Dryopteris filix-mas	O	5
Poa annua	O	7
Impatiens glandulifera	O	7
Agrostis capillaris	O	4

A.4.2 Woodland quadrat

Scientific name	DAFOR	Ellenberg Value
Anus glutinosa	8	6
Fraxinus excelsior	4	6
Quercus robur	5	4
Corylus avellana	2	6
Populus tremulus	2	6

A.4.3 Field layer quadrat

Scientific name	DAFOR	Ellenberg Value
Ranunculus acris	6	4
Agrostis capillaris	5	4
Plantago lanceolata	5	4
Centaurea nigra	2	5
Urtica dioica	3	8
Rumex crispus	1	6

A.4.4 Woodland condition assessment

Woodland Criteria	Score	Comments
1	2	Majority semi-mature
2	3	No animal browsing evident
3	2	INNS present
4	3	Seven species noted
5	3	More than 80% cover is native trees
6	3	Only small areas of temporary space
7	2	Two age classes noted
8	3	Trees appeared healthy
9	1	No NVC community
10	2	Two stories noted
11	1	No veteran trees noted
12	1	No deadwood observed
13	3	Nettle and cleavers prolific
Condition:	Moderate	

A.4.5 Photographs illustrating habitat recorded on the site

Photograph 1	Photograph 2
	

Photograph 3


A.5 Philips Park LNR and Philips Park and North Wood SBI

A.5.1 Woodland Transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Quercus robur	O	4
Acer pseudoplatanus	O	6
Alnus glutinosa	O	6
Fraxinus excelsior	F	6
Prunus padus	O	7

Scientific name	DAFOR	Ellenberg Value
Betula pendula	O	4
Understorey		
Crataegus monogyna	O	5
Ilex aquifolium	O	5
Sambucus nigra	O	7
Field layer		
Dryopteris filix-mas	O	5
Dryopteris dilatata	F	5
Impatiens glandulifera	A	7
Galium aparine	F	8
Urtica dioica	F	8
Rubus sp.	A	6
Heracleum sphondylium	F	7
Ranunculus repens	O	7
Ranunculus acris	O	4
Anthriscus sylvestris	O	7
Silene dioica	O	7
Geum urbanum	O	7
Convolvulus arvensis	O	6
Vicia sativa	O	4
Asplenium scolopendrium	R	5
Cirsium vulgare	O	6
Juncus effusus	O	4
Equisteum arvense	O	6
Carex pendula	O	6
Deschampsia flexuosa	R	3
Juncus inflexus	R	5
Pteridium aquilinum	O	3
Rumex obtusifolius	O	9

Scientific name	DAFOR	Ellenberg Value
Cirsium palustre	R	4
Phalaris arundinacea	O	7
Agrostis capillaris	F	4
Reynoutria japonica	F	6

A.5.2 Woodland quadrat

Scientific name	DAFOR	Ellenberg Value
Quercus robur	5	4
Acer pseudoplatanus	5	6
Alnus glutinosa	6	6
Ilex aquifolium	5	5
Prunus padus	4	7
Sambucus nigra	4	7
Betula pendula	5	4
Crataegus monogyna	6	5

A.5.3 Field layer quadrat

Scientific name	DAFOR	Ellenberg Value
Impatiens glandulifera	6	7
Urtica dioica	5	8
Galium aparine	3	8
Ranunculus repens	4	7
Ranunculus acris	3	4
Anthriscus sylvestris	4	7
Silene dioica	2	7
Geum urbanum	4	7
Agrostis capillaris	4	4

A.5.4 Woodland condition assessment

Woodland Criteria	Score	Comments
1	2	Two age classes seen

Woodland Criteria	Score	Comments
2	3	No herbivore damage
3	1	INNS prolific
4	3	More than five native species
5	2	Canopy was mostly native species
6	2	Gaps present with INNS present
7	2	Two classes present
8	3	No visible disease
9	1	No recognisable NVC
10	2	Two stories present
11	1	No veteran trees seen
12	1	Limited deadwood observed
13	1	Gradient to nettle and cleavers closer to road
Condition:	Moderate	

A.6 Hazlitt Wood SBI

A.6.1 Woodland Transect

Scientific name	DAFOR	Ellenberg Value
Canopy		
Fagus sylvatica	A	5
Salix caprea	O	7
Quercus spp	O	4
Sorbus aucuparia	O	4
Acer pseudoplatanus	O	6
Fagus sylvatica	A	5
Understory		
Sambucus nigra	O	7
Crataegus monogyna	F	6
Field layer		
Impatians glandulifera	O	7
Dryopteris dilatata	O	5

Scientific name	DAFOR	Ellenberg Value
Rubus spp agg	O	6
Rubus idaeus	O	5
Urtica dioica	O	8
Galium aparine	O	8
Hyacinthoides non-scripta	R	6

A.6.2 Woodland quadrat

Scientific name	DAFOR	Ellenberg Value
Fagus sylvatica	7	5
Salix caprea	5	7
Crataegus monogyna	7	6
Quercus spp	4	4
Acer pseudoplatanus	5	6
Sambucus nigra	2	7

A.6.3 Field layer quadrat

Scientific name	DAFOR	Ellenberg Value
Impatiens glandulifera	4	7
Dryopteris dilatata	6	5
Galium aparine	3	8
Hyacinthoides non-scripta	2	6
Rubus sp.	4	6

A.6.4 Woodland condition assessment

Woodland Criteria	Score	Comments
1	2	Two age classes seen
2	3	No browsing seen
3	2	Less than 10% INNS
4	3	Five species seen
5	3	Canopy was mostly native
6	1	Less than 10% open

Woodland Criteria	Score	Comments
7	2	Two classes observed
8	3	No tree mortality
9	1	No NVC seen
10	3	Three stories seen
11	1	No veteran trees
12	1	No deadwood seen
13	2	Nettle towards the boundary
Condition:	Moderate	

A.6.5 Photographs illustrating habitat recorded on the site

Photograph 1	Photograph 2
	

A.7 Rochdale Canal (Scowcroft to Warland) SBI

A.7.1 No vegetation observed

A.7.2 Photographs illustrating habitat recorded on the site

Photograph 1	Photograph 2
	
Photograph 3	**Photograph 4**
	

Annex B Duration calculations

B.1.1 For each site, the nearest relevant road links likely to influence the nitrogen deposition impacts, were identified and the total NO_x emission rates extracted for the Opening year (2029) and the design year (2044) for Do Something (DS) and the Opening year Do Minimum (DM). The emission rates were taken from the air quality modelling, which takes into account the forecast reductions in 'per vehicle' emissions based on the speeded banded emission factors (which are based on Defra Emission factor toolkit v11) and forecasted traffic growth. For each intervening year between 2029 and 2044 the DS emission rates were calculated by linear interpolation and then compared to the DM Opening year emission rate for the same sections.

B1.2 The time taken after opening of the Scheme for the Do Something (DS) NO_x emissions to reduce to the Do Minimum (DM) NO_x emissions in the Opening year was calculated to provide an indication of the duration of impact. It should be noted that the above method is an approximation to provide an indication of duration that the emissions are above the Opening years DM. The maximum duration calculated by this method would be 15 years and, if the modelled emissions have not reduced to the DM Opening year value in that timeframe, the output is given as greater than 15 years.

Annex C Figures

Figure 8.2.1: Designated Sites Within 200m of the ARN

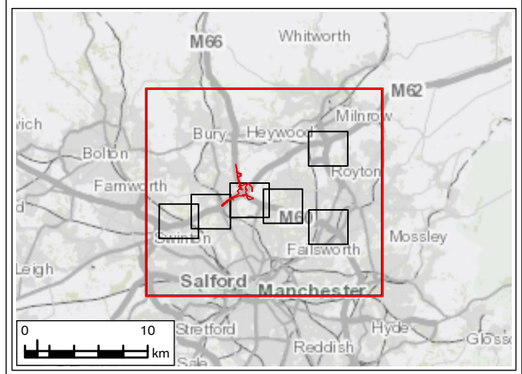
Figure 8.2.2: Designated Sites Affected by Nitrogen Deposition

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)

Rochdale Canal (Scowcroft to Warland) (SBI) 1
Rochdale Canal (SAC/SSSI) 1
Rochdale Canal (SAC/SSSI) 1
Rochdale Canal (Scowcroft to Warland) (SBI) 1
Sudden Brook (West) (SBI)
Rochdale Canal (SAC/SSSI) 2
A627M by Tandle Hill (SBI) 1
Rochdale Canal (Scowcroft to Warland) (SBI) 2
Rochdale Canal (SAC/SSSI) 2
Gerrard Wood (SBI)
A627M by Tandle Hill (SBI) 3
North Wood (AW)
Philip's Park (LNR) 2
Philips Park & North Wood (SBI) 2
Philips Wood (AW)
Hazlitt Wood (SBI)
Alkrington Woods and Rhodes Lodges (SBI)
Alkrington Woods (LNR)
Rhodes Farm Sewage Works (SBI) 1
Clifton Country Park (SBI)
Clifton Wood (AW)
Clifton Moss (South) (SBI)
Mere Clough (LNR)
Mere Clough (AW)
Boardman Brook (SBI)
Rochdale Canal (SAC/SSSI) 2
Philip's Park (LNR) 1
Philips Park & North Wood (SBI) 1
Rhodes Farm Sewage Works (SBI) 2
Philips Park & North Wood (SBI) 3



P01	JAN 24	For DCO application	LT	MS	JR	BB
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Development Consent Order Number: TR010064

Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 1 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:61,000	DO NOT SCALE	
Jacobs No.	B36601F0	Rev	P01
Client No.	HE548642		

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)

Clifton Moss (South) (SBI)

Clifton Country Park (SBI)

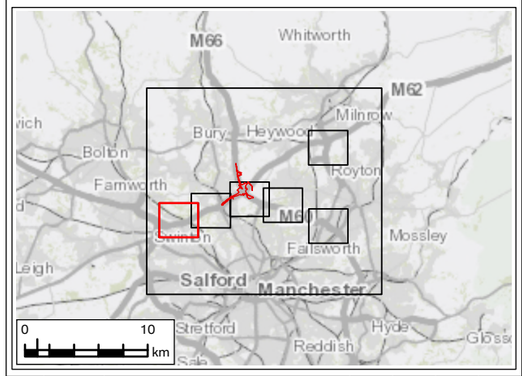
Clifton Wood (AW)

Rhodes Farm Sewage Works (SBI) 1

Ringley Woods (East) (SBI)

Clifton Country Park (LNR)

Rhodes Farm Sewage Works (SBI) 2



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number: TR010064	Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 2 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Philips Park & North Wood (SBI) 2

Philip's Park (LNR) 2

Philips Wood (AW)

North Wood (AW)

Ringley Woods (East) (SBI)

Philips Park & North Wood (SBI) 3

Mere Clough (LNR)

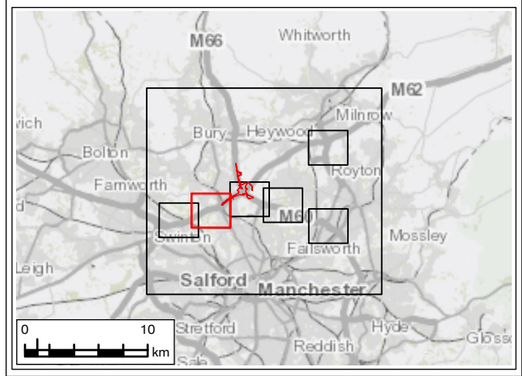
Mere Clough (AW)

Philips Park & North Wood (SBI) 1

Philip's Park (LNR) 1

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



P01	JAN 24	For DCO application	LT	MS	JR	BB
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Development Consent Order Number: TR010064	Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 3 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

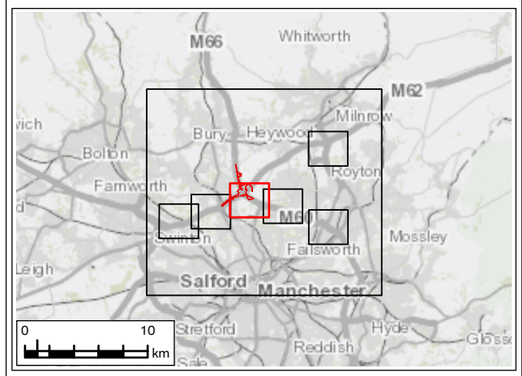
Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)

Hazlitt Wood (SBI)



P01	JAN 24	For DCO application	LT	MS	JR	BB
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Development Consent Order Number: TR010064	Development Consent Order Drawing Number: 6.3

Client

national highways

Project

REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title

DESIGNATED SITES WITHIN
200M OF AFFECTED ROAD NETWORK
SHEET 4 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

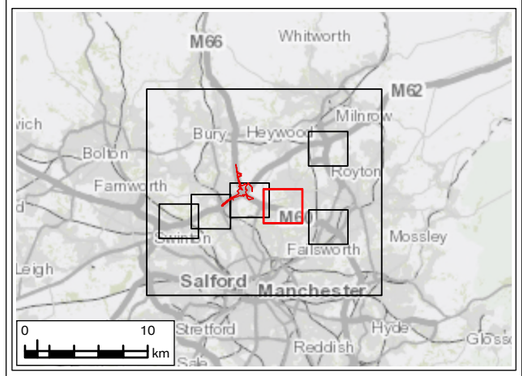
Alkrington Woods and Rhodes Lodges (SBI)

Boardman Brook (SBI)

Alkrington Woods (LNR)

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



P01	JAN 24	For DCO application	LT	MS	JR	BB
Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Development Consent Order Number:	Development Consent Order Drawing Number:
TR010064	6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 5 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000		DO NOT SCALE
Jacobs No.	B36601F0		
Client No.	HE548642	Rev	P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

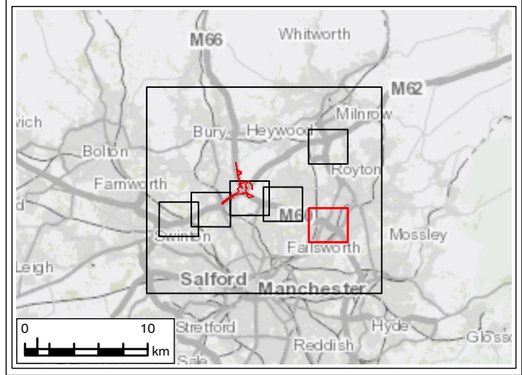
ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Rochdale Canal (SAC/SSSI) 2

Rochdale Canal (SAC/SSSI) 2

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number: TR010064

Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 6 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.1

Rochdale Canal (Scowcroft to Warland) (SBI) 1

Rochdale Canal (SAC/SSSI) 1

Rochdale Canal (Scowcroft to Warland) (SBI) 2

Rochdale Canal (SAC/SSSI) 2

A627M by Tandle Hill (SBI) 1

A627M by Tandle Hill (SBI) 2

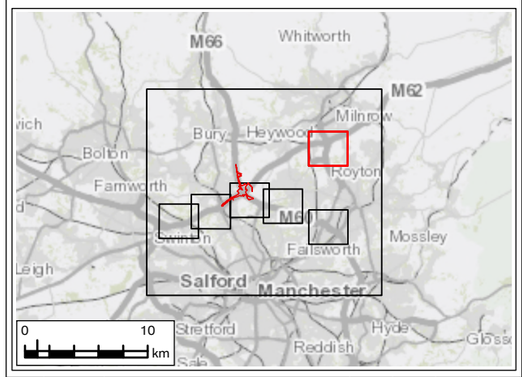
A627M by Tandle Hill (SBI) 3

Gerrard Wood (SBI)

Sudden Brook (West) (SBI)

Legend

- Order Limits
- Affected Road Network
- Affected Road Network 200m Buffer
- Ancient Woodland (AW)
- Site of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number: TR010064

Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP M60/M62/M66 SIMISTER ISLAND INTERCHANGE

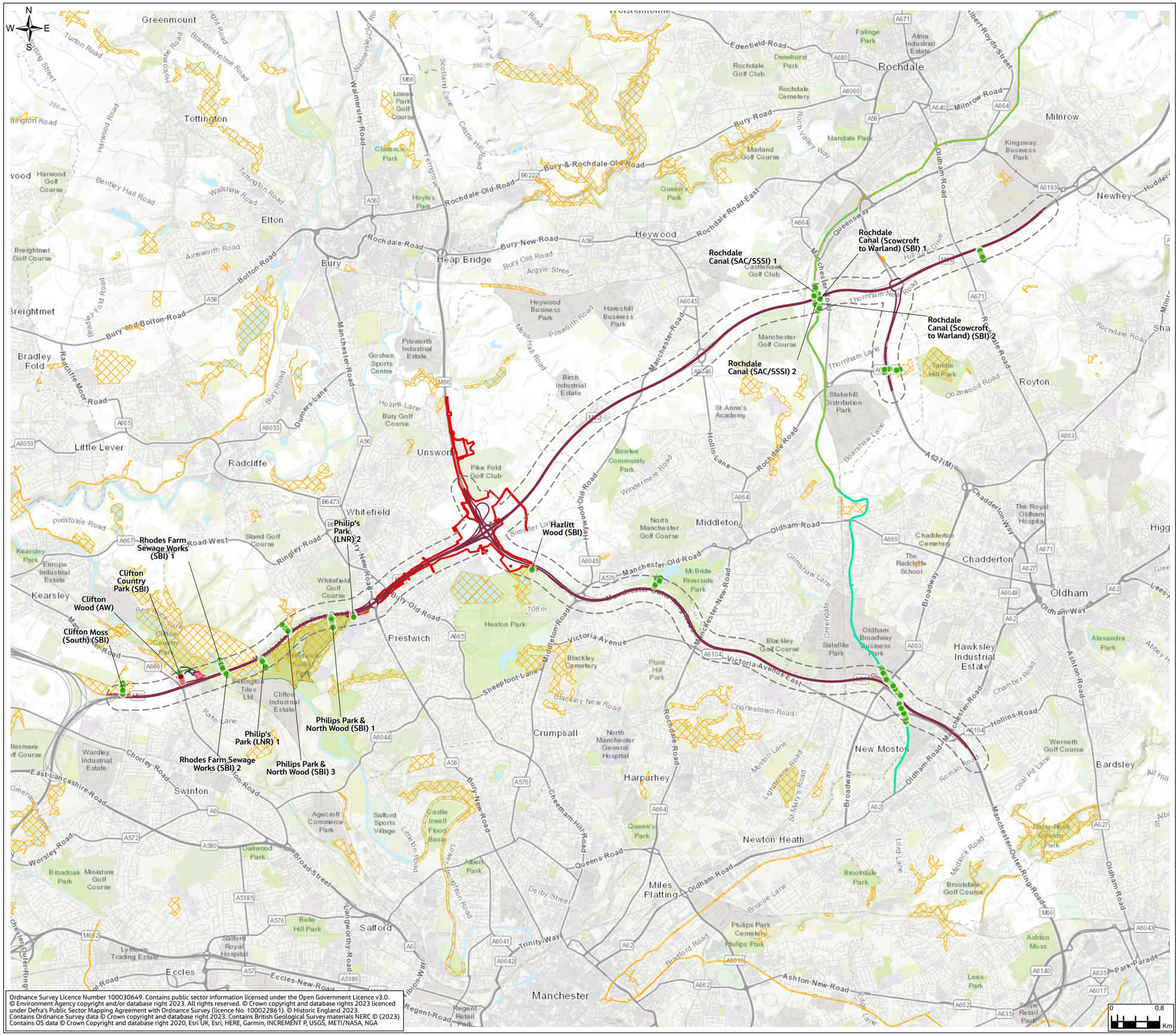
Drawing Title: DESIGNATED SITES WITHIN 200M OF AFFECTED ROAD NETWORK SHEET 7 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:10,000	DO NOT SCALE	
Jacobs No.	B36601F0	Rev	P01
Client No.	HE548642		

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0040

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2

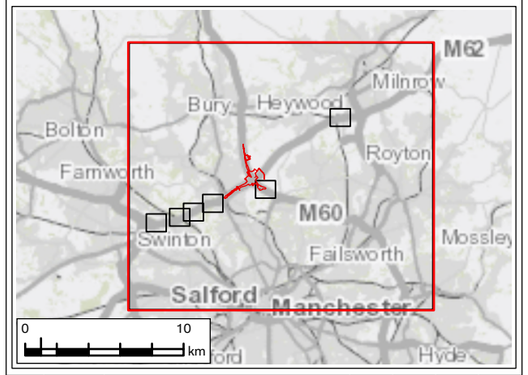


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number:	TR010064
Development Consent Order Drawing Number:	6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

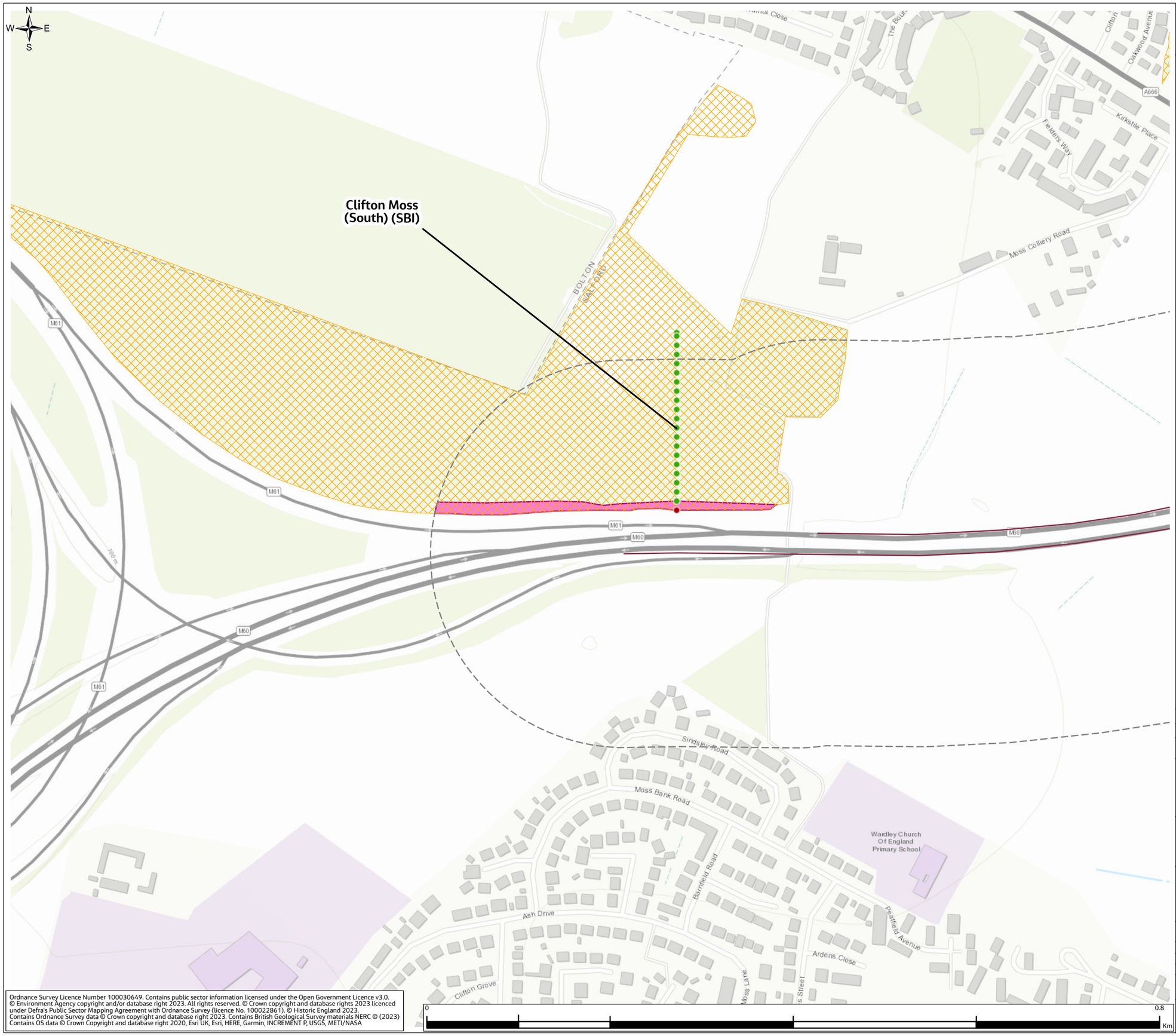
Drawing Title: DESIGNATED SITES AFFECTED BY NITROGEN DEPOSITION SHEET 1 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:61,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2

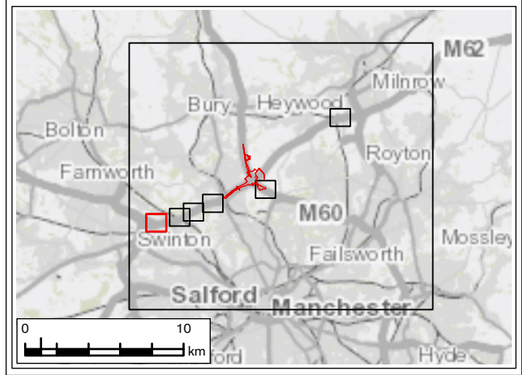


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number:	Development Consent Order Drawing Number:
TR010064	6.3

Client

national highways

Project

REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title

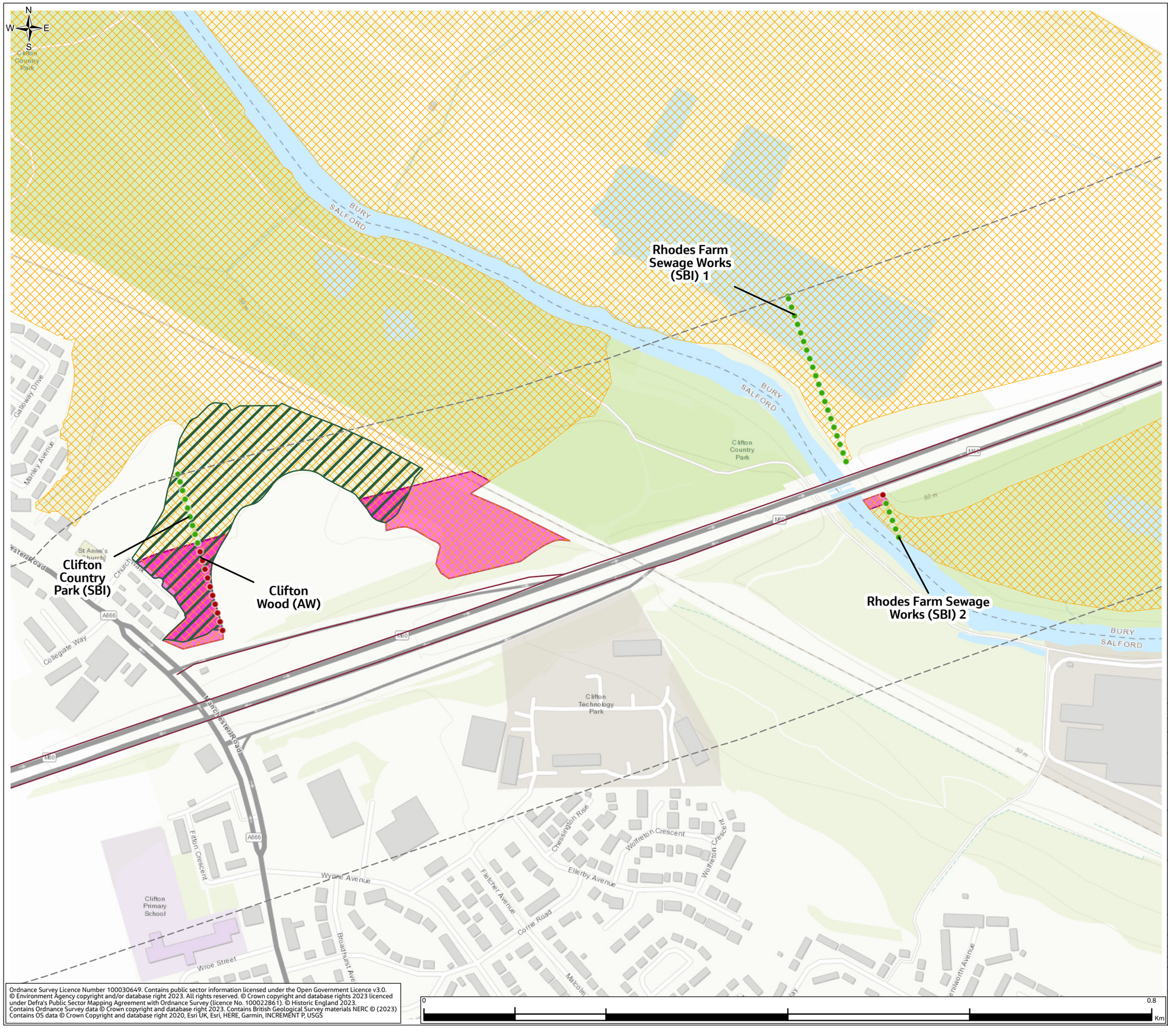
DESIGNATED SITES
AFFECTED BY NITROGEN DEPOSITION
SHEET 2 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2

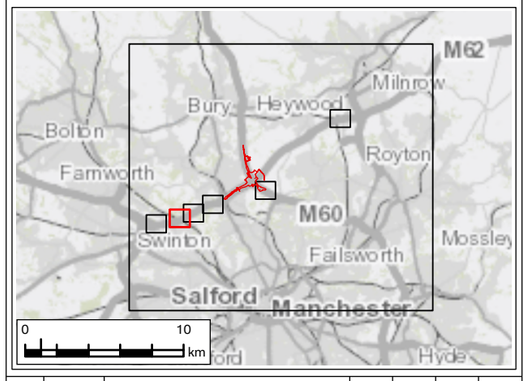


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number: TR010064

Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP M60/M62/M66 SIMISTER ISLAND INTERCHANGE

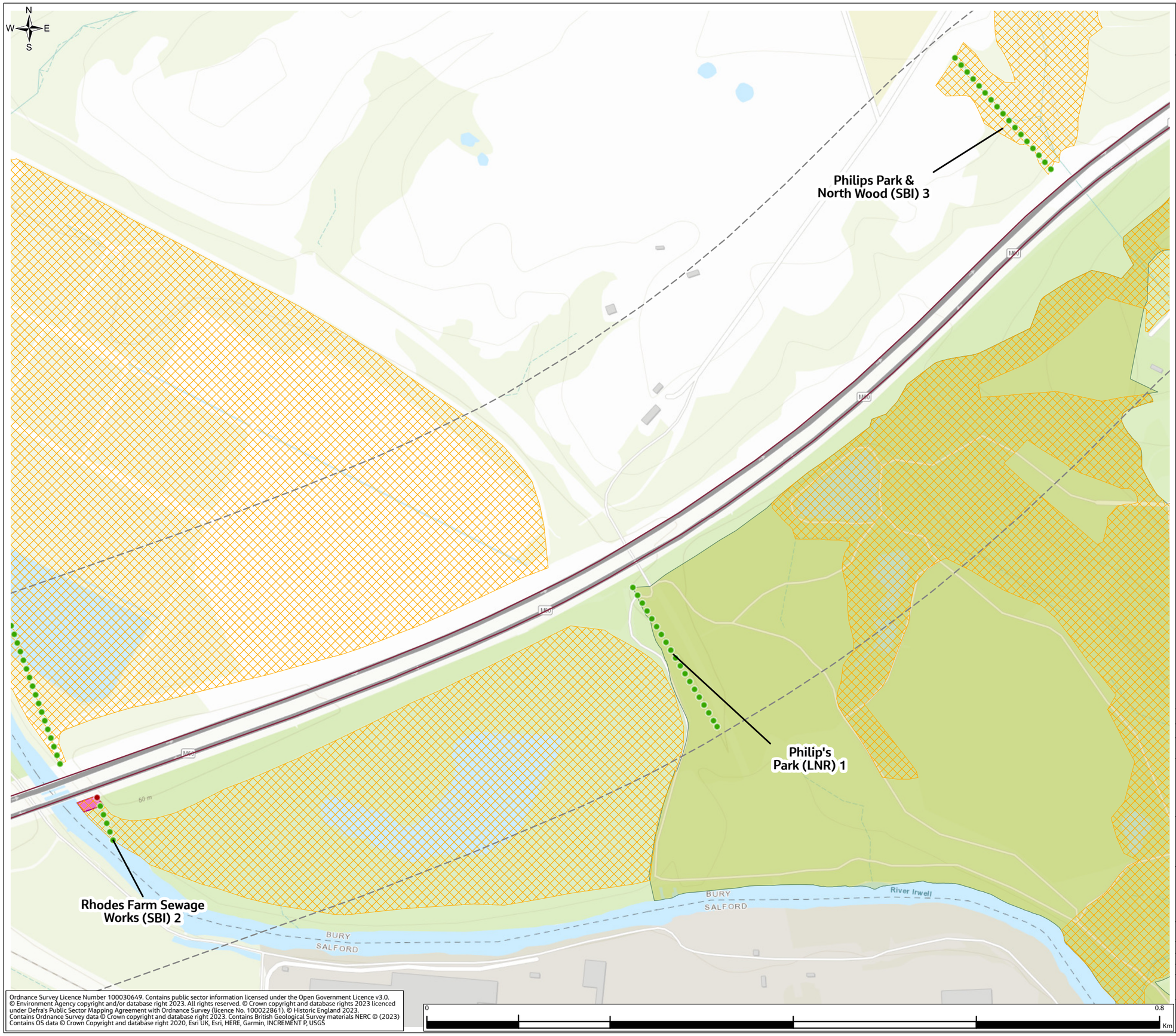
Drawing Title: DESIGNATED SITES AFFECTED BY NITROGEN DEPOSITION SHEET 3 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

ENVIRONMENTAL STATEMENT
APPENDIX 8.2 FIGURE 8.2.2

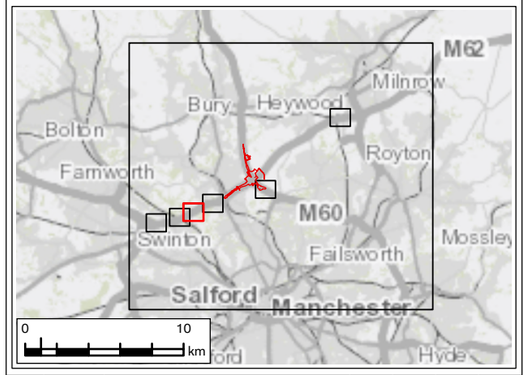


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number:	Development Consent Order Drawing Number:
TR010064	6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

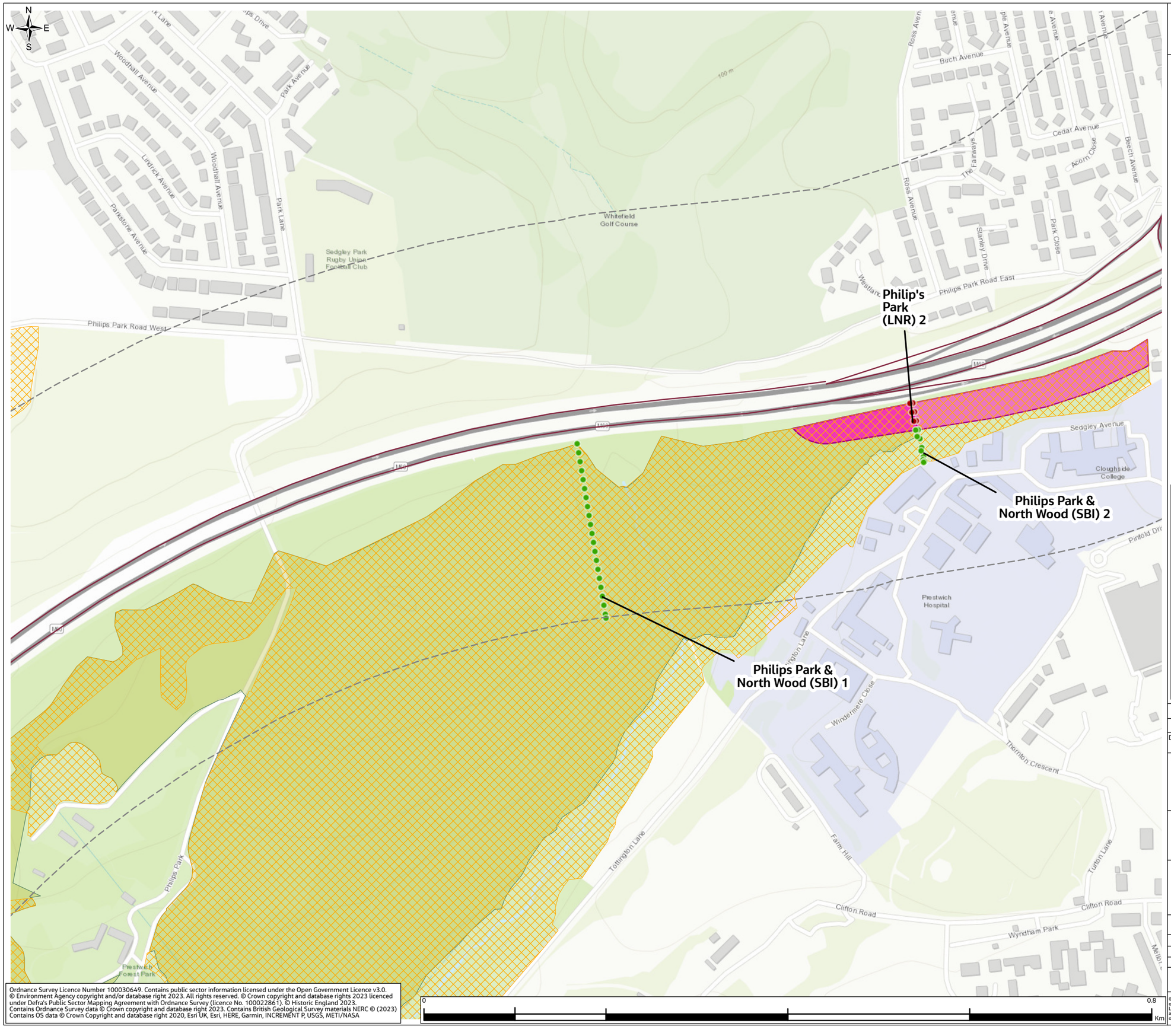
Drawing Title: DESIGNATED SITES
AFFECTED BY NITROGEN DEPOSITION
SHEET 4 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2

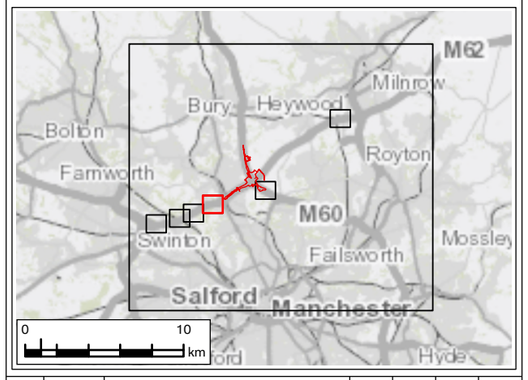


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number:	Development Consent Order Drawing Number:
TR010064	6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

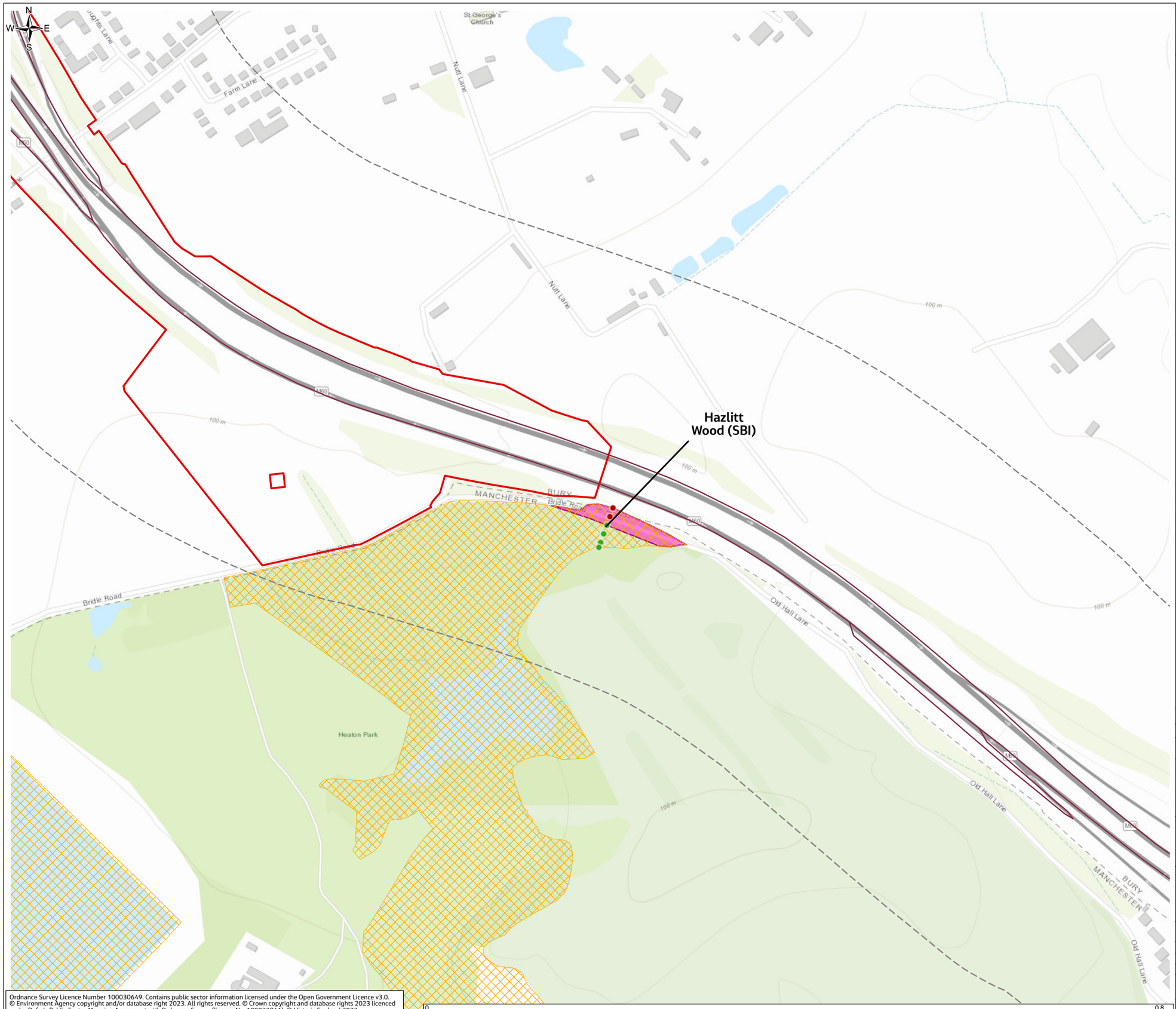
Drawing Title: DESIGNATED SITES
AFFECTED BY NITROGEN DEPOSITION
SHEET 5 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	Rev P01
Client No.	HE548642	

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2

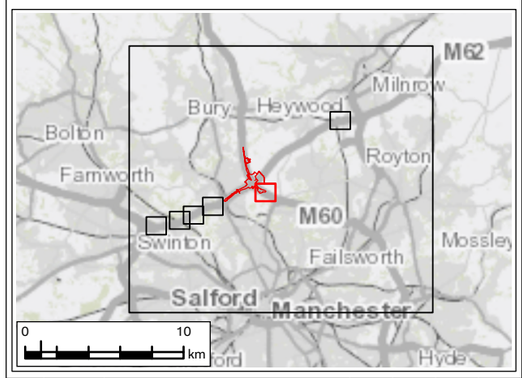


Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)



Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number:	Development Consent Order Drawing Number:
TR010064	6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES AFFECTED BY NITROGEN DEPOSITION SHEET 6 OF 7

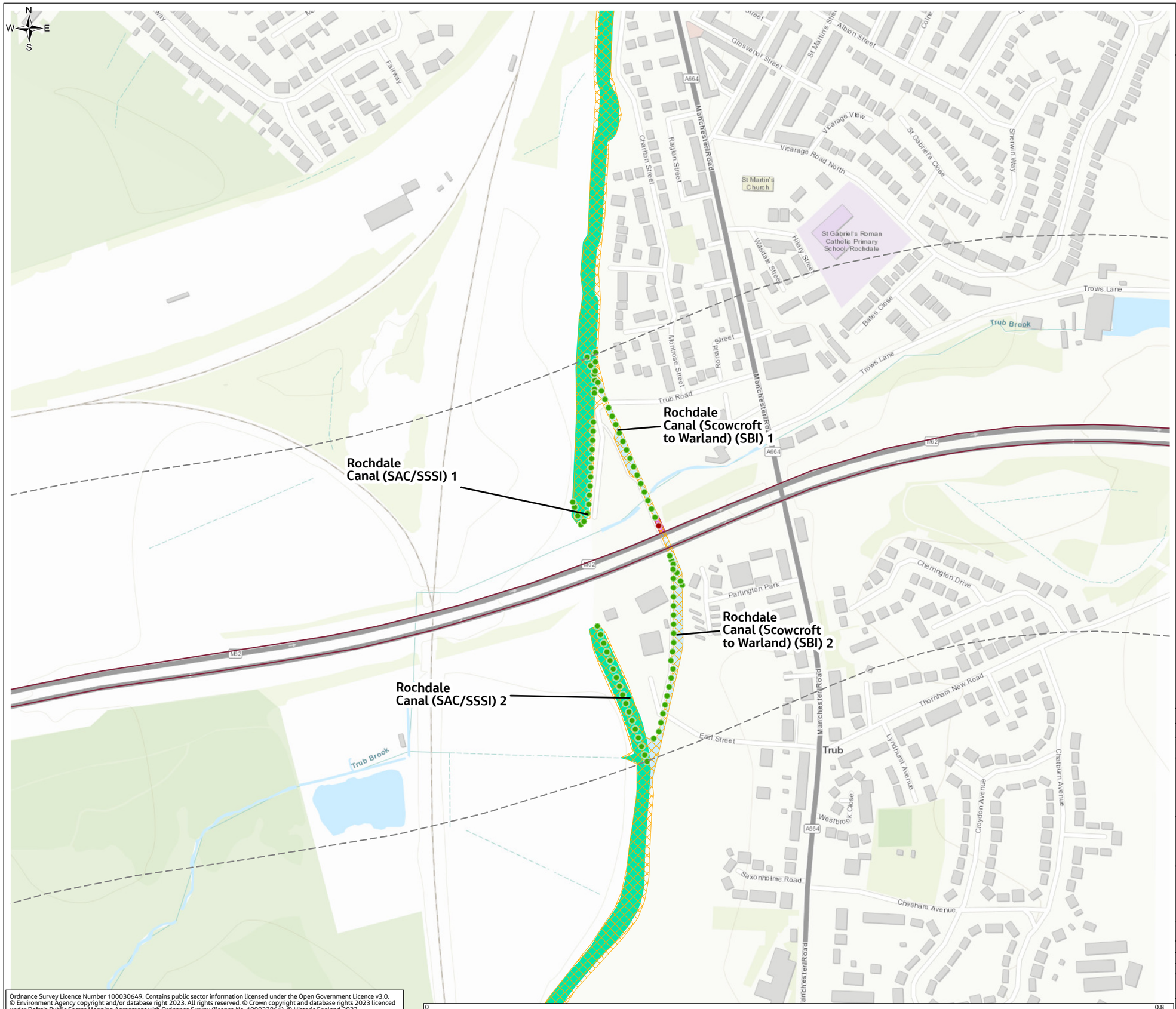
Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

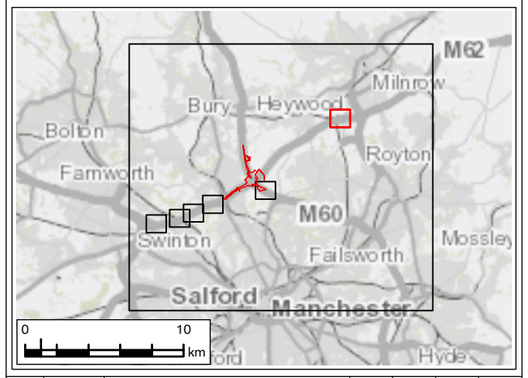
Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041

0 0.8 Km

ENVIRONMENTAL STATEMENT APPENDIX 8.2 FIGURE 8.2.2





Legend

- Order Limits
- Affected Road Network (ARN)
- Affected Road Network 200m Buffer

Modelled Ecological Receptors (Operational)

- Not significant
- Potentially Affected
- Nitrogen Affected Areas
- Ancient Woodland (AW)
- Sites of Biological Importance (SBI)
- Local Nature Reserve (LNR)
- Rochdale Canal (Sites of Specific Interest and Special Area of Conservation)

Rev.	Rev. Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
P01	JAN 24	For DCO application	LT	MS	JR	BB

Development Consent Order Number: TR010064

Development Consent Order Drawing Number: 6.3

Client: national highways

Project: REGIONAL DELIVERY PARTNERSHIP
M60/M62/M66 SIMISTER ISLAND INTERCHANGE

Drawing Title: DESIGNATED SITES
AFFECTED BY NITROGEN DEPOSITION
SHEET 7 OF 7

Drawing Status: S4 – SUITABLE FOR STAGED APPROVAL

Scale @ A3	1:4,000	DO NOT SCALE
Jacobs No.	B36601F0	
Client No.	HE548642	Rev P01

Drawing Number: HE548642-JAC-LDC-SII_MLT-SK-LE-0041