



M54-M6/M6 Toll Link Road

PCF Stage 3 EIA Scoping Report

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December 2018**

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1. INTRODUCTION

1.1. Purpose of the Report

1.1.1. This document is an Environmental Impact Assessment (EIA) Scoping Report for the M54-M6 / M6 Toll Link Road (herein referred to as 'the proposed Scheme'). The proposed Scheme would provide a link road between Junction 1 of the M54 and Junction 11 of the M6. The proposed Scheme aims to reduce congestion on local and regional routes, particularly the A460 and A449 and deliver improved transport links to encourage the development of the surrounding area, providing social and economic benefits for the West Midlands region. The proposed Scheme would comprise the following works:

- a new link road of approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11 to provide a two lane carriageway in both directions;
- new grade-separated junction at M54 Junction 1 to provide free flow links to and from the M54 and the new link road;
- a three roundabout dumbbell arrangement connected by short dual carriageway link roads would be provided at M54 Junction 1 to maintain connectivity of the local road network;
- realignment of Hilton Lane over the new link road and construction of new accommodation bridges along the length of the proposed Scheme; and
- the new link road would connect at-grade to M6 Junction 11. Junction capacity improvements are proposed at M6 Junction 11.

1.1.2. The proposed Scheme is defined as a Nationally Significant Infrastructure Project (NSIP) under Section 14(1)(h) and Section 22 of the Planning Act 2008 (PA 2008) (Ref 1.1) (as amended by The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013) (Ref 1.2) by virtue of the fact that:

- it comprises the construction of a highway;
- the highway to be constructed is wholly in England;
- the Secretary of State is the highway authority for the highway; and
- the speed limit for any class of vehicle on the highway is to be 50 miles per hour or greater and the area for the construction of the highway is greater than 12.5 hectares (ha).

1.1.3. In accordance with PA08, a Development Consent Order (DCO) is therefore required to allow the construction and operation of the proposed Scheme.

1.1.4. The proposed Scheme will be subject to an EIA, as reported within an Environmental Statement, on the basis that it is considered to be EIA development and listed within Schedule 2 Regulation 3(1) Part 10 (f) (construction of roads) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (herein required to as 'the EIA Regulations') (Ref 1.3), and it has the potential to generate significant environmental effects by virtue of its nature, scale and location.

1.1.5. In accordance with Regulation 8(1) (b) of the EIA Regulations, Highways England has notified the Secretary of State for Transport (Secretary of State) in a letter to the Planning Inspectorate (the Inspectorate) dated 11th January 2019 that an Environmental Statement presenting the findings of the EIA will be submitted with the DCO application.

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- 1.1.6. It is the purpose of this report to identify the scope of the EIA to be reported in the Environmental Statement. This report has been prepared in accordance with the requirements of the EIA Regulations.
- 1.1.7. The Localism Act 2011 (Ref 1.4), appointed the Inspectorate as the agency responsible for operating the DCO process for NSIPs. In its role, the Inspectorate will examine the application for the proposed Scheme and then will make a recommendation to the Secretary of State who will make the decision on whether to grant or to refuse the DCO.
- 1.1.8. In accordance with section 104(2) of the PA 2008, the Secretary of State is required to have regard to relevant National Policy Statement (NPS), amongst other matters, when deciding whether or not to grant a DCO. The relevant NPS for the proposed Scheme is the National Policy Statement for National Networks (NPSNN) (Ref 1.5) which was designated in January 2015 (refer to Section 5.2).
- 1.1.9. Other matters that the Secretary of State considers important and relevant include national and local planning policy. The National Planning Policy Framework (NPPF) published in July 2018 is the relevant national planning policy (Ref 1.6).
- 1.1.10. The key local planning policies of relevance to the proposed Scheme consist of the following:
- South Staffordshire Council Core Strategy Development Plan Document adopted December 2012 (Ref 1.7);
 - South Staffordshire Site Allocations document adopted September 2018 (Ref 1.8);
 - Minerals Local Plan for Staffordshire (2015-2030) adopted February 2017 (Ref 1.9); and
 - Staffordshire and Stoke-on-Trent Waste Local Plan (2010 to 2026) adopted March 2013 (Ref 1.10).
- 1.1.11. Chapters 6 to 16 of this EIA Scoping Report describe the national and local planning policies relevant to the assessment with a summary provided for each environmental topic.
- 1.1.12. The purpose of considering the above mentioned planning policy at the EIA scoping stage of the EIA is twofold:
- To identify policy that could influence the sensitivity of receptors (and therefore the significance of effects) and any requirements for mitigation.
 - To identify planning policy that could influence the methodology of the EIA. For example, a planning policy may require the assessment of a particular impact or the use of a particular methodology.

1.2. Overview of the Project

- 1.2.1. The proposed Scheme would consist of a new two lane dual carriageway link road, approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11 (Refer to Figure 1.1 Draft DCO Site Boundary and General Arrangement). This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.
- 1.2.2. The proposed Scheme, located in South Staffordshire, would bypass the villages of Featherstone and Sharesill to the east of the existing A460. The alignment of the proposed Scheme would be sited to the west of Hilton Hall, crossing Hilton Park to

the west of Hilton Park ponds, close to Dark Lane. A bridge would cross over the link road maintaining continuous access along Hilton Lane. The proposed Scheme would then continue to the east of Brookfield Farm before linking into the M6 Junction 11 roundabout. Junction capacity improvements are proposed at M6 Junction 11.

The Overseeing Organisation

- 1.2.3. Highways England is the Applicant and the Strategic Highways Company, as defined in the Infrastructure Act 2015 (Ref 1.11) charged with modernising and maintaining the highways, as well as running the network and keeping traffic moving.

2. THE PROJECT

- 2.1.1. In 2001 the West Midlands Area Multi Modal Study (Ref 2.1) recommended that the construction of a link road between the M54 and M6/ M6 Toll to provide the 'missing' link between the M54 and the M6 northbound. The government formerly identified the need for the proposed Scheme in 2014 in the Road Investment Strategy: 2015 to 2020 (Ref 2.2), which sets out the long term approach to improve England's motorways and major roads.
- 2.1.2. The M54 currently merges into the M6 southbound at Junction 10a. There is no direct motorway link from the M54 to the M6 northbound or M6 Toll. Traffic wishing to make this movement has to leave the motorway network and use the regional/local road network including the A449, A5 and A460. The routes used are heavily congested, particularly during peak periods, and exhibit relatively high accident rates.
- 2.1.3. The current signed trunk road route between the M54 eastbound and the M6 northbound is the A449, featuring a National Speed limit, and the A5 with a 50 mph speed limit travelling between M54 Junction 2 and M6 Junction 12. Traffic heading for the M6 northbound and the M6 Toll currently divert at M54 Junction 1 on to the A460 local road, past the villages of Featherstone and Shareshill, then through M6 Junction 11.
- 2.1.4. The M6 between Junction 10a and 13 has recently been upgraded to Smart Motorway. The scheme, opened in February 2016 implements Controlled Motorway between Junctions 10a and 11a and Smart Motorway All Lanes Running between Junctions 11a and 13.
- 2.1.5. The existing A460 west of the M6 is a single carriageway road approximately 10 metres wide with no physical separation between the flows of traffic in each direction. The A460 predominantly features a 40 mph speed limit, interspersed with 30 mph and 50 mph sections. The A460 has numerous minor roads and private accesses joining it between the M54 and the M6, requiring six priority junctions and one signal controlled junction. These provide access to Featherstone, Shareshill, Hilton Park and other isolated properties. These junctions are all at-grade and result in right turning traffic having to cross on-coming traffic to exit and enter the junctions. At Featherstone and Shareshill there are ghost island right turn lanes. The junction with New Road and Dark Lane in Featherstone is a signalised cross road.
- 2.1.6. The regional and local road network is not adequate to cope with the high volumes of traffic, often consisting of heavy goods vehicles (HGVs), having to divert off the motorway network to travel between the M54 and M6 northbound and the M6 Toll. There is a need to provide a link road to address the current levels of congestion and its impacts on motorists and business users. Investment in additional capacity will contribute to economic growth by facilitating development along the M54 corridor including the Shrewsbury and Telford growth points, the major investment site i54 at Junction 2 and the High Technology Corridor along the A449 north of Wolverhampton.
- 2.1.7. The purpose of the proposed Scheme is to provide a link between the M54 Junction 1 and the M6 Junction 11. The proposed Scheme aims to relieve congestion in the A460 corridor and to provide better regional transportation links.

2.2. Project Objectives

2.2.1. The overall objectives for the proposed Scheme are:

- **Make the network safer:** reducing accidents on the A460 and the A449 by transferring strategic traffic from the existing roads onto the new link. Designing the link to modern highway standards, reducing driver stress, and providing adequate capacity for predicted traffic levels.
- **Improve user satisfaction:** making journey times more reliable and easing congestion on the A460 and A449 by segregating local and non-motorised road users from high-speed traffic moving between the motorways by transferring strategic traffic from the local road network onto the new link.
- **Support the smooth flow of traffic:** by putting the right traffic on the right roads, providing long distance, strategic traffic with a route appropriate for its needs. Providing increased lane capacity and improved junction performance to meet predicted traffic growth. Making movements at M54 Junction 1 and M6 Junction 11 more free-flowing through improved geometry.
- **Encourage economic growth:** by increasing the capacity and resilience of a critical part of the trans-European network providing better access to and from the Midlands for businesses and commuters, enabling major residential and commercial developments to proceed, leading to increased economic growth, regionally and nationally.
- **Deliver better environmental outcomes:** by identifying environmental issues early and engaging with interested parties in order to try and minimise the impact of the proposals.
- **More accessible and integrated network:** by placing the right traffic on the right roads and freeing up local capacity for all types of road user, including pedestrians, cyclists, equestrians and other vulnerable users and improve connectivity for the communities along the roads, improve amenities for non-motorised users and reduce severance on the routes.
- **Achieving real efficiency:** by promoting a “one team” type of environment which will help drive efficiencies in terms of cost and programme savings throughout the delivery of the project.
- **Keeping the network in good condition:** Providing a high capacity link to modern design standards will make the network easier and safer to maintain.
- **Create a Positive Legacy:** Recognising the wider benefits of the road improvement Scheme for local communities and businesses.

2.3. Project Location

2.3.1. The proposed Scheme would be located within the county of Staffordshire between the national and regional routes, the M54, M6 and A460. The M54 runs approximately east to west between Junction 10a of the M6 and the urban area of Telford. Located within the administrative boundary of local authorities Staffordshire County Council and South Staffordshire District Council the proposed Scheme would be located in a predominantly rural area consisting mainly of mixed agricultural land and scattered woodland. South of Hilton Lane is an area of historic park land associated with Hilton Hall.

2.3.2. The nearest residential areas include the villages of Shareshill to the north-west, Featherstone and Hilton to the west and Essington to the south and the hamlet of

Little Saredon to the north-west. There are also a number of more isolated residential properties and farm holdings.

- 2.3.3. The land required for the construction, operation and maintenance of the proposed Scheme (hereafter referred to as the draft DCO site boundary) which includes land required for permanent and temporary purposes, is shown in Figure 1.1. Key environmental constraints and receptors for biodiversity, cultural heritage, landscape and visual and water resources are illustrated in Figures 7.1, 8.1-8.3, 9.1 – 9.5, 12.1 and 14.1. It is important to note that as the design process is ongoing the current draft DCO site boundary captures what is thought to be a reasonable worst-case requirement for land, including both temporary and permanent land take (see also use of the ‘Rochdale Envelope’ paragraphs 2.3.5-2.3.7).
- 2.3.4. The proposed Scheme is located in the Green Belt and crosses a Historic Landscape Area designated under Core Strategy policies EQ3 and EQ4. The draft DCO site boundary includes a sliver of land designated as the Hilton Cross Strategic Employment Site under Core Strategy Policy CP1 and EV1, located to the south-west of M54 Junction 1. At the time of writing this assessment, we are not aware of any extant or pending planning applications or other areas allocated for development in the South Staffordshire Local Plan located within the draft DCO site boundary.

The Rochdale Envelope

- 2.3.5. The Inspectorate’s Advice Note 9: Using the ‘Rochdale Envelope’ (Ref 2.3) provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the PA 2008. The advice note acknowledges that there may be aspects of the proposed scheme design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst case variations to ensure that all foreseeable significant environmental effects of the proposed scheme have been assessed. In accordance with the guidance provided in Advice Note 9, the draft DCO site boundary has been drawn at this stage to allow some design flexibility. The project design process is ongoing, and as such it is not possible to define the exact footprint of the proposed Scheme. Figure 1.1 is intended to show the potential worst-case scenario, including candidate sites that may be required for site compounds, soil and material storage, flood storage areas and areas needed for mitigation or enhancement, based on current knowledge. As such, the draft DCO site boundary as included herein will be subject to review and revision, but will be finalised prior to the DCO application.
- 2.3.6. This Scoping Report is based on the emerging preliminary design for the proposed Scheme, as described in Section 2.4. The proposed Scheme is to be developed further through a reference design stage which will form the basis for the DCO application.
- 2.3.7. Within the reference design there will need to be sufficient flexibility to provide scope for finalising the detailed design and construction methodology in due course. Therefore, when presenting the proposed Scheme design in the Environmental Statement and the accompanying assessment, the requirements of Advice Note 9 will be complied with to ensure that the likely significant effects of the proposed Scheme are assessed on a reasonable worst-case basis.

2.4. Project Description

- 2.4.1. The preferred route for the proposed Scheme was confirmed by the Secretary of State in September 2018. This section provides a description of the proposed Scheme from south to north.

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- 2.4.2. M54 Junction 1 would be rebuilt with the existing junction removed. The new arrangement would provide free flow movements between the M54 and the new link road in both directions. The free flow links would pass through the junction underneath the existing M54 and approximately at existing ground level. Three new smaller roundabouts connected by short dual carriageway link roads would replace the existing junction and maintain connectivity of the local road network at this location. Junction optioneering is currently being undertaken for the M54 Junction 1 as part of Value Engineering, there is the potential for the free flow aspect of the junction to be removed and replaced with an at-grade signalised junction solution.
- 2.4.3. The proposed Scheme would cross Hilton Park passing to the west of the Hilton Park ponds roughly at-grade, close to Dark Lane (approximate distance of 30 m between the roads centreline and closest property). The alignment of the mainline in the vicinity of Dark Lane is currently under review to provide if possible further separation between the alignment and residential properties on Dark Lane.
- 2.4.4. Dark Lane will be stopped up between the final property along Dark Lane to the west and the junction with Hilton Lane to the east. The proposed Scheme crosses the existing alignment of Hilton Lane roughly at-grade. A new bridge will connect Hilton Lane either side of the new link road. It is proposed that approximately 700 m of Hilton Lane would be realigned to the west of its current alignment by up to 20 m and raised by approximately 6 m in height. Local accesses and turning heads are proposed on either side of Hilton Lane to retain access to the existing residential properties. Alternative options for the vertical level of the mainline in the vicinity of Hilton Lane are currently being explored in order to reduce the length of Hilton Lane that will need to be realigned as well as the visual and noise intrusion.
- 2.4.5. Accommodation bridges and tracks will also be provided along the mainline to serve severed land including land and fishing ponds to the south-west of Hilton Hall and land to the east of Brookfield Farm. The route of the proposed Scheme would then continue to the east of Brookfield Farm before linking into M6 Junction 11. Junction capacity improvements are proposed at M6 Junction 11. These improvements currently consist of an enlargement of the M6 Junction 11 roundabout to accommodate both A460 connection and the new link road. Two new structures would be required over the M6 which would both be four lanes wide and designed to be built offline to the north and south of the existing structures. Earthworks Design
- 2.4.6. At M54 Junction 1 the new free flow links would pass through the junction underneath the existing M54 at the level of the existing roundabout, immediately to the east of M54 Junction 1 the proposed Scheme would be in cutting through the Historic Parkland towards Dark Lane. The two roundabouts proposed at M54 Junction 1 to the north of the M54 would be on embankment in order to provide a dumbbell link over the mainline. The roundabout to the south of the M54 would be roughly at the existing roundabout level.
- 2.4.7. The proposed Scheme would be approximately at-grade in the vicinity of Dark Lane and continue at-grade up to Hilton Lane. Between Hilton Lane and Brookfield Farm the proposed Scheme would be approximately at grade with small sections of embankment and cutting due to the undulating nature of the exiting topography. The proposed Scheme would then rise to link into the M6 Junction 11 roundabout and would be on embankment from the River Penk crossing to M6 Junction 11.
- 2.4.8. Initial assessment indicates that the proposed Scheme would have an overall deficit of approximately 100,000 m³ of material based on a 1:3 side slope. However, as noted previously, alternative options for the vertical level of the mainline in the vicinity of Hilton Lane are currently being explored which would also increase the

amount of available material onsite that may be suitable for reuse in order to reduce the deficit.

Drainage and Flood Risk Design

- 2.4.9. The design of the proposed Scheme will include the provision of a suitable drainage design. Outfalls would be provided to local watercourses, with flow rates limited in accordance with Environment Agency requirements.
- 2.4.10. The proposed Scheme would cross an area of land designated as Flood Zone 2 and Flood Zone 3 to the north of the proposed Scheme at Latherford Brook. Development in this area has the potential to result in an increased risk of flooding. In order to manage such risks, flood modelling will be undertaken in order to design appropriate compensatory flood storage areas. Flood storage provisions will be confirmed in the Environmental Statement.

Provision for Pedestrians, Cyclists and Equestrians

- 2.4.11. The proposed Scheme design aims to at least maintain the level of provision and connectivity for pedestrians, cyclists and equestrians (also referred to as non-motorised users (NMUs)) that exists at present with enhanced provision where deemed appropriate and reasonable – refer to Chapter 13 (Population and Health). In undertaking the design of proposed NMU facilities, the requirements of the Equality Act 2010 will be considered where required in order to take appropriate account of the needs of disabled users.
- 2.4.12. Improvements to NMU facilities and connectivity across M54 Junction 1 and M6 Junction 11 have been identified as opportunities to improve connectivity between local communities. This will be explored through preliminary design.
- 2.4.13. The proposed Scheme will be designed to minimise the impact on public rights of way. The design of alternative routes will aim to keep routes as close to the existing route as possible, and avoid diverting routes alongside the realigned road network where possible.
- 2.4.14. The proposed Scheme will adopt construction and traffic management methods which, as far as possible, maintain access to NMU routes for road users, cyclists, pedestrians, equestrians and other key accesses during construction periods.

Lighting and Signing Strategy

- 2.4.15. Currently it is anticipated that both M54 Junction 1 and M6 Junction 11 would be lit, however the mainline of the proposed Scheme is not anticipated to be lit outside of the junction areas. A project appraisal report will be undertaken as part of preliminary design that will confirm the requirement for lighting along the proposed Scheme.
- 2.4.16. Currently it is anticipated that new gantry mounted signage would be required along the M54 on approach to M54 Junction 1. It is proposed that existing signage arrangement would be retained along the M6. A review of the wider signing strategy for the strategic road network in the vicinity of the proposed Scheme will be undertaken as part of preliminary design.

Utilities

- 2.4.17. Enabling works including utilities diversions will be required to accommodate the proposed Scheme. Such works would be undertaken by the applicable utilities companies.

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- 2.4.18. Notable utilities assets that would require diversion as part of the proposed Scheme include a large diameter high pressure gas main in the vicinity of M54 Junction 1 and a large diameter potable water main along Dark Lane.

Areas Needed for Construction

- 2.4.19. A number of areas are likely to be required temporarily during construction of the proposed Scheme. These areas are included within the draft DCO site boundary (Figure 1.1) and include proposed areas for temporary construction compounds. The need for these areas will be confirmed and reported within the Environmental Statement.
- 2.4.20. It is currently anticipated that the majority of the proposed Scheme will be constructed offline including the mainline and majority of M54 Junction 1 with access from the existing road network. Once construction of the offline section of the proposed Scheme is complete the connections to the existing network at M54 Junction 1 and M6 Junction 11 will be constructed. This phasing seeks to complete sections of road works and open to traffic as soon as is practical, in order to secure tangible benefits to customers as early as possible.

Timescale

- 2.4.21. Statutory Consultation for the proposed Scheme is planned to take place in the spring and summer of 2019. Following assessment of the consultation feedback, appropriate design amendments and EIA, the formal DCO application is planned for early 2020. Subject to successfully passing through the DCO process it is intended to commence construction in 2021, with the first full year of opening anticipated to be 2024.
- 2.4.22. The assessment of alternative options is discussed in Chapter 3 of this report.

3. ASSESSMENT OF ALTERNATIVES

3.1. Introduction

3.1.1. The Secretary of State announced the preferred route for the proposed Scheme on 26th September 2018. This chapter presents a brief history of the proposed Scheme and the alternative designs considered to reach the preferred route as described in Chapter 2.

3.1.2. The process of option identification and selection is proscribed by the stages of the Highways England Project Control Framework (PCF) as shown in Figure 3.1.

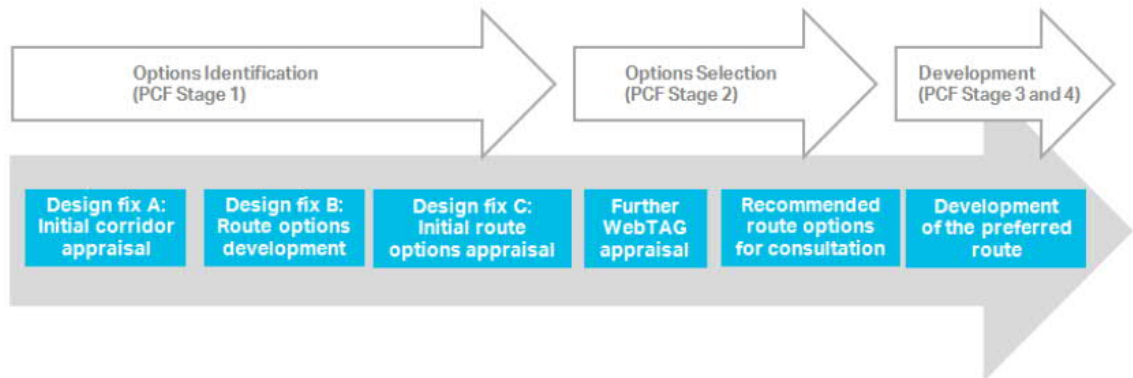


Figure 3.1: The PCF Option Identification and Selection Process

3.1.3. A three-stage process of options identification and sifting was undertaken to identify shortlisted route options for detailed appraisal:

- Design Fix A - Corridor identification and initial sifting of corridors;
- Design Fix B - Design development of route options within preferred corridors; and
- Design Fix C - Initial appraisal and sifting of route options to identify options to take forward for appraisal.

3.2. History of the Proposed Scheme

3.2.1. In 2001 the West Midlands Area Multi Modal Study (Ref 3.1) recommended the following:

“As a result of the appraisal process, the following key highway components, [...] have been identified for the 2031 Plan:-

- *The M5/M6 corridor should retain a role as the north-south strategic route for long distance through traffic;*
- *A link should be provided between the M54 and the M6/Birmingham Northern Relief¹”*

3.2.2. PCF Stage 1 option identification took place between 2004 and 2009. Preliminary alignment options were developed in 2004. Three distinct route types were identified:

- Option A - A dual two lane all-purpose road linking the M54 Junction 1 to M6 Junction 11.

¹ The M6 Toll was previously referred to as the Birmingham Northern Relief.

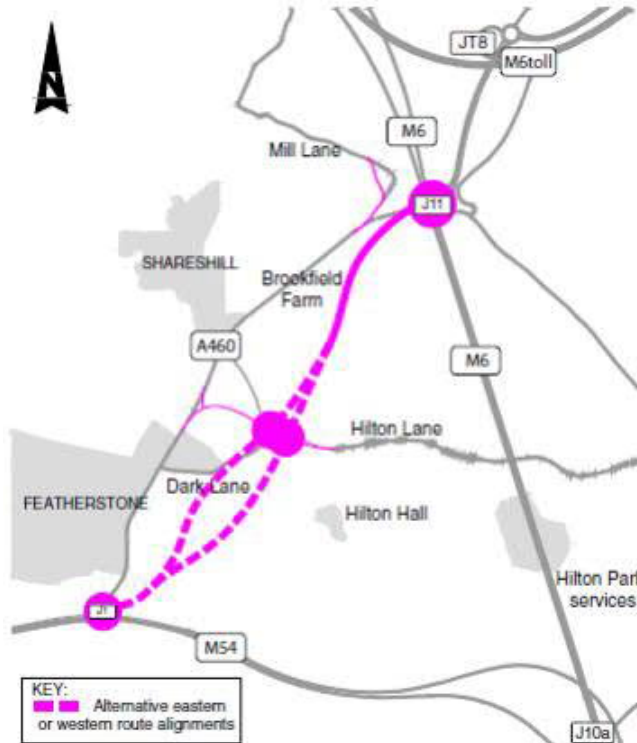
- Option B - A dual two lane all-purpose road linking the M54 Junction 1 to M6 (Toll) Junction T8, bypassing M6 Junction 11.
- Option C - Provision of direct north facing links between the M54 and M6, at Junction 10 of the M6.

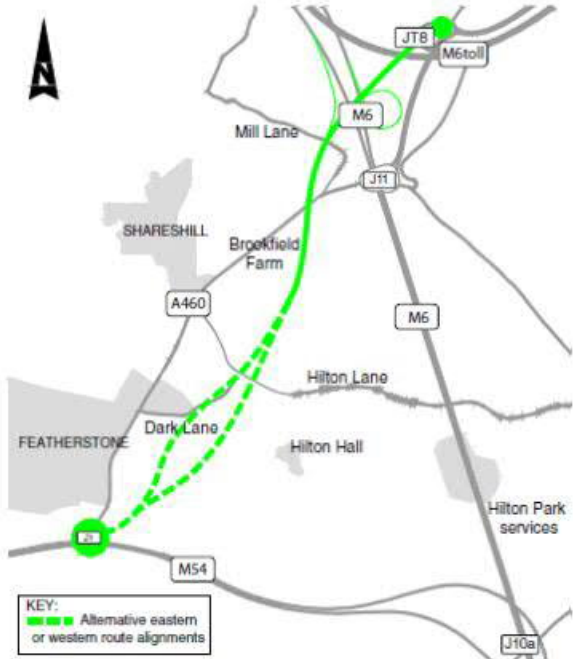
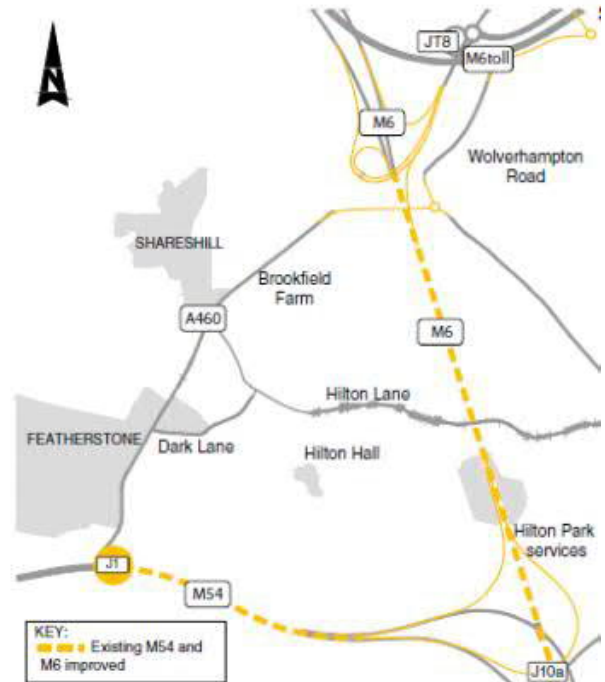
3.2.3. In June 2006 these three potential route concepts were shared with the public at public information exhibitions for comment. Following the public information exhibitions further development of the concepts was undertaken to take account of comments or views received at the exhibitions.

PCF Stage 2 - Environmental Assessment Report (2015)

3.2.4. Following the proposed Scheme’s inclusion in the Road Investment Strategy (Ref 3.1) PCF Stage 2 commenced in 2014, initially assessing seven route options (A(e), A(w), B(e), B(w), C, B(e)M and B(w)M). These options were taken forward from the PCF Stage 1 2009 Traffic Assessment Report (TAR) (Ref 3.2) and 2014 TAR Addendum (Referred to at PCF Stage 1 as options A, B9, B10, C, D5 and D8) (Ref 3.3). From 2014 to 2016 these options were further developed and assessed, the results of which were reported in the 2015 Environment Assessment Report (EAR) (Ref 3.4). The EAR provided an initial assessment of air quality, noise and vibration, cultural heritage, landscape, nature conservation, geology and soils, materials, effects on all travellers, community and private assets and road drainage and the water environment for each of the proposed Scheme options. The conclusions of the environmental assessments within the EAR were used to inform the public consultation and used as part of the sifting process to inform the selection of the preferred route.

Table 3.1: PCF Stage 2 Options assessed in the EAR (2015)

Option	Description	Scheme Design
Option A: East alignment and West alignment	A new dual 2-lane all-purpose link road between M54 Junction 1 and the M6 Junction 11, bypassing the villages of Featherstone and Shareshill and sited to the west of Hilton Hall.	 <p>The map illustrates the proposed route for Option A, highlighted in pink. It shows a link road connecting M54 Junction 1 (J1) to M6 Junction 11 (J11). The route bypasses the villages of Featherstone and Shareshill and is located to the west of Hilton Hall. Key locations and roads shown include: M54, J1, Featherstone, Dark Lane, Hilton Lane, Hilton Hall, Hilton Park services, M6, J11, Mill Lane, Brookfield Farm, A460, Shareshill, M6 Toll, JTB, and J10a. A north arrow is present in the top left corner. A key at the bottom left indicates that the pink dashed line represents 'Alternative eastern or western route alignments'.</p>

Option	Description	Scheme Design
<p>Option B: East alignment and West alignment</p>	<p>A new dual 2-lane link road between the M54 Junction 1 and the M6 (Toll Junction T8). This option considered two variations in road specification; one is a dual 2-lane all-purpose road and the other a dual lane motorway.</p>	
<p>Option C</p>	<p>A direct motorway standard links at the M6 Junction 10a between the M54 and the M6 to and from the north. The M6 between Junction 10a and Junction 11 would become All Lane Running by continuing the hard shoulder running through Junction 10a up to Junction 11.</p>	

3.2.5. During public consultation in 2015 with local stakeholders it was determined that statutory bodies, major employers and local businesses preferred Option B, followed by Option C. In contrast, the responses from the general public favoured Option C, followed by Option B.

3.2.6. Between January and March of 2016, a further 21 alternatives for the route concept 'C' were developed - these were presented in the Supplement to Scheme Assessment Report (Ref 3.5). The report concluded that in terms of safety, environmental and economic factors, the alternatives to Option C do not perform

significantly better than the originally assessed Option C layout in terms of the extent that they achieve the objectives of the proposed Scheme.

- 3.2.7. The Supplement to Scheme Assessment Report (2016) recommended that Option B(W) should be put forward as the Preferred Route for the proposed Scheme following amendment to the design. This amendment comprised the A460 bridging the new link road to the west of the M6 Junction 11, with the link road lowered to a level similar to that of the existing A460.

PCF Stage 2 – Environmental Assessment Report Addendum (2018)

- 3.2.8. In December 2016 during PCF Stage 2 (options selection), Highways England re-examined an alternative option based on Option C in terms of alignment and economics with the aim of keeping the route close to the existing motorway corridor. In January 2017 the review concluded that the Modified Option C(E) is a viable option and recommended that further detailed assessments be undertaken to produce comparative PCF Stage 2 assessments between the Modified Option C(E) and Modified Option B(W) (an iteration of Option B(W), developed for the 2015 EAR).
- 3.2.9. Environmental assessment of Modified Option C(E) found that this design option would have a direct impact on areas of ancient woodland, resulting in the loss and fragmentation of a valuable and irreplaceable ecological resource. As a result a further variant of Option C, Modified Option C(W), was identified that would avoid direct impacts on ancient woodland.
- 3.2.10. Public consultation was carried out in September 2017 with approximately 71% of respondents supporting Modified Option B(W) as their preferred route. Modified Option C(W) attracted approximately 17% of the responses and Modified Option C(E) approximately 8%. Modified Option B(W) was favoured by local residents and businesses and well as key stakeholders such as Natural England. The exception to this was Historic England who preferred Modified Option C(W) due to the greater impact of all of the other options on the historic park land surrounding Hilton Hall.
- 3.2.11. Overall a large number of responses gave reasons against both Modified Option C(W) and C(E) referring to the impact on the local horse / farming community and the negative impact on wildlife and the landscape. The option C variants (C(W) and C(E)) were found to have a negative effect on several businesses in the area, such as a number of successful farms / equine businesses and a gun club. Reasons for support for Modified Option B(W) focused on convenience and directness, least disruptive and reducing congestion on A460.
- 3.2.12. The free-flow connection to the M6 Toll was subject to contributions by other parties. Due to uncertainty in funding support from Midland Expressway Limited (MEL) who manage the M6 Toll a review of alternative cost saving options for the preferred route, Modified Option B(W) was undertaken. The new option design, Modified Option B(W) (excluding M6 Toll Link) was identified as providing improved value for money. This option is a variant of Modified Option B(W), connecting to the M6 at Junction 11 rather than directly the M6 Toll Junction T8.
- 3.2.13. An assessment of the potential environmental effects of all of the proposed Scheme options, Modified Option B(W), Modified Option B(W) (excluding M6 Toll Link), Modified Option C(E) and Modified Option C(W) are presented in the EAR Addendum (Ref 3.6). The EAR Addendum provided an initial assessment of air quality, noise and vibration, cultural heritage, landscape and visual, nature conservation, geology and soils, materials, people and communities (previously split into effects on all travellers and community and private assets) and road drainage and the water environment of the four proposed Scheme options. The conclusions of

the environmental assessments within the EAR Addendum were used to inform the public consultation and used as part of the sifting process to inform the selection of the preferred route. Figure 3.2 illustrates the routes of the proposed Scheme options assessed within the EAR Addendum.

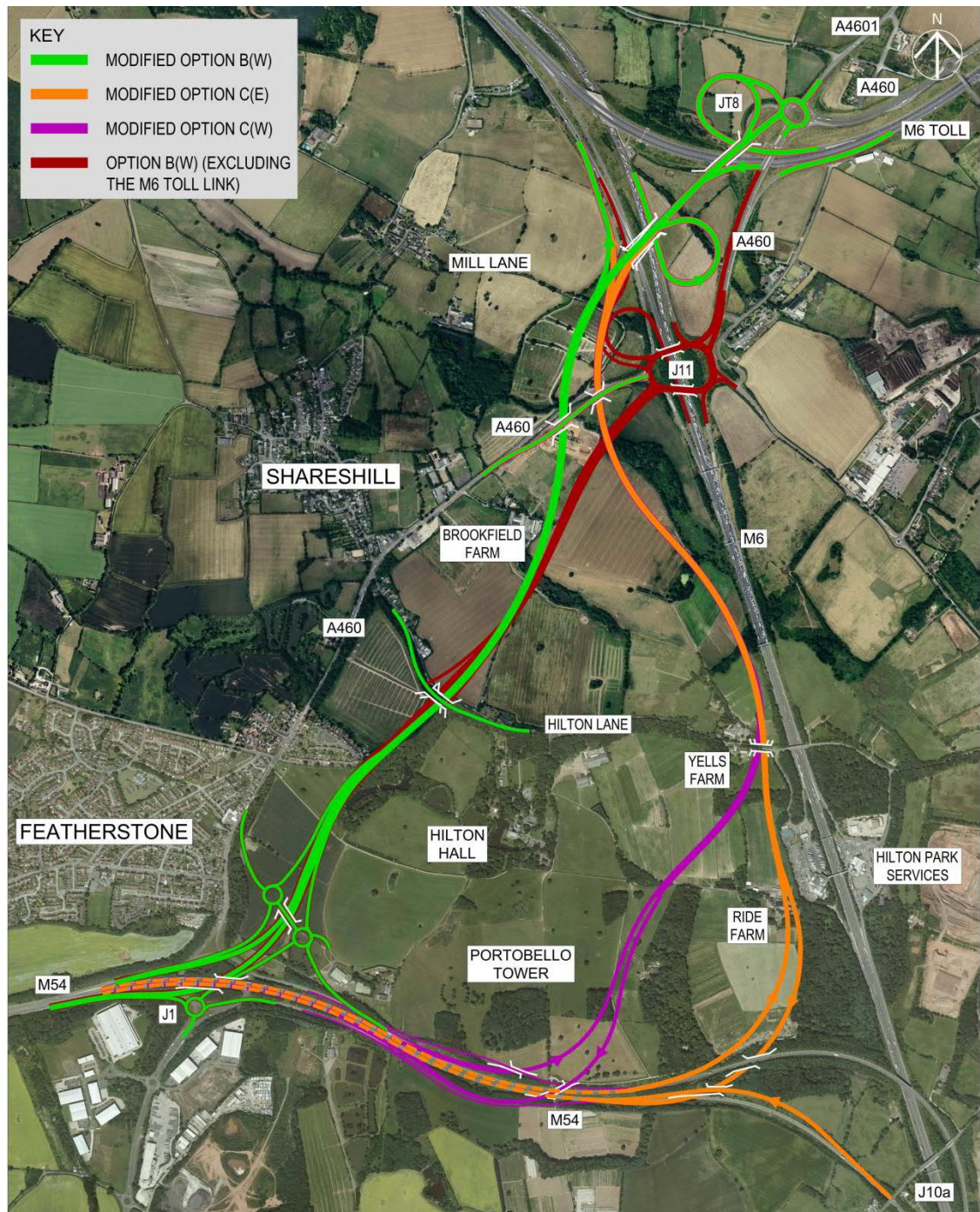


Figure 3.2: PCF Stage 2 options assessed within the EAR Addendum

3.2.14. Modified Option B(w) (Excluding M6 Toll) was taken forwards as the preferred route due to the following:

- the route provides the highest benefit to the local economy;
- the route will provide the best journey time of the options;

- the route is preferred by the majority of the respondents to the public consultation;
- the route protects ancient woodland; and
- the route provides the best value for money.

Further Scheme Development

- 3.2.15. Following the PRA in September 2018 the proposed Scheme is now progressing through PCF Stage 3 (preliminary design) towards DCO application, refer to Figure 1.1 for the current design of the proposed Scheme. The proposed Scheme design will be further developed during PCF Stage 3. This design development, along with details of the assessment of alternative options will be reported in the Environmental Statement which will support the DCO application.

4. CONSULTATION

4.1. Proposed Consultation

4.1.1. Effective consultation and stakeholder engagement is an important part of the DCO process and is intrinsic to the success of the proposed Scheme.

DCO Consultation Requirements

4.1.2. The DCO process has a number of statutory requirements regarding consultation which are detailed in the Planning Inspectorate's Advice Note 3 (Ref 4.1). These requirements stipulate that certain stakeholder groups and the community must be consulted as part of the pre-application process, as set out in Sections 42 and 47 of Planning Act 2008 (Ref 4.2). Further requirements set out how the proposed scheme must be publicised and specific documents produced, including a Statement of Community Consultation (SoCC) and a Consultation Report.

4.1.3. The SoCC for the proposed Scheme will be published prior to formal consultation periods. The SoCC will outline how Highways England will formally consult with the local community about the proposed Scheme. Highways England is required to first consult the relevant local authorities on the draft SoCC and they will have a period of at least 28 days following receipt of the draft SoCC to respond, prior to its publication for inspection by the public.

Statutory Consultation

4.1.4. The Planning Inspectorate will consult on this EIA Scoping Report under the EIA Regulations. The views of consultees will be considered and used to inform the scoping opinion to be issued by the Planning Inspectorate.

4.1.5. Under Section 42 of the PA 2008, Highways England will conduct its own consultation with prescribed consultees (e.g. Natural England, the Environment Agency and Historic England), relevant planning authorities (e.g. Staffordshire County Council and South Staffordshire District Council) and interested parties (e.g. landowners and tenants).

4.1.6. The local community and wider public will be consulted on the proposed Scheme via a statutory consultation programme in accordance with Section 47 of the Planning Act 2008. The statutory consultation programme is expected to be undertaken through spring and summer 2019 and will be carried out in accordance with the SoCC which is currently being developed.

4.1.7. The approach to Section 47 consultation is currently being finalised, but is likely to include (without being limited to):

- exchanges of correspondence, meetings and workshops with local community groups and businesses;
- publication of leaflets, reports and other information made available in the local area and online; and
- public exhibitions at which members of the community can meet with members of the project team.

4.1.8. The purpose of this consultation will be to seek comments from the local community and statutory and technical consultees on the proposed scheme. The consultation will include the provision of environmental information contained within a Preliminary Environmental Information Report (PEIR).

- 4.1.9. Feedback received during the consultation will be taken into consideration by the project team and summarised in the Consultation Report which will be submitted as part of the DCO application. The Consultation Report will demonstrate how Highways England has complied with the consultation requirements of the PA Act 2008 and will be considered by the Inspectorate, both when determining whether to accept the application, and then in examining the application.

5. ENVIRONMENTAL ASSESSMENT METHODOLOGY

5.1. Surveys and Predictive Techniques and Methods

5.1.1. This Scoping Report identifies the topics that will be covered in the Environmental Statement and provides details on how they will be assessed, to ensure that:

- features of environmental importance that could be affected by the proposed Scheme are investigated and evaluated.
- analysis of the impacts and potential effects during construction and operation are undertaken to the necessary level of detail.
- appropriate mitigation measures are identified.
- the significance of effects are assessed.
- cumulative effects are considered.

5.1.2. This Scoping Report is based on the data collected and environmental assessment undertaken at PCF Stage 2 and reported in the EAR Addendum (Ref.5.1). This has been supplemented by advanced ecology surveys as described in Chapter 9: Biodiversity.

Design Manual for Roads and Bridges

5.1.3. The Design Manual for Roads and Bridges (DMRB) Guidance published by the Government for the preparation of environmental assessments of proposed road schemes is contained in the DMRB Volume 11. This sets out both the general process and the methods for assessing individual environmental topics. This EIA Scoping Report also adheres to Interim Advice Note (IAN) 125/15 Environmental Assessment Update (Ref 5.2), which provides a new structure of DMRB Volume 11.

5.1.4. DMRB Volume 11 advises on the environmental topics to be included in an EIA for highway schemes, and the methods to be used in the assessment for each of those topics. The topics identified in Chapters 6 to 16 of this EIA Scoping Report are those required by DMRB and by the EIA Regulations.

5.1.5. The EIA will adhere to the most up-to-date, relevant guidance contained in DMRB and Highways England Interim Advice Notes (IANs). More details of the methods to be used for each individual topic are provided in Chapters 6 to 16 of this EIA Scoping Report. Should any revisions to IANs or DMRB be issued between scoping and reporting of the EIA, they will be adopted where appropriate, provided that it is reasonable to do so within the programme and governance for the project. Any changes in environmental legislation, such as for example the EIA Regulations, will be mandatory, and therefore accommodated.

The National Policy Statement for National Networks (NPSNN)

5.1.6. Strategic roads have their own policy framework, with relevant policy objectives set out in the NPSNN. The NPSNN is framed in the context of wider Government policies on environment, safety, technology, sustainable transport and accessibility. It provides planning guidance for promoters of NSIPs on the road network, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. The Secretary of State will use the NPSNN as the primary basis for making decisions on development consent applications for national networks NSIPs in England. Given the importance of the NPSNN, the EIA approach adopted for the proposed Scheme takes account of this key policy document. The EIA will have regard to the methodological advice within Chapter 5 of the NPSNN.

Major Accidents and Disasters

Legislative Requirements

- 5.1.7. The EIA Regulations have introduced a requirement to consider major accidents and disasters. It is considered likely that the original changes to the EIA Directive to consider major events were made in order to bring certain other statutory requirements, mainly other EU Directives, within the overall 'wrapper' of EIA and the Environmental Statement. The Directive and domestic Regulations cite two specific directives as examples of risk assessments to be brought within EIA, these are Directive 2012/18/EU of the European Parliament and of the European Council (which deals with major accident hazard registered sites) and Council Directive 09/71/Euratom (which deals with nuclear sites). Neither of these Directives is of relevance to the proposed Scheme.

Highways England Guidance

- 5.1.8. Guidance from Highways England, sets out how the changes brought about by the 2017 EIA Regulations are to be implemented for Highways England projects. As such, these instructions set out the proposed scope of assessment in relation to major events ('events' being the collective term used in the instructions for both accidents and disasters). This general scope should cover:

- vulnerability of the project to risks of major accidents and/ or disasters; and
- any consequential changes in the predicted effects of that project on environmental topics.

- 5.1.9. To achieve this, the instructions identify that projects should:

- Apply professional judgement in consultation with the Overseeing Organisation to develop project specific definitions of major events.
- Identify any major events that are relevant to and can affect a project.
- Where major events are identified, describe the potential for any change in the assessed significance of the project on relevant environmental topics in qualitative terms. Report the conclusions of this assessment within the individual environmental topics.
- Clearly describe any assumed mitigation measures, to provide an evidence base to support the conclusions and demonstrate that likely effects have been mitigated/ managed to an acceptable level.

- 5.1.10. The potential receptors of impacts resulting from major events are all reported in the relevant topic chapters, and as such major events is not included as a standalone chapter. Relevant major events will, therefore, be reported in the project description section of the Environmental Statement, whilst any consequences for receptors will be reported in the applicable topic chapters as appropriate.

Methodology

- 5.1.11. The assessment will assess the potential for significant effects (during construction and operation) of major accidents and disasters that:

- could result in impacts upon the proposed Scheme (e.g. fires, flooding); or
- could occur as a consequence of the proposed Scheme (e.g. structure failure/ collapse).

5.1.12. The methodology adopted includes three main stages, as follows:

- **Stage 1:** a long list of possible major events will be developed. This list will draw upon a variety of sources, including the UK National Risk Register of Civil Emergencies (Ref 5.3), the proposed Scheme risk register and the proposed Scheme design hazard assessment log;
- **Stage 2:** a screening exercise will be undertaken to review the long list of major events and to give consideration to their relevance to the proposed Scheme, and therefore whether they should be included on the project specific short list of events requiring further consideration, including by topic specialists; and
- **Stage 3:** where further design mitigation is unable to remove the potential interaction between a major event and a particular topic, the relevant Environmental Statement chapter will identify the potential consequence for receptors covered by the topic, and give a qualitative evaluation of the potential for the significance of the reported effect to be increased as a result of a major event.

5.1.13. Where events identified during this process are not already being considered within existing chapters of the Environmental Statement, they will continue to be reviewed with the design team to ensure the risks are understood and addressed through design as necessary. It is considered highly likely that major events will be scoped out of the assessment prior to the publication of the Environmental Statement, however the assessment carried out to scope major events will be reported in the Environmental Statement.

Heat and Radiation

5.1.14. The EIA Regulations have introduced a requirement to consider the likely significant effects of the proposed Scheme on the environment resulting from 'heat and radiation'. The proposed Scheme characteristics have been reviewed, which indicates that neither heat nor radiation are of relevance to the proposed Scheme and thus these aspects will be scoped out of the Environmental Statement.

Transboundary Effects

5.1.15. Regulation 32 of the EIA Regulations 2017 requires the consideration of any likely significant effects on the environment of another European Economic Association State. Guidance upon the consideration of transboundary effects is provided in the Inspectorate's Advice Note 12: Transboundary Impacts (Planning Inspectorate, 2015). A transboundary screening matrix is provided in Appendix 5.1 which indicates that the proposed Scheme is not anticipated to generate any significant potential transboundary effects. Transboundary effects are thus proposed to be scoped out of the EIA.

Assessment of Cumulative Effects

5.1.16. Cumulative effects are the result of multiple impacts on environmental receptors or resources. There are principally two types of cumulative impact:

- the combined action of a number of different environmental topic specific impacts upon a single resource/receptor (in combination); and/ or
- the combined action of a number of different projects, cumulatively with the project being assessed, on a single resource/receptor (cumulative).

5.1.17. Further details on the scope of the cumulative effects assessment is provided in Chapter 16.

Mitigation measures, enhancements and residual effects

- 5.1.18. The EIA will take into account any design measures that have been incorporated into the proposed Scheme design, as well as any standard management activities that the proposed Scheme will implement.
- 5.1.19. Mitigation of potentially significant adverse environmental effects will be an iterative part of the proposed Scheme development following the hierarchy below:
- **Avoidance** – incorporate measures to avoid the effect, for example, alternative design options or modifying the proposed Scheme programme to avoid environmentally sensitive periods.
 - **Reduction** – incorporate measures to lessen the effect, for example, fencing off sensitive areas during construction and implementing a Construction Environmental Management Plan (CEMP) to reduce the potential impacts from construction activities.
 - **Compensation/ Remediation** – where it is not possible to avoid or reduce a significant effect then offsetting measures should be considered, for example the provision of replacement of habitat to replace that lost to the proposed Scheme or remediation such as the clean-up of contaminated soils.
 - **Enhancement** – where possible enhancement measures will be incorporated into the proposed Scheme in line with the aims and objectives of the Highways England Licence. Enhancement measures are considered to be over and above any avoidance, mitigation and compensation measures required to neutralise the impacts of the proposed Scheme.
- 5.1.20. Impacts and effects that remain after mitigation are referred to as residual. Residual effects of moderate, large or very large significance are deemed to constitute a significant environmental effect in the context of the EIA Regulations. Accordingly, these effects represent key factors in the decision-making process.
- 5.1.21. Likely effects will be assessed and categorised to identify those that are significant. The potential significance of effects will be assessed taking into account the impact avoidance measures embedded within the proposed Scheme design as well as the standard management practices that will be implemented.
- 5.1.22. After the effects of the proposed scheme as designed have been assessed, any further measures required to mitigate such effects (especially where effects are deemed to be significant) will be considered. Thereafter, the remaining residual effects will be reported.

5.2. General Assessment Assumptions and Limitations

Project Timescales

- 5.2.1. It is proposed that the following timescales are used for the EIA, these may be subject to change:

Existing Baseline – 2019

- 5.2.2. This year represents the existing conditions around the proposed Scheme and will give a baseline against which the impacts of the proposed Scheme both adverse and beneficial can be evaluated. Where 2019 cannot be used as the baseline conditions this will be stated in the individual technical chapters.

Construction – 2021 - 2024

- 5.2.3. The construction period is anticipated to commence in 2021 and be completed in 2024.

Opening Year, Year 1 - 2024

- 5.2.4. A number of the assessments make use of the year in which the proposed Scheme is anticipated to be the proposed Scheme's first full year in operation. For example, local air quality assessment typically focuses on the opening year, as under current guidance this is typically the worst year for air quality assessment, in the first 15 years of proposed Scheme operation. However, DMRB leaves open the possibility that another year might be the worst for air quality assessment, in which case that year should also be assessed.

Future Baseline/ Design Year, Year 15 – 2039

- 5.2.5. This year will be used to represent the future conditions with and without the proposed Scheme. It represents circumstances at a point 15 years on from the 'Opening Year'. This allows time for any long term effects associated with and without the proposed Scheme to be realised, for example, the establishment of any areas of landscaping associated with the proposed Scheme.
- 5.2.6. For the noise assessment future year scenarios in Year 1 and Year 15 consider the traffic flows with the proposed Scheme, referred to as 'Do-Something' and without the proposed Scheme, referred to as 'Do-Minimum'.

Demolition and Decommissioning

- 5.2.7. Due to the nature of the proposed Scheme it is considered highly unlikely that the proposed Scheme would be demolished after its design life as the road is likely to have become an integral part of highway infrastructure in the area. In the unlikely event that the proposed Scheme was demolished this would be part of the relevant statutory process at the time, including EIA as appropriate. It is therefore proposed that the demolition of the proposed Scheme is scoped out of the EIA.

Maintenance

- 5.2.8. It is considered that the principal components that make up the proposed Scheme are appropriate for its design life. Thus no major components are anticipated to require dismantling or replacement (e.g. lighting columns). During operation of the proposed Scheme, should any components require replacement/ maintenance, such works would be undertaken by the Highways Asset Support Contractor (Highways England) in accordance with their standard maintenance practices. Such practices require the investigation, assessment and appropriate management of potential environmental effects associated with such works in accordance with their environmental management planning systems. As such, the assessment of potential environmental effects associated with the maintenance and replacement of proposed Scheme components during its operational phase has been scoped out of the EIA, given that these will be appropriately managed such that significant environmental effects would be avoided.

5.3. Significance Criteria

5.3.1. DMRB Volume 11, Section 2, Part 5, HA205/08 states that “*the significance of the effect is formulated as a function of the receptor or resource environmental values (or sensitivity) and the magnitude of project impact (change)*”. This process includes the following stages:

- assigning environmental value (or sensitivity), refer to Table 5.1;
- assigning a magnitude of impact/change, refer to Table 5.2; and
- assigning an effect significance level, refer to Table 5.3.

Table 5.1: Environmental Value or Sensitivity and Typical Descriptors

Value	Typical Descriptors
Very high	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or lower)	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity local scale.

Table 5.2: Magnitude of Impact/ Change and Typical Descriptors

Magnitude of Change	Typical Descriptors
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Low or medium importance and rarity, local scale.
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 5.3: Matrix for Determination of Significance of Effect

Magnitude of Impact	Value/ Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
Major	Very Large	Large/ Very Large	Moderate/ Large	Slight/ Moderate	Slight
Moderate	Large/ Very Large	Moderate/ Large	Moderate	Slight	Neutral/ Slight
Minor	Moderate/ Large	Slight/ Moderate	Slight	Neutral/ Slight	Neutral/ Slight
Negligible	Slight	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

5.3.2. Those effects categorised as moderate, large or very large are considered to be significant. Slight adverse and neutral effects are not considered to be significant. Slight and moderate effects can be borderline cases and whether these effects are considered to be significant should be based on professional judgement. This determination should take into account whether effects are considered to be positive or negative, permanent or temporary, direct or indirect, the duration/frequency of the effect and whether any secondary effects are caused.

5.3.3. Significance criteria as described in the DMRB Volume 11, Section 2, Part 5 have been employed where specified within the environmental topic chapters. Where appropriate, topic-specific criteria have been adopted from institute guidelines or best practice. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining effect significance. Where quantitative measures may not be applied, qualitative criteria derived from DMRB have been utilised.

5.4. Duplication of Assessment

5.4.1. The following assessments and reports will be produced as stand-alone documents to support the DCO application. To avoid duplication these reports will be cross referenced and the results summarised in the Environmental Statement where appropriate.

- Habitat Regulations Assessment (HRA) Screening Report;
- Flood Risk Assessment (FRA) Report;
- Water Framework Directive (WFD) Assessment Report; and
- Arboricultural Implications Report.

5.5. Environmental Statement

5.5.1. The Environmental Statement will be produced in a clear concise report following the guidance given in DMRB Volume 11, Section 2, Part 6 Reporting of EIAs supplemented by the relevant IANs and guidance.

5.5.2. The Environmental Statement will be split into four parts:

- Non-Technical Summary;

- Volume 1: Main Document;
- Volume 2: Figures and Drawings; and
- Volume 3: Technical Appendices.

5.5.3. The contents of Volume 1 of the Environmental Statement will include the following:

- Chapter 1: Introduction;
- Chapter 2: The Project;
- Chapter 3: Assessment of Alternatives;
- Chapter 4: Environmental Assessment Methodology;
- Assessments (topic based assessment during construction and operation of the proposed Scheme):
 - Chapter 5: Air Quality;
 - Chapter 6: Cultural Heritage;
 - Chapter 7: Landscape and Visual;
 - Chapter 8: Biodiversity;
 - Chapter 9: Geology and Soils;
 - Chapter 10: Material Assets and Waste;
 - Chapter 11: Noise and Vibration;
 - Chapter 12: Population and Health;
 - Chapter 13: Road drainage and the Water Environment;
 - Chapter 14: Climate;
 - Chapter 15: Assessment of Cumulative Effects.
- Chapter 16: Summary; and
- References and Glossary.

5.5.4. Each topic based assessment (Chapters 5 to 14) will include the following sub-headings:

- **Competent Expert Evidence:** a brief statement demonstrating that the person(s) contributing to the production of the Environmental Statement have sufficient expertise to ensure the completeness and quality of the Environmental Statement.
- **Legislative and Policy Framework:** an outline of the policy requirements, guidance and legislation used to define the assessment approach.
- **Assessment Methodology:** the proposed level and scope of assessment and a brief description of the method for defining the significance of effects.
- **Assessment Assumptions and Limitations:** a description of the limitations of the assessment, any uncertainties involved and identify any assumptions that the assessment is based on.
- **Study Area:** a clear definition and justification for the study area(s) used for each aspect of the assessment.

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- **Baseline Conditions:** a summary of resources and receptors within the study area, and an indication of their importance / sensitivity and condition (if relevant).
 - **Potential Impacts:** a brief description of the potential impacts on the environment during both construction and operation and a justification for scoping these impacts in or out of the remainder of the assessment.
 - **Design, Mitigation and Enhancement Measures:** an outline description of the mitigation and enhancement strategy for the proposed Scheme and confirmation of the delivery mechanism for each mitigation and enhancement measure (such as through the CEMP or as a DCO requirement).
 - **Assessment of Likely Significant effects:** the assessment of effects on the environment resulting from the impacts of construction and operation of the proposed Scheme. This will take into account mitigation and enhancement measures outlined in the chapter as embedded within the proposed Scheme as well as the standard management practices that will be implemented. Conclusions on the significance of effects will be clearly stated, explained and justified for all effects, significant or not. After the effects of the proposed Scheme as designed have been assessed, any further measures required to mitigate such effects (especially where effects are deemed to be significant) will be considered. Thereafter, the remaining residual effects will be reported.
 - **Monitoring:** a description of the proposed monitoring measures for significant environmental effects.

6. AIR QUALITY

6.1. Introduction

6.1.1. The proposed Scheme has the potential to affect local air quality, both during construction and operation. This section provides an overview of the potential impacts of the proposed Scheme on air quality and describes the proposed assessment methodology for the Environmental Statement.

6.2. Study Area

6.2.1. For the assessment of air quality, study areas will be defined on the basis of anticipated changes in traffic conditions (flow, speed and composition) as a result of the proposed Scheme i.e. Do-Something (DS), compared to road conditions without the proposed Scheme i.e. Do-Minimum (DM).

6.2.2. In the case of the local air quality assessment, the study area will be based on predicted changes to traffic conditions in the expected proposed Scheme opening year (2024). The assessment will be based on the opening year as this is expected to be the worst case year of operation. This is because the influence of improving vehicle exhaust emission standards is likely to be greater than any additional growth in traffic in subsequent operational assessment years.

6.2.3. The traffic change criteria set out in Design Manual for Roads and Bridges (DMRB) Air Quality guidance (HA207/07) (Ref. 6.1) will be used to define the 'affected road network' (ARN) for the local air quality assessment. The DMRB local air quality traffic change criteria are as follows:

- road alignment will change by 5 m or more; or
- daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more; or
- heavy duty vehicle (HDV) flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/h or more; or
- peak hour speed will change by 20 km/h or more.

6.2.4. The local air quality study area will be defined, based on the above criteria, for those links within the ARN which have relevant receptors within 200 m of either side of road carriageways (specified in DMRB HA207/07). All road links within 200 m of these relevant receptors will then be included in the air quality assessment and this area forms the overall study area. A distance of 200 m from roads is used because at these distances pollutant contributions from roads are difficult to distinguish from background pollutant concentrations.

6.2.5. In addition to the local air quality study area, the air quality assessment will also include a regional assessment of air quality and will report the findings of a Transport Analysis Guidance (WebTAG) plan level appraisal.

6.2.6. The study area for the assessment of regional pollutant emissions will be defined using the regional air quality study area in DMRB HA207/07 (paragraph 3.20), as follows:

- daily traffic flows will change by 10% AADT or more;
- HDV flows will change by 10% AADT or more; and
- daily average speed will change by 20 km/h or more.

6.2.7. The WebTAG plan level appraisal provides an overall measure of improvement or deterioration in air quality due to the proposed Scheme. The WebTAG plan level appraisal uses the same study area as the local air quality assessment described in paragraph 6.2.3. The study area for the assessment will be based on the extent of the identified ARN, with a buffer of 200 m around this extent.

6.2.8. The air quality assessment will also consider construction air quality impacts with a study area of 200 m around the DCO site boundary.

6.3. Legislation, Policy and Guidance

6.3.1. The assessment of impacts on sensitive receptors and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by key documents described here.

Policy

6.3.2. The following planning policies are relevant to air quality:

- National Policy Statement for National Networks (NPSNN) designated January 2015); paragraphs 5.6-5.9 and 5.14-5.15 (air quality); 5.84-5.85 and 5.89 (dust) (Ref 6.2);
- National Planning Policy Framework (NPPF) published July 2018; section 9, paragraph 103 and section 15 paragraphs 170 and 181 (Ref. 6.3); and
- The South Staffordshire Core Strategy adopted December 2012; Policy Core 11 (sustainable transport) (Ref. 6.4).

6.3.3. The Planning Policy and Guidance (PPG) (Ref. 6.5) provides a summary of the air quality issues set out in the NPPF. The assessment will include information on the following, in accordance with the PPG:

- The existing air quality in the study area (existing baseline).
- The future air quality without the development in place (future baseline).
- The future air quality with the development in place (with mitigation).

6.3.4. The assessment subsequently summarises the predicted changes in air pollution to ascertain whether the proposed Scheme would lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Conservation of Habitats and Species Regulations (Ref. 6.6), in line with the PPG. This means that the assessment is also in accordance with the NPSNN.

6.3.5. By taking account of mitigation measures in order to minimise the impact of the proposed Scheme on air quality, the assessment is in accordance with The South Staffordshire Core Strategy.

6.3.6. In July 2017, The Department for Environment, Food and Rural Affairs (Defra) released the 'UK plan for tackling roadside nitrogen dioxide concentrations' (Ref. 6.7). The plan principally focuses on empowering local councils to make major changes to their road systems. The plan requires local authorities to set out initial plans by the end of March 2018, followed by final plans by the end of December 2018.

6.3.7. Alongside these plans a dataset of Defra's predicted pollutant concentrations along specific roads was published. This dataset is called the PCM dataset and this is

used to inform the assessment of compliance of the proposed Scheme with EU Limit Values.

- 6.3.8. In October 2018, Defra published a 'Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations' (Ref 6.8). The supplement focuses on measures to bring forward compliance in 33 local authorities with NO₂ exceedances. South Staffordshire District Council within which the proposed Scheme is located was not one of the local authorities included in the supplementary plan. Wolverhampton City Council, which is an adjacent authority, is one of the councils included in the supplementary plan. Wolverhampton City Council will be implementing further measures to achieve compliance in the shortest time possible.

Guidance

- 6.3.9. The air quality assessment methodology follows the air quality guidance given in the DMRB, HA207/07. This sets out the methodology to determine the impact that road projects may have on local and regional air quality for human health and ecological receptors. The Guidance includes a calculation method to estimate local pollutant concentrations and regional emissions for air including those for carbon.
- 6.3.10. In addition to the main DMRB Guidance document, a number of air quality Interim Advice Notes (IANs) have been issued as outlined below:
- IAN 170/12 v3 Updated air quality advice on the assessment of future NO_x and NO₂ projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (Ref 6.9);
 - IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (Ref 6.10);
 - IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (Ref 6.11); and
 - IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3 Part A Air Quality (Ref 6.12).
- 6.3.11. Where necessary, the air quality assessment will refer to Defra's Local Air Quality Management (LAQM) Technical Guidance LAQM.TG16.
- 6.3.12. The WebTAG appraisal will follow the latest Transport Analysis Guidance (TAG) as provided by the Department for Transport (Ref. 6.13).

6.4. Baseline Conditions

- 6.4.1. Baseline air quality data for the study area has been gathered from the following sources:
- Department for Environment, Food and Rural Affairs (Defra) Air Quality Management Area (AQMA) information (Ref. 6.14);
 - Local Authority monitoring data (e.g. Ref. 6.15 and Ref. 6.16);
 - Highways England monitoring data;
 - Defra Pollution Climate Mapping (PCM) Model Geographical Information System (GIS) data for the latest available year (Ref. 6.17);
 - Defra air pollution background concentration maps (Ref. 6.18);

- locations of human health receptors (residential properties, schools, hospitals and elderly care homes) from Ordnance Survey base mapping (Ref. 6.19); and
- designated ecological site boundary information (Ref. 6.20).

6.4.2. The proposed Scheme is located within the boundaries of South Staffordshire District Council but based on the PCF Stage 2 EAR Addendum (Ref 6.21, 6.22) the ARN is likely to extend beyond these boundaries into the surrounding local authorities.

AQMAs

6.4.3. There are no AQMAs within 200 m of the proposed Scheme. South Staffordshire District Council has declared three AQMAs due to exceedances of the annual mean nitrogen dioxide (NO₂), detailed in Table 6.1. However, the nearest AQMA to the proposed Scheme is located in the adjacent local authority, Wolverhampton City. The Wolverhampton AQMA 2005 was declared due to exceedances of annual mean NO₂ and 24 hour Particulate (PM₁₀) objectives. This AQMA is located approximately 360 m south-west of the proposed Scheme. Other surrounding local authorities have also declared AQMAs; these will be considered if they are found to be on the ARN.

Table 6.1: Local AQMAs

Local Authority	AQMA	Description	Pollutant and Averaging Period
South Staffordshire District Council	AQMA No.1 (Woodbank)	Area encompassing Woodbank House, Teddesley Road, Penkridge and the adjacent M6. It is understood that this AQMA is likely to soon be revoked.	Annual mean NO ₂
South Staffordshire District Council	AQMA No.4 (Wedges Mills)	Area encompassing properties on the western side of Wolverhampton Road (A4601), Wedges Mills from its junction with Wood Lane for a distance of 200 m northwards.	Annual mean NO ₂
South Staffordshire District Council	AQMA No. 5 (Oak Farm)	Oak Farm, Watling Street (A5), Four Crosses.	Annual mean NO ₂
Wolverhampton City Council	Wolverhampton AQMA 2005	The City of Wolverhampton.	Annual mean NO ₂ and 24 hour PM ₁₀

Monitoring Data

6.4.4. To comply with local air quality management regime reporting requirements, local authorities often collect air quality monitoring data within their administrative area. The data are often collected through a combination of automatic monitoring stations and passive NO₂ diffusion tubes.

6.4.5. In 2015 South Staffordshire District Council did not measure any exceedances of the annual mean NO₂ at any of its 11 monitoring locations; however the nearest monitor to the proposed Scheme is 2.5 km away to the south east. In Wolverhampton City Council, the adjacent local authority, annual mean NO₂ exceedances were measured at 4 out of 63 sites where NO₂ monitoring was carried out in 2015. The

nearest monitors to the proposed Scheme (STA9 and STA9A) are 1.9 km away to the south-west, and measured concentrations of $28 \mu\text{g}/\text{m}^3$ and $30 \mu\text{g}/\text{m}^3$ respectively. Further exceedances of the annual mean NO_2 are also measured in the surrounding local authorities which may be within the local air quality ARN for the proposed Scheme.

- 6.4.6. In addition, Highways England has carried out passive diffusion tube monitoring at a series of locations within the anticipated study area for the local air quality assessment. These sites were chosen to supplement data available from local authorities and monitors were sited to provide data from locations close to sensitive receptors.
- 6.4.7. Highways England commissioned 34 diffusion tubes adjacent to the M54/M6 Toll, over a period between 2013 and 2014. Annualised to 2014 this data shows that the annual average objective for NO_2 has been exceeded at 2 of the 34 locations. In addition to the monitoring adjacent to the M54/M6 Toll, Highways England also commissioned monitoring at other areas further afield, including locations adjacent to the M6, which suggests further exceedances of the annual average objective for NO_2 . Whether these other areas are relevant to the air quality assessment will be dependent upon the extent of the ARN.

EU Limit Value Compliance

- 6.4.8. Defra's PCM model is a national-scale model designed to fulfil part of the UK's EU Directive (2008/50/EC) requirements to report on the concentrations of particular pollutants in the atmosphere, including NO_2 .
- 6.4.9. There are no Defra National Air Quality Compliance model links within 200 m of the proposed Scheme; the nearest Defra compliance link is 220 m to the north-east of the proposed Scheme, on the A4601. In 2015, mean NO_2 concentrations of $27.3 \mu\text{g}/\text{m}^3$ are given for this link, which is well under the limit value of $40 \mu\text{g}/\text{m}^3$.
- 6.4.10. The ARN is likely to include a number of Defra compliance links. However, the nearest Defra compliance link for which an exceedance of the limit value is predicted in the opening year of 2024 is 22 km away (the A38), in the centre of Birmingham. Therefore there is a low risk of exceedance of the EU Limit Value with the proposed Scheme.

Backgrounds

- 6.4.11. The average Defra background NO_2 concentration local to the proposed Scheme in 2015 is $18.5 \mu\text{g}/\text{m}^3$, ranging from $14.9 - 22.5 \mu\text{g}/\text{m}^3$.

Receptors

- 6.4.12. There are two types of sensitive receptor for local air quality as follows:
- nationally and internationally designated ecological sites (e.g. Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites); and
 - public exposure receptors: these are sensitive locations where relevant exposure for the air quality criteria being assessed could occur e.g. residential properties or schools (defined in Defra Local Air Quality Management, Technical Guidance 2016 (LAQM.TG(16)) (Ref. 6.23).
- 6.4.13. For the construction phase of the proposed Scheme, sensitive receptors that may be affected include those outlined above and other receptors that may be sensitive to the deposition of dust (e.g. parks, allotments).

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- 6.4.14. Construction dust can include particles that contribute to ambient PM₁₀ concentrations, and also far coarser particles. There are no statutory criteria for deposition rates, however dust from wet or dry deposition on receptor surfaces can result in a loss of amenity, and as such is considered a statutory nuisance under the Environmental Protection Act 1990 (Ref. 6.24).
- 6.4.15. The air quality objectives have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such the sensitivity of receptors was considered when setting the objectives and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary.
- 6.4.16. There are public exposure receptors consisting of residential properties and a primary school at Featherstone, and residential receptors at Shareshill, that are located close to the proposed Scheme and may be affected. In addition it is likely that there will be further sensitive receptors within 200 m of the local air quality ARN.
- 6.4.17. Designated ecological sites can be affected by increases in oxides of nitrogen (NO_x) concentrations and associated increases in nitrogen deposition rates with higher NO_x emissions from vehicles. Construction dust can also affect ecosystems through deposition that acts as a barrier physical to photosynthesising plants, and through the effects of its chemical constituents on sensitive ecological receptors.
- 6.4.18. There are no nationally or internationally designated ecological sites within 200 m of the proposed Scheme. The nearest designated ecological site is Stowe Pool and Walk Mill Clay Pit SSSI, approx. 1.6 km to the north-east of the proposed Scheme. Ecological sites in the wider area may be affected if they are located within 200 m of the local air quality ARN.

6.5. Potential Impacts

- 6.5.1. The proposed Scheme has the potential to affect local air quality, both during construction and once in operation.

Construction

- 6.5.2. During construction the proposed Scheme could affect local air quality in the following ways:
- there could be increased emissions of dust during construction of the proposed Scheme from dust-raising activities on site that could affect a large number of sensitive receptors within 200 m of the proposed construction works;
 - there will be emissions associated with non-road mobile machinery (NRMM) undertaking construction works; and
 - air quality could be affected by changes in traffic flows during construction, as a result of temporary traffic management measures and/or additional vehicles travelling to and from the construction site transporting materials, plant and labour.
- 6.5.3. There is some potential for adverse effects during the construction of the proposed Scheme in relation to construction dust and NRMM and vehicle emissions. However, any impacts on human health related to air quality would be temporary (i.e. during the period of the construction works only) and could be suitably minimised by the application of industry standard mitigation measures. The need for any additional mitigation measures will be identified in addition to standard dust mitigation measures as part of the assessment.

- 6.5.4. The criterion for a potentially affected route in relation to construction HGV traffic is a change of more than 200 HGVs per day. Where HGV movements are below this threshold, significant changes in air quality are not likely. Further work would be required to characterise potential air quality impacts from this source during the environmental assessment, if construction phase estimated HGV numbers (based on advice from a construction contractor) are above the DMRB criteria for an extended period (i.e. more than 6 months).
- 6.5.5. The air quality assessment at PCF Stage 2 (option selection) identified that due to the proposed Scheme requiring some works to the existing road network, traffic management would be in place to minimise traffic re-routing throughout the construction phase. However, it is not currently known to what extent of traffic re-routing may take place during this period. As such, further air quality work may be required during the environmental assessment depending upon traffic re-routing estimates (based on advice from a construction contractor and traffic modellers).

Operation

- 6.5.6. Once the proposed Scheme is operational, local air quality could be affected in the following ways:
- once operational, air quality could be affected (positively or negatively) by changes in vehicle activity (flows, speeds and composition) as a result of the proposed Scheme; and
 - air quality could also be affected by any changes in the distances between sources of emissions and air quality sensitive receptors.
- 6.5.7. On the basis of the available information including existing monitored levels in the wider study area, exceedances of the annual mean NO₂ UK Air Quality Strategy objective have the potential to occur near busy roads in the study area.
- 6.5.8. Operational impacts on air quality may be difficult to avoid, but in some circumstances it is possible to reduce impacts on air quality with appropriate mitigation measures, particularly if impacts are focused in a small geographic area rather than spread across the extent of the air quality study area. However, the proposed Scheme design to date does not include specific air quality mitigation measures for the operational phase.

6.6. Design, Mitigation and Enhancement Measures

- 6.6.1. With regard to the construction phase, best practice mitigation measures will be identified within the air quality assessment and included in the proposed Scheme Construction Environmental Management Plan (CEMP). The final selection of the most appropriate mitigation measures, including specific mitigation measures as related to construction phase HGV movements and construction phase traffic management, will be reconsidered during the EIA taking advice from a construction contractor.
- 6.6.2. Specific air quality mitigation measures for the operational phase are not proposed at this stage.
- 6.6.3. No additional monitoring of air quality is recommended at this stage.

6.7. Description of the Likely Significant Effects

- 6.7.1. The PCF Stage 2 (options selection) assessment indicated that there is a risk that environmental standards will be breached with the proposed Scheme, due to the predicted small increase in annual NO₂ concentration at ten receptors where annual

average concentrations of NO₂ are above the objective. However, the overall finding was that operational air quality effects as a result of the proposed Scheme would not be considered significant overall. On the basis of this and other available information no likely significant effects are predicted with regard to air quality at this stage.

6.8. Assessment Methodology

Proposed Level and Scope

6.8.1. The air quality impact assessment will include:

- an assessment of local air quality effects;
- changes in regional emissions of carbon dioxide (CO₂) and other regional pollutants; and
- construction impacts.

6.8.2. On the basis that there is a risk that environmental standards will be breached, as identified in the EAR Addendum, it is proposed that a detailed level of air quality assessment (local air quality only) is undertaken and reported in the Environmental Statement.

Assessment of Effects

Construction

6.8.3. The potential impacts from construction dust emissions generated during the construction phase of the proposed Scheme will be based on the DMRB guidance i.e. to consider sensitive receptors within 200 m of construction activity. The locations of any sensitive receptors such as housing, schools, hospitals or international or nationally designed ecological sites within 200 m of a construction site will be identified such that mitigation measures to reduce dust emissions can be applied.

6.8.4. Demolition and construction plant emissions will not be explicitly modelled, as these are considered to be a small emission source relative to ambient local conditions in the vicinity of the proposed Scheme. These emissions will be managed through best practice mitigation measures and scoped out of any further assessment.

6.8.5. Assessment of construction phase HGV emissions will also follow the DMRB methodology to consider any additional HGV movements due to construction of the proposed Scheme. These will be assessed at a later stage of the proposed Scheme when more information will be available and if the traffic data shows that there are unlikely to be more than 200 HGVs per day, then these impacts will be screened out. Similarly, the effect of traffic management measures will be considered to determine whether the DMRB thresholds are exceeded, triggering the need for limited detailed dispersion modelling.

6.8.6. Mitigation measures, that can be included in a CEMP for the proposed Scheme, will be identified where required. Mitigation measures will be based on best practice such as those presented in the Institute of Air Quality Management (IAQM) Guidance (Ref. 6.25) that are appropriate for road schemes.

Operation - Local Air Quality Assessment

6.8.7. The local air quality impact assessment during operation of the proposed Scheme will focus on emissions of the key pollutants NO₂ and PM₁₀ as these are the principal pollutants of concern with regards to emissions from road traffic, as set out in the DMRB.

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- 6.8.8. Information on current air quality in the vicinity of the proposed Scheme will be taken from available monitoring data as identified in the baseline conditions, Section 6.4.
- 6.8.9. Assessment of operational impacts adjacent to the ARN will be undertaken in accordance with DMRB HA207/07 (and associated IANs) using the latest version of the Atmospheric Dispersion Modelling System (ADMS) Roads to determine the impact of the proposed Scheme at identified representative sensitive receptor locations.
- 6.8.10. The key scenarios to be considered for local air quality are:
- the existing base situation which is the year 2015 for air quality; and
 - Do-Minimum and Do-Something for the proposed Scheme in the first full year of opening (2024).
- 6.8.11. Road sources included in the traffic model will be explicitly modelled using ADMS-Roads. The model requires input of traffic flow, composition and speed data as well as the road width and type and hourly sequential meteorological data.
- 6.8.12. Traffic data can be input to ADMS-Roads for the morning peak (AM), Inter Peak (IP), evening peak (PM) and off peak (OP) period. Period flows will be used where possible and the following parameters adopted:
- composition will be input in terms of a percentage of HDV;
 - speeds are input as a speed category. This category will be determined in accordance with IAN 185/15 on speed banding;
 - corresponding NO_x and PM₁₀ rates based on the speed category will be used; and
 - road geometry will be mapped in GIS software.
- 6.8.13. Representative sensitive receptors will be selected for assessment within the local air quality ARN. These will generally include those sensitive receptors placed closest to the ARN.
- 6.8.14. Local air quality modelling predictions using the ADMS-Roads will provide estimates of the contribution from road traffic emissions to annual mean concentrations of NO_x at discrete receptors; these concentrations will be combined with estimates of background concentrations, to derive totals for annual mean NO₂. NO_x to NO₂ conversion will be carried out according to Defra guidance.
- 6.8.15. Base year (2015) modelled estimates will be verified, with comparison against available ratified monitoring data wherever possible and with reference to Defra's Technical Guidance LAQM.TG(16). Where systematic bias is clearly evident in the base year verification, adjustment will be applied to bring modelled concentrations more into line with monitored concentrations.
- 6.8.16. A key element of the local air quality impact assessment is the rate of improvement in air quality over time as cleaner vehicles enter the national vehicle fleet. The methodology outlined within IAN 170/12 v3 on the assessment of future NO_x and NO₂ projections will be used in this assessment. The method considers Defra's advice on long term trends related to roadside NO₂ concentrations, which suggests that there is a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality as previously published in Defra's technical guidance and observed trends.

- 6.8.17. The methodology, known as 'Gap Analysis', involves the completion of air quality modelling and verification to correct verified modelled total NO₂ concentrations. Then following verification of the modelled results, predictions are then adjusted to represent the observed long term trend. The adjusted results from this Gap Analysis will be presented based on Long Term Trend E6 (LTT_{E6}).

Operational Impacts – Local Air Quality Compliance Risk Assessment

- 6.8.18. A compliance risk assessment for the proposed Scheme against the EU Directive in accordance with IAN 175/13 will be provided in the air quality assessment. This assessment enables proposed Scheme assessors to undertake and report on the risk of a proposed Scheme being non-compliant with the EU Directive. The compliance risk assessment is undertaken using the results of the local air quality assessment and the PCM Model. The overall evaluation of significance will also include information on compliance risks in relation to the Directive.

Operational Impacts – WebTAG Plan Level Local Air Quality Assessment

- 6.8.19. The local plan level methodology within the WebTAG guidance aims to quantify the change in exposure at receptors in the opening year as a result of proposed Schemes, through the quantification of exposure for all DMRB local affected roads. The methodology follows a number of steps comprising:

- identification of the affected road network, which is the same as the DMRB local air quality affected road network;
- quantification of the number of properties within 0 – 50 m, 50 – 100 m, 100 – 150 m and 150 – 200 m bands, from the affected roads;
- the calculation of concentrations within each band at 20 m, 70 m, 115 m and 175 m from the road centreline using the DMRB spreadsheet model;
- calculation of property-weighted NO₂ and PM₁₀ concentrations;
- calculation of the total numbers of properties where air quality improves, worsens or stays the same for each pollutant; and
- calculation of an overall assessment score for NO₂ and PM₁₀.

- 6.8.20. An overall positive score indicates an overall worsening in air quality, and an overall negative score indicates an overall improvement in air quality.

- 6.8.21. The WebTAG plan level appraisal is a reporting requirement of DMRB. WebTAG plan level appraisal outcomes do not have defined significance criteria but will be presented and described to inform the assessment of overall change.

Operational Impacts – Regional Air Quality Assessment

- 6.8.22. An assessment of regional emissions of NO_x, PM₁₀ and carbon dioxide will be undertaken in accordance with DMRB HA207/07 using vehicle emission factors from the emission factor toolkit. The key scenarios to be modelled are:

- the existing base situation (2015);
- Do-Minimum and Do-Something for the proposed Scheme in the first full year of opening (expected to be 2024); and
- Do-Minimum and Do-Something for the proposed Scheme in a future year (2039).

- 6.8.23. The results of the regional assessment (annual emissions, change in emissions with the proposed Scheme and distance travelled) will be presented in tabular format,

together with interpretive text. The regional assessment is a reporting requirement of DMRB. The regional assessment outcomes do not have defined significance criteria but will be presented and described to inform the assessment of overall change.

Criteria for Significance of Impact

- 6.8.24. Evaluation of the significance of the local air quality assessment findings at sensitive receptors for health and designated ecological sites will be undertaken in accordance with IAN 174/13 guidance. This guidance evaluates the significance of air quality effects using the total estimated pollutant concentrations at sensitive receptors and the magnitude of change estimated to occur as a result of a scheme and recommends that the following key criteria for air quality are considered.
- Is there a risk that environmental standards will be breached?
 - Is there a high probability of the effect occurring?
 - Will there be a large change in environmental conditions?
 - Will the effect continue for a long time?
 - Will many people be affected?
 - Is there a risk that protected sites, areas or features will be affected?
 - Will it be difficult to avoid, or reduce or repair or compensate for the effect?
- 6.8.25. Following the collation of information to address these questions, an informed professional judgement on the significance of local air quality effects for public exposure and designated ecological sites will be established. Of the above questions, 'will many people be affected?' will be addressed in terms of the number of receptors predicted to have small, medium and large changes in air quality. The change focuses only on those receptors that exceed the air quality objective and in cases where the numbers of affected properties are above the upper thresholds listed in Table 6.2 (taken from IAN 174/13), this may suggest likely significant air quality effects. The air quality assessment will consider the potential for significant adverse effects on receptors in line with the key questions outlined in paragraph 6.8.24.

Table 6.2: Guideline for Number of Properties Constituting a Significant Effect (in accordance with IAN 174/13)

Magnitude of Change in NO ₂ or PM ₁₀ (µg/m ³)	Guideline for Number of Properties Constituting a Significant Effect	
	Worsening of air quality objective already above objective or creation of a new exceedance	Improvement of an air quality objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

- 6.8.26. The significance of the effects on European and nationally designated habitat sites, including the magnitude of change in NO_x and/or nitrogen deposition, will be considered in the Biodiversity chapter.

6.8.27. The predicted air quality effects of the proposed Scheme will also be evaluated against relevant national, regional and local air quality planning policy.

6.9. Assessment Assumptions and Limitations

6.9.1. The scope of the proposed air quality assessment will be informed by the most recent information available at the time of writing. Up to date monitoring data will be obtained from local authorities and previous proposed Scheme-specific study data has been obtained. The local operational air quality assessment will use a comprehensive traffic dataset, the latest Defra local air quality management tools and guidance, Highways England tools and guidance, a detailed air quality model (ADMS-Roads) and predictions will be checked against the most recently available local air quality monitoring data. This approach will minimise the assumptions and limitations of the local operational air quality assessment as far as practicable.

7. CULTURAL HERITAGE

7.1. Introduction

7.1.1. The proposed Scheme has the potential to affect archaeology, historic buildings and historic landscapes, both during construction and operation. This section provides an overview of the potential impacts of the proposed Scheme on cultural heritage and describes the proposed assessment methodology for the Environmental Statement.

7.2. Study Area

7.2.1. A study area of 1 km from the draft DCO site boundary, including areas of potential environmental mitigation, such as ecology and flood risk, and construction compounds, was used for assessment of cultural heritage baseline conditions (see Figure 7.1). This study area was defined following guidance provided in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 2: Cultural Heritage (HA 208/07) (Ref. 7.1). This study area is intended to place heritage assets within their wider context and to understand the landscape within which they are located.

7.3. Legislation, Policy and Guidance

7.3.1. The assessment of impacts on cultural heritage and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents:

- The Ancient Monuments and Archaeological Areas Act 1979 (Ref 7.2);
- The Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref 7.3);
- National Planning Statement for National Networks (Ref 7.4);
- National Planning Policy Framework (Ref 7.5);
- Planning Practice Guidance (Ref 7.6);
- DMRB, Volume 11, Section 3, Part 2: Cultural Heritage;
- DMRB Volume 10, Section 6, Part 1: HA 75/01 – Trunk Roads and Archaeological Mitigation (Ref 7.7);
- Historic England Good Practice Advice Note GPA3, The Setting of Heritage Assets (Ref 7.8); and
- Chartered Institute for Archaeologists, Code of Conduct and Standards and Guidance for Historic Environment Desk-based Assessment (Ref 7.9 & 7.10).

7.4. Baseline Conditions

7.4.1. Within the study area there are 29 archaeological sites, 13 historic buildings and four historic landscapes. Eight of the historic buildings are listed buildings, five are locally listed buildings and four are non-designated buildings. The historic landscapes comprise two non-designated historic parks and two Historic Environment Character Zones (HECZ).

7.4.2. There are no World Heritage Sites, scheduled monuments, conservation areas or registered battlefields within the study area.

7.4.3. The bracketed alpha-numerical references after archaeological sites and built heritage assets within the text refer to references on Figure 7.1 and Appendix 7.1.

Archaeology

- 7.4.4. There are three sites of prehistoric date recorded in the study area. The earliest of these is the find spot of a Neolithic axe (c. 4000 to 2200 BC) (A5). The find spot of a Bronze Age (c. 2200 to 700 BC) palstave axe (A13) is also recorded. Prehistoric settlement evidence is limited to the site of a possible barrow (SJ 94 05, exact location unknown). It is possible that some of the cropmarks in the area (e.g. A17, A18, A21), of unknown date, may have their origins in the later prehistoric period, or the Roman period.
- 7.4.5. There are two recorded sites of Roman (AD 43 to 410) date within the study area. The exact location of both sites is unknown and they comprise the alleged site of a Roman tumulus (SJ 95 08) and the find spot of a silver denarius coin of Hadrian (SJ 93 04). Just outside the study area, to the west, is the Roman road between Featherstone and Pennocrium, near the modern village of Penkridge, where there is a cluster of scheduled Roman settlement and military sites.
- 7.4.6. There is only one site of early medieval date (AD 410 to 1066) recorded in the study area. This is the deserted settlement of Hilton or Haltone (A6), which is centred around Hilton Park. The settlement was first recorded in the very late 10th century and is recorded in the Domesday Book. The date of desertion is not known, and no above-ground evidence survives within the current park. The villages of Featherstone to the west, and Essington to the south-east were also first recorded in the 10th century (Mills 2003).
- 7.4.7. There are nine sites with evidence of medieval date (1066 to 1500). The majority of these are moated sites. One is located at Hilton Park (A4), which has been built over by the 18th century house (B2). Other moats are located across the study area, including a 14th century example to the east (A2), and other examples in the vicinity of Shareshill (A7 & two un-located in grid square SJ 94 06).
- 7.4.8. The remainder of the medieval sites are related to agricultural activity and include evidence for ridge and furrow (A11, A20 & A24), as well as the site of a windmill (A14) and cropmarks of a medieval field system (A19), excavated as part of the construction works of the M6 Toll. This site also contained evidence of post-medieval field boundaries and trackways. Some of the ridge and furrow sites may also contain elements of post-medieval activity, such as site A11.
- 7.4.9. Eight recorded sites of post-medieval date (1500 to 1900) are located in the study area, in addition to those medieval sites that may have extended into this later period. These sites predominantly relate to the agricultural use of the landscape, as well as evidence for increasing industrial activity in the 18th and 19th centuries.
- 7.4.10. As well as the sites discussed in the medieval section (such as ridge and furrow, A11, and field systems, A19), agricultural evidence includes the site of Brook House Farm (A12), first shown on Yates' map of 1775, which is no longer extant. Other extant agricultural buildings are discussed in the built heritage section below. A possible marl pit (A8) is also recorded, used to extract clay and lime which was used to improve agricultural land.
- 7.4.11. Industrial sites recorded in the study area are primarily related to brick and tile production, which was widespread in the wider area and required to fulfil the needs of the nearby growing urban areas, such as Wolverhampton to the south-west. A brickworks is located further north (A10) the northern end of the study area. Several more brick and tile works are also located just outside the study area. A possible earlier tile kiln is suggested by the find spot of 16th century tile (SJ 95 08, exact location uncertain), which is similar to tiles found on the roofs of nearby churches.

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- 7.4.12. The Streetway and Wordsley Green Turnpike Road (A16) was established in the mid-18th century. This largely follows the line of the A460 through the study area, joining the A4601 to the north of the M6 Toll. A possible boundary marker (A3) in the form of a low bank may have also been followed by a former road or track.
- 7.4.13. The final asset of post-medieval date is the find spot of post-medieval material (A11), including a hand-made brick and pottery.
- 7.4.14. The modern period (1900 to present) is represented by five sites. The find spot (A9) and brickworks (A10) described in the post-medieval section above both contained evidence of modern date. Another colliery of 20th century date, Hilton Colliery (A25), was established in the early 20th century, but little now survives.
- 7.4.15. The other site of modern date is related to the defences of the outskirts of the urban area near Wolverhampton and Birmingham. The site of a Cold War Royal Observer Corps monitoring post (A15), which opened in 1961 and closed in 1991, is located in west of the study area but is no longer extant.
- 7.4.16. The remaining sites are of unknown date and all are recorded from aerial photographs. Some of these, such as cropmarks of enclosures (A18) or of possible settlement activity (A21 & possibly A23) could be of later prehistoric or Roman date, while others may represent medieval or post-medieval field systems (such as A19).
- 7.4.17. There is potential for previously unrecorded archaeological remains to be found within the DCO site boundary. While remains of any period cannot be discounted, remains associated with the later prehistoric periods and the medieval and post-medieval landscape are considered to be most likely to be present.

Built Heritage

- 7.4.18. There are a number of historic buildings within the study area, eight of which are statutorily designated and date from the post-medieval period. The listed buildings can be divided into groups according to their location or association to a place.
- 7.4.19. There are five listed buildings that lie within Hilton Park, an 18th century landscape park, comprising Hilton Hall (B2), the principal building of the park that dates from the early 18th century, and its associated outbuildings. These include an early 19th century Conservatory (B5), a Coach House and Stable Block (B3), a pair of early 18th century gate piers (B4) and the Portobello Tower (B6). Hilton Hall (B2) and its Conservatory (B5) are the only Grade I listed buildings within the study area.
- 7.4.20. The remaining listed buildings are scattered around the study area. To the south-west, there is a group of buildings associated with Moseley Old Hall (B1), including Moseley Old Hall Cottage and Moseley Hall. Moseley Old Hall (B1) is one of the two Grade II* listed buildings within the study area and has 16th century origins. Moseley Old Hall Cottage (B25) is listed at Grade II and also has 16th century origins, although it was mostly rebuilt in the 19th century.
- 7.4.21. In the western part of the study area there is a listed building located in the village of Shareshill. This comprises the Grade II* Church of St Mary and St Luke (B8), which dates from the 18th century with a 15th or 16th century tower
- 7.4.22. Further north is Little Saredon Manor (B7), a 16th century house with an earlier moat, and farmhouse and attached cowhouse associated with Saredon Hall Farm. The farmhouse dates from the early 18th century with a mid to late 19th century addition, while the cowhouse dates mainly from the mid to late 19th century with some 16th century work. These buildings are Grade II listed.

- 7.4.23. There are nine non-designated heritage assets identified on the South Staffordshire Local List and the Staffordshire Historic Environment Records (HER). The local list includes assets listed at three different grades (Grade A, Grade B and Grade C), five of which fall within the study area. Both Elms Public House (B10), dating from the mid-19th century, and Old Barn (B11), that was built around 1800, are listed at Grade A category and lie in Shareshill village. There is a single Grade B locally listed building to the north of Essington (B14) a former primary school, built in 1911. Two further assets are listed at Grade C. These include a small, modern, ex-Wolverhampton Corporation timber bus shelter (B9) at the south-eastern end of Shareshill and a modern, anti-aircraft gun site (B13) to the northern end of the study area.
- 7.4.24. There are four non-designated historic buildings identified on the HER that are not included within the Local List. These comprise three post-medieval farmsteads within the historic landscape of Hilton Park (B19, B20 and B21), as well as a former shell filling factory from World War II (B16) at Cat and Kittens Lane, Featherstone.

Historic Landscapes

- 7.4.25. A number of non-designated historic landscapes have been identified. There are no designated historic landscapes within the study area. Of the non-designated landscapes, two form historic parks, and two are HECZ.

Hilton Park

- 7.4.26. The study area is dominated by Hilton Park, a non-designated historic park that has been defined as Historic Parkland within the South Staffordshire Local Plan. The park is associated with Hilton Hall and was probably established in the mid to late 18th century with some of the landscape work attributed to Humphry Repton (1752 – 1818). Originally, the park covered an extensive area of land, part of which is now covered by gravel pits, while the M6 and the M54 bisect the park to the south and east.

Formal garden, Old Moseley Hall

- 7.4.27. To the south-west of the study area there is a small formal garden that surrounds Old Moseley Hall. The existing garden was reconstructed in order to represent an earlier one dating from circa 1640.

Featherstone

- 7.4.28. This area is divided into three HECZs, Featherstone - Hilton Park (FSHECZ 1), Featherstone - North of Featherstone (FSHECZ 2) and Featherstone - Featherstone (FSHECZ 3). The key characteristics of this area include:
- The surviving components of the historic landscape park associated with Hilton Park, including the shelter belts, woodland, ornamental lake and parkland trees (FSHECZ 1).
 - A well preserved historic field pattern surviving to the north of Featherstone, which may be associated with medieval assarting (conversion to agricultural use) (FSHECZ 2).
 - Historic farmsteads surviving within FSHECZ 3 are testimony to the historic dispersed settlement pattern which probably had at least medieval origins across Featherstone parish.
 - The remains of a probable World War II military site, associated with the Shell Filling Factory to the west of, and outside of, the study area, has the potential to

further our understanding of this site and its role in the 20th century social and economic history of Featherstone (FSHECZ 3).

Great Wyrley

- 7.4.29. Only the HECZ including the area to the west of Cheslyn Hay is included within the study area, Great Wyrley - West of Cheslyn Hay (GWHECZ 2). The key characteristics of this zone include:
- Industrial archaeology, which is a particular feature of the study area with above and below ground remains being present in three of the four zones (including GWHECZ 2). These heritage assets include the sites of former collieries, brickworks, tramways and mineral railways as well as the remains of two branch canals. An edge tool works, which had its origins in the early 19th Century, has been the subject of an archaeological evaluation in advance of development at Churchbridge (GWHECZ 2).
 - Historic farmsteads still form a feature of the historic landscape, some of which are associated with historic field patterns. Lodge Farm may lie on the site of a warrener's lodge which probably existed by the late 16th century (GWHECZ 2).
 - Historic field patterns also survive within the landscape of the study area. The late 18th/19th century planned enclosure is still legible within GWHECZ 2 despite the construction of the M6 Toll.
- 7.4.30. Baseline built heritage and archaeological data for the study area has been gathered from the following sources:
- Staffordshire HER;
 - Historic Environment Archive Service;
 - Historic England's National Heritage List for England; and
 - South Staffordshire District Council for details of locally listed buildings and conservation areas.

7.5. Potential Impacts

- 7.5.1. An impact is defined as a change resulting from the proposed Scheme on the significance of a heritage asset. Effects on heritage assets relate to either physical impacts on the heritage assets or effects to their significance relating to changes to their setting.
- 7.5.2. The proposed Scheme has the potential to impact heritage assets as follows:
- physical impacts upon archaeological features; and
 - impacts on the setting of heritage assets.

Construction

- 7.5.3. The scoping process has identified that construction of the proposed Scheme could potentially result in the following types of impact and effect:
- the partial or total removal of heritage assets;
 - compaction of archaeological deposits;
 - changes to groundwater levels and possible desiccation of waterlogged archaeological deposits;
 - physical effects on heritage assets, including the encroachment of Hilton Park;

- effects on the setting of heritage assets;
- the potential to encounter or disturb undiscovered buried archaeology;
- the truncation of the historic landscapes associated with Hilton Hall and Moseley Old Hall; and
- the introduction of built form into the landscape, leading to cumulative effects on historic landscape elements.

Operation

7.5.4. The scoping process has identified that operation of the proposed Scheme could potentially result in the following types of impact and effect:

- Changes to the setting of a number of heritage assets, including Hilton Hall, through the operation of the proposed Scheme including traffic movements, noise and lighting.
- Changes to the historic landscape as a consequence of traffic-related noise and the introduction of new sources of lighting.

7.6. Design, Mitigation and Enhancement Measures

7.6.1. Mitigation will be inbuilt in the design of the proposed Scheme to minimise impacts to heritage assets and their setting as far as possible. Mitigation will be developed and refined during the EIA process and agreed with stakeholders including Historic England, the Staffordshire County Council's Historic Environment Service, and the conservation officer. The development of mitigation will follow guidance from the Chartered Institute for Archaeologists.

7.6.2. Potential mitigation measures for impacts on heritage assets include:

- Detailed design of development proposals to avoid or reduce impacts on heritage assets, such as use of a false cutting and landscape planting.
- Installation of physical protection or screening measures, or temporary removal of assets and reinstatement following the completion of construction works.
- Archaeological investigations in advance of, or during, construction.
- Historic building recording and historic landscape recording in advance of construction to provide a permanent documentary record of assets in their current form and condition.
- Dissemination of the results of all surveys in an appropriate format and supporting archive.

7.6.3. It is anticipated that it would be possible to mitigate the development's impacts upon the buried archaeological resource through an appropriate staged programme of archaeological investigation and recording. To mitigate impacts upon archaeological sites from the proposed Scheme, a programme of archaeological mitigation would be required to ensure that surviving archaeological remains are recorded prior to their destruction by construction activities. This could include geophysical survey and potentially evaluation excavation (trial trenching) to identify the extent and survival of recorded remains, followed by excavation to ensure they are fully understood and recorded. An archaeological watching brief during construction is also likely to be required to mitigate effects on previously unrecorded remains.

- 7.6.4. There is little in the way of additional mitigation that can be recommended for impacts to the built heritage and historic landscape. However, additional landscape planting and other landscape mitigation could assist in reducing effects.

7.7. Description of the Likely Significant Effects

- 7.7.1. The PCF Stage 2 (options selection) assessment (Ref. 7.11) indicated that the proposed Scheme has the potential to result in significant adverse effects on heritage assets. The findings of this assessment are summarised below. The assessment of impacts on built heritage assets does not consider mitigation measures at this stage.

Construction

- 7.7.2. It is anticipated that the proposed Scheme would have a significant adverse effect on the setting of Hilton Hall, as well as the setting of other listed buildings such as the Grade I listed conservatory, and the Grade II listed coach house stable block and Portobello Tower. There would also be a physical impact on the historic Hilton Park and its setting which is likely to result in a significant adverse effect.
- 7.7.3. There is the potential for adverse effects on archaeological assets and historic landscapes. With mitigation in place these effects are not anticipated to be significant. However, the proposed Scheme has the potential to impact upon previously unrecorded archaeological sites not yet identified.

Operation

- 7.7.4. There may be significant adverse effects on Hilton Park and its associated listed buildings caused by the operation of the proposed Scheme including traffic movement, noise and lighting.

7.8. Assessment Methodology

Data Sources

- 7.8.1. The following data sources will be used to inform the assessment of cultural heritage impacts on receptors as a result of the proposed Scheme:
- The National Heritage List for England (NHLE).
 - Staffordshire Historic Environment Record (HER).
 - The Historic England Archive.
 - Aerial photographs.
 - Staffordshire Record Office.
 - South Staffordshire District Council website.
 - A walkover survey.
 - Other sources identified as research progresses.
- 7.8.2. Additional archaeological surveys will also be required. This could include geophysical survey and potentially evaluation excavation (trial trenching) to identify the extent and survival of recorded remains.

Proposed Level and Scope

- 7.8.3. The methodology contained within DMRB Volume 11, Section 3, Part 2: Cultural Heritage (HA 208/07) will form the basis for a detailed level assessment. A detailed assessment is required where there is potential to cause significant effects, and a

detailed study is required to obtain sufficient information to allow for assessment of effects. The methodology outlined in Chapter 5 and annexes 5 (Sub-Topic Guidance: Archaeological Remains), 6 (Sub-Topic Guidance: Historic Buildings) and 7 (Sub-Topic Guidance: Historic Landscape) of DMRB will be used to assess the value, impact and significance of the effect on the known cultural heritage assets at both the construction and operational phases of the proposed Scheme.

Additional Survey Requirements

- 7.8.4. It is anticipated that archaeological evaluation will be required as part of the development process. As part of the detailed assessment a review of the archaeological fieldwork previously undertaken within the study area will be undertaken. The results of these former phases of evaluation will be used to inform an appropriate level of evaluation and mitigation to be undertaken as part of the proposed Scheme. It is proposed that a geophysical survey will be undertaken in the first instance as part of the detailed assessment, the results of which will also inform further phases of work.
- 7.8.5. Further evaluation works may include but are not limited to:
- monitoring of geotechnical work; and
 - evaluation trenching.
- 7.8.6. All evaluation work methodology will be considered as part of the assessment process following the collection of the baseline data. All works will be agreed in advance with the archaeological advisor for Staffordshire, and will follow guidance from the Chartered Institute for Archaeologists (CIfA).

Assessment of Effects

- 7.8.7. The assessment methodology will follow guidance set out in DMRB, Volume 11, Section 3, Part 2, HA 208/7 Cultural Heritage. The value of heritage assets and magnitude of impacts will be judged in accordance with the factors described in DMRB.
- 7.8.8. NPPF defines value of heritage assets as “The value of a heritage asset to this and future generations because of its heritage interest.” (Ref 7.5, Annex 2 Glossary). In addition, the NPPF sets out criteria which should be considered when assessing the significance of cultural heritage assets, which include archaeological, architectural, artistic and historic interest (Ref 7.12). These criteria will therefore been used in the assessment of significance for each affected asset. This information, in conjunction with professional judgement, will be used to assess the value of heritage assets, see Table 7.1.

Table 7.1: Determination of the Value of Heritage Assets

Value	Archaeological Assets	Historic Buildings	Historic Landscape Character
Very High	<ul style="list-style-type: none"> • World Heritage Sites (including nominated sites). • Assets of acknowledged international importance. • Assets that can 	<ul style="list-style-type: none"> • Structures inscribed as of universal importance as World Heritage Sites. • Other buildings of recognised international importance. 	<ul style="list-style-type: none"> • World Heritage Sites inscribed for their historic landscape qualities. • Historic landscapes of international value, whether designated or not.

Value	Archaeological Assets	Historic Buildings	Historic Landscape Character
	<p>contribute significantly to acknowledged international research objectives.</p>		<ul style="list-style-type: none"> Extremely well preserved historic landscapes with exceptional coherence, time-depth, or other critical factor(s).
High	<ul style="list-style-type: none"> Scheduled Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives. 	<ul style="list-style-type: none"> Scheduled Monuments with standing remains. Grade I and Grade II* Listed Buildings. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. Conservation areas containing very important buildings. Undesignated structures of clear national importance 	<ul style="list-style-type: none"> Designated historic landscapes of outstanding interest. Undesignated landscapes of outstanding interest. Undesignated landscapes of high quality and importance, and of demonstrable national value. Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s).
Medium	<ul style="list-style-type: none"> Designated or undesignated assets that contribute to regional research objectives. 	<ul style="list-style-type: none"> Grade II Listed Buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation areas containing buildings that contribute significantly to its historic character. Historic Townscape or built-up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture etc.). 	<ul style="list-style-type: none"> Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factor(s).
Low	<ul style="list-style-type: none"> Designated and undesignated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to 	<ul style="list-style-type: none"> 'Locally Listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association. Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street 	<ul style="list-style-type: none"> Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations.

Value	Archaeological Assets	Historic Buildings	Historic Landscape Character
	contribute to local research objectives.	furniture etc.).	
Negligible	<ul style="list-style-type: none"> Assets with very little or no surviving archaeological interest. 	<ul style="list-style-type: none"> Buildings of no architectural or historical note; buildings of an intrusive character. 	<ul style="list-style-type: none"> Landscapes with little or no significant historical interest.
Unknown	<ul style="list-style-type: none"> The importance of the resource has not been ascertained. 	<ul style="list-style-type: none"> Buildings with some hidden (i.e. inaccessible) potential for historic significance. 	<ul style="list-style-type: none"> n/a

7.8.9. Assessment of residual effects will be undertaken in two stages. The magnitude of impact is first assessed without reference to the value of the feature, but taking into account any appropriate mitigation. The findings of this assessment will then be cross-referenced with the value rating of the feature to establish the significance of residual effect that is likely to result from the proposed Scheme. This is calculated by the use of a matrix as illustrated in Table 5.3 that balances the importance of a feature against the magnitude of impact, taking into account any mitigation measures proposed.

7.9. Assessment Assumptions and Limitations

7.9.1. The assessment has been based on data received from databases held and maintained by third parties. It is assumed that this data is appropriate for use.

7.9.2. The proposed Scheme has not been subject to a cultural heritage site walkover or archaeological investigation at this preliminary stage. This will be undertaken during further stages of assessment. It is assumed that there will be access to all required land to undertake both intrusive and non-intrusive archaeological surveys, and that the results of the surveys will be available and incorporated within the Environmental Statement.

8. LANDSCAPE AND VISUAL

8.1. Introduction

8.1.1. The proposed Scheme has the potential to affect landscape character and visual receptors, both during construction and once operational. This section provides an overview of the potential impacts of the proposed Scheme on landscape and visual receptors and describes the proposed assessment methodology for the Environmental Statement.

8.2. Study Area

8.2.1. The study area comprises a 1 km buffer from the draft DCO site boundary in accordance with IAN135/10 (Ref. 8.1).

8.2.2. The Zone of Theoretical Visibility (ZTV) has been established by initial analysis of topographic maps, 3D digital modelling and terrain analysis and is based on the maximum theoretical visibility of the proposed Scheme derived from points of 1.5m height located along the highway, which represents theoretical visibility of cars on the highway, theoretical visibility of 4.5m HGVs and theoretical visibility of 12.5m high lighting columns. An indicative 10.0m height has been allocated to prominent areas of vegetation, and 7.5m to areas of settlement within the wider study area in order to provide a more refined ZTV output. The ZTV output is based on a viewer height of 1.7m with the theoretical viewer located at 25m centres throughout the study area.

8.2.3. The extent of the study area has therefore been determined to include the area of mapping illustrated on Figure 8.1 Study Area and Zone of Theoretical Visibility which outlines the study area and ZTV for the proposed Scheme.

8.3. Legislation, Policy and Guidance

8.3.1. The assessment of impacts on landscape and visual receptors and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents:

- National Networks National Planning Statement, December 2014, sections 5.84, 5.85, 5.89, 5.144-147, 5.150, 5.156 and 5.158-161 (Ref. 8.2);
- National Planning Policy Framework, July 2018, Policies 7, 9 and 11 (Ref. 8.3);
- DMRB, Volume 11, Section 3, Part 5: Landscape Effects (Ref. 8.4);
- Interim Advice Note 135/10, Landscape and Visual Effects Assessment;
- Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (Landscape Institute and IEMA) (Ref. 8.5); and
- South Staffordshire Council (2012) Core Strategy and Development Plan Document, policy EQ4 (Ref. 8.6).

8.4. Baseline Conditions

8.4.1. The proposed Scheme links M54 Junction 1 and M6 Junction 11 near the settlements of Shareshill and Featherstone in South Staffordshire. There are a number of rural and urban-fringe features within the study area including extensive mixed farmland, as well as the settlements of Shareshill, Featherstone, Essington and Cheslyn Hay. Highway infrastructure already exerts an influence over the study

area, with the presence of the M6, M54 and M6 Toll detracting from the surrounding landscape and having a negative influence on any perceived tranquillity.

- 8.4.2. The landscape and visual baseline has been determined through a combination of desk study and field work undertaken for assessment at PCF Stage 2 (options selection) (Ref 8.7 and Ref 8.8).

Landscape and Townscape Baseline

- 8.4.3. At a national level Natural England has defined a series of National Character Areas (NCAs) for England. The study area encompasses:
- NCA 67: Cannock Chase and Cank Wood; and
 - NCA 66: Mid Severn Sandstone Plateau.
- 8.4.4. Landscape character assessment is a hierarchical process descending from national to regional to local scale and ultimately to scheme-specific studies. It is unlikely that the proposed Scheme would have any significant effects on the character of these NCAs. This is because the key characteristics are regional and localised highway development would not likely result in a significant effect over the entire NCA. Therefore the LVIA will provide a high level overview of them.
- 8.4.5. At a county level, Planning for Landscape Change Supplementary Planning Guidance (SPG) (1996-2011) (Ref. 8.9) was originally published in 2000 by Staffordshire County Council, to provide guidance on Landscape Character within the county. The landscape of Staffordshire has been refined into 22 Landscape Character Types (LCTs), defined as broad tracts of landscape that convey a unity of character derived from their inclusion within specific regional character areas.
- 8.4.6. The footprint of the proposed Scheme is located within two Landscape Character Types (LCTs) - Settled Plateau Farmland Slopes and Settled Heathlands. Landscape Character Types (LCTs) are shown on Figure 8.2.
- 8.4.7. Settled Plateau Farmland Slopes LCT comprises a gently undulating landscape with some small-scale valley characteristics, creating some long distance views from plateau tops. Land use within the LCT predominantly constitutes small scale pastoral farmland of low intensity with ancient hedgerow patterns and relatively dense tree cover which limits views. Changes in vegetation cover ensure diversity in character across the LCT; tree species are predominantly ash or oak, with examples of alder and willow along watercourses. Unmanaged hedgerows contribute to the screening of potential views across the wider landscape. Where hedgerows have been managed, scale has a tendency to become larger, putting more emphasis on the landform. Nearer to urban areas the landscape tends to become more open, heavily influenced by surrounding residential areas and other human influences.
- 8.4.8. Within the Settled Heathlands LCT, the landscape is flat to gently rolling and supports a mix of arable and pastoral farming activities. Adjacent to urban areas, the field pattern was originally medium scale. However, over the years this has deteriorated and a large scale field pattern is now evident, bounded by gappy hedgerows. Away from urban development, the landscape is more intact. Given the origins of the LCT as heathland, indicators of this past land cover such as bracken and birch are evident across the LCT. There are a number of wooded stream valleys throughout the landscape. Transport infrastructure and urban development both have a negative influence on the landscape quality.
- 8.4.9. In summary, within the Planning for Landscape Change SPG (Staffordshire County Council), the study area encompasses, from south to north:

- Coalfield Farmlands LCT;
- Settled Plateau Farmland Slopes LCT; and
- Settled Heathlands LCT.

8.4.10. Within the far south-western corner of the study area is an area of townscape contained within the Black Country Historic Landscape Characterisation, published by the Black Country Archaeology Service in 2009 (Ref 8.10). This townscape belongs to the Pendeford, Fordhouse and Bushbury Character Area which contains relatively new housing and is the most recently developed suburb of the city of Wolverhampton. Around half of the land within the character area comprises housing, with other uses such as industry, public services and recreational facilities present.

Visual Baseline

8.4.11. Views are predominantly in close proximity to the proposed Scheme, including from the residential areas of Featherstone, Hilton, Shareshill, Essington, Little Saredon, and Laney Green. The majority of views are within 1km of the proposed Scheme and include a baseline which is heavily influenced by the existing M54, M6 and M6 Toll highway corridors.

8.4.12. Views are also obtained from public rights of way (PRoW) adjacent to the proposed Scheme including a number of footpaths and bridleways. Intervening vegetation across the study area acts as a visual barrier to parts of these PRoW, restricting accessible views to the proposed Scheme.

Landscape Designations

8.4.13. There are no international or national designations of landscape quality or value within the study area.

8.4.14. Hilton Park, within the south of the study area, constitutes a Historic Landscape Area (HLA) as designated by South Staffordshire District Council and subject to additional protection through the Adopted Core Strategy. HLAs were selected for the strong historic landscape character and the desirability of conserving and restoring it.

8.4.15. There are no other local landscape designations within the study area.

8.4.16. Much of the study area is designated as green belt. Green belt is a designation of landscape value related primarily to openness between settlements rather than an indication of landscape quality.

8.4.17. Baseline landscape and visual data for the study area has been gathered from the following sources:

- Planning for Landscape Change SPG (Staffordshire County Council); and
- The Black Country - A Historic Characterisation (Black Country Archaeology Service).

8.5. Potential Impacts

8.5.1. Interactions between the proposed Scheme and landscape receptors would potentially occur in two ways; through direct loss of landscape elements (i.e. subtractions which change landscape character) or through additions which change landscape character (additive).

- 8.5.2. The ZTV of the proposed Scheme (refer to Figure 8.1) shows relatively wide views due to the gently undulating landscape and lack of woodland, although in practice, these views are more restricted by intervening vegetation and built form.

Construction

Landscape

- 8.5.3. The proposed Scheme would be accommodated on land to the east of the existing A460 corridor. The immediate surroundings of the proposed Scheme are currently a mix of existing highway, arable farmland, woodland, residential properties and parkland. It is considered that implementation of the proposed Scheme would constitute a loss of characteristic landscape elements such as parkland, farmland and trees through the construction process. In addition, construction activity would appear relatively incongruous in the semi-rural context.

Visual

- 8.5.4. Visually, a number of receptors (including users of local PRoW and highway users) would be affected by the presence of construction vehicles, construction compounds, soil stockpiles and other construction activity within views. These views would be filtered by undulating landform, as well as intervening vegetation and built form.

Operation

Landscape

- 8.5.5. As set out above, the existing landscape baseline is characterised by the presence of highway infrastructure within the study area. The addition of the proposed Scheme at operation would therefore result in an intensification of the highway infrastructure, but would not necessarily result in the addition of incongruous elements to the landscape context.

Visual

- 8.5.6. At operation, the proposed Scheme would not be visually well defined within the wider landscape due to the effect of topography, intervening vegetation and built form. Direct views of the proposed Scheme would therefore be predominantly obtained from highway locations in the approach to junctions with or crossings of, as well as footpaths/bridleways immediately adjacent to it (particularly those near Shareshill). The context of the proposed Scheme has variable levels of existing lighting due to its semi-rural and urban fringe nature.

8.6. Design, Mitigation and Enhancement Measures

- 8.6.1. Environmental considerations will be taken into account during the further development of the proposed Scheme design, including consideration of minimising building demolition requirements and minimising land take.
- 8.6.2. A CEMP would be prepared and implemented by the appointed construction contractor – this would include a range of best practice measures associated with mitigating potential environmental impacts e.g. limiting construction lighting and signage to that which is absolutely necessary to reduce additional visual clutter and minimise effects on both landscape character and visual amenity.
- 8.6.3. The proposed Scheme design will include an appropriate landscape design which will incorporate tree and shrub planting, as well as earthworks manipulation such as bunds, false cuttings and use of natural landform. The landscape design will help to mitigate some of the landscape and visual impacts by integrating and replacing

landscape features, enhancing landscape character and providing screening for visual receptors. In particular the landscape design will take account of ecological mitigation and enhancement requirements and heritage features as well as the opinions stakeholders including the Staffordshire County Council Landscape Officer and applicable local resident groups.

8.7. Description of the Likely Significant Effects

- 8.7.1. The PCF Stage 2 assessment (options selection) (Ref. 8.2 and Ref. 8.3) indicated that the proposed Scheme has the potential to generate a range of landscape and visual effects which would change over time.
- 8.7.2. Construction was not considered as part of the PCF Stage 2 assessment (options selection). However, it is considered that, during construction of the proposed Scheme, the landscape effects in the vicinity of the proposed Scheme would potentially range from neutral to moderate / large adverse effects. Effects upon some viewpoints during construction have the potential to range from negligible to large / very large, depending on the receptor sensitivity and the predicted impact magnitude (which includes the consideration of the duration and permanence of effects).
- 8.7.3. No significant landscape effects are anticipated during operation of the proposed Scheme in the opening year (Year 1) or the design year (Year 15).
- 8.7.4. During operation, visual amenity effects are predicted to range from neutral to large / very large adverse in the opening year (Year 1) (depending on the receptor sensitivity and the predicted impact magnitude), and following maturation of landscape mitigation (Year 15). Some of the predicted visual effects would reduce by Year 15 as mitigation planting matures and reduces the impact of the proposed Scheme within the view.

8.8. Assessment Methodology

Data Sources

- 8.8.1. The following data sources will be used to inform the assessment of landscape and visual impacts on receptors as a result of the proposed Scheme:
- Desk-based assessment of landscape character, including its condition and value.
 - Computer-generated ZTV based on the maximum theoretical visibility of the proposed Scheme.
 - Site survey to record landscape character and views from representative viewpoint locations.

Proposed Level and Scope

- 8.8.2. A detailed LVIA assessment will be carried out in line with IAN 135/10 as there is the potential for significant landscape and visual effects arising from the proposed Scheme. The assessment will include desk and fieldwork in order to identify the character of the landscape, including its condition and value, and the nature and sensitivity of the visual receptors that may be affected by the project.
- 8.8.3. The ZTV allows for identification of representative viewpoint locations which will be visited and forms the basis of the assessment of effects on visual amenity within the LVIA. The LVIA will also assess changes in visual amenity as a result of effects arising from additional land areas associated with the proposed Scheme.

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- 8.8.4. The viewpoints will be drawn from publically accessible locations chosen to cover the range of effects on visual amenity from receptors such as residential areas, PRow, highways, commercial and leisure locations, although not all categories may be present. The viewpoints will represent grouped effects of multiple receptors from settlements but will take the GLVIA3 approach to representative viewpoints rather than listing all locations.
- 8.8.5. The LVIA will assess likely effects of the proposed Scheme on each of these representative viewpoints and by extension, the additional similar viewpoints which may also be similarly impacted by the proposed Scheme.
- 8.8.6. The LVIA will assess likely effects of the proposed Scheme on the landscape character of the published assessments within the study area.
- 8.8.7. The landscape and visual effects of the proposed Scheme will be assessed at the following stages of the development:
- During proposed Scheme construction period;
 - At year 1 of proposed Scheme opening; and
 - At 15 years after proposed Scheme opening, allowing time for the contribution of planting or other landscape mitigation to mature and taking into account future planned development.
- 8.8.8. The LVIA will comprise, but not be limited to, the following:
- Desktop study of existing landscape character assessments both at national and local level. Reference will be made to Natural England National Character Area Profiles relevant to the area.
 - Identification of the baseline character, value and quality of the site and surrounding landscape as well as its susceptibility to the specific change arising from the proposed Scheme.
 - Identification of the ZTV - this will help identify receptors and public viewpoints that should be assessed (see Figure 8.1). Assessment locations will be agreed with the local planning authority. Photographs will be taken at representative viewpoints along with a record of the key landscape and visual characteristics.
- 8.8.9. The assessment of impacts from the agreed viewpoints, using photography and where appropriate, photomontages. The nature of existing views will be described for each viewpoint. An assessment of sensitivity of receptor, derived from susceptibility to the specific change and value of view combined with magnitude of effect derived from the scale/ extent, duration and reversibility of change in the view, will be used to determine likely overall significance of effect.
- 8.8.10. The results of the LVIA will be integrated with the cultural heritage, ecological and arboricultural assessment as far is necessary given the degree of overlap.
- 8.8.11. Identification of appropriate mitigation and enhancement proposals to be illustrated on a landscape master plan to minimise or reduce impacts.

Landscape and Visual Value

- 8.8.12. Under Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (Ref. 8.6), value of landscape resources is a function of the factors listed below, which may be encompassed within a designation of landscape value:
- landscape quality;

- scenic quality;
 - rarity;
 - representativeness;
 - conservation interest;
 - recreation value;
 - perceptual aspects; and
 - associations.
- 8.8.13. The LVIA will assess landscape value based on these criteria and by reference to landscape designations within the study area. An overview of landscape designations is provided below.
- 8.8.14. Assessment of value of views will form a component of the LVIA required to establish sensitivity. Value of views is typically more subjective and may vary from viewer to viewer, however, factors to be considered will include views of or from heritage assets, designated landscapes/ views, or named or promoted views found in guidebooks or tourist literature.

Assessment of Effects

- 8.8.15. The GLVIA3 methodology will be used to determine sensitivity of receptors and magnitude of impacts (see Tables 8.1 and 8.2) which will then be combined using the terminology in Table 8.3 derived from IAN 135/10. In accordance with GLVIA3 methodology, the matrix will be used as a guideline to define landscape and visual effect significance rather than a prescriptive or inflexible process. Effects predicted to be slight or neutral are considered to be 'non-significant'. Moderate/Large or Very Large effects are considered to be significant and require weighing in the planning balance against other benefits of the proposed development.

Table 8.1: Matrix for the Definition of Magnitude and Nature of Impact and Typical Descriptors (derived from IAN 135/10)

Magnitude of Impact	Typical Criteria Descriptors
Major Adverse	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Moderate Adverse	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements.
Minor Adverse	Slight loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
Negligible Adverse	Barely noticeable loss or damage to existing character or features and elements, and/or the addition of new but uncharacteristic features and elements.
No Change	No noticeable loss, damage or alteration to character or features or elements.
Negligible Beneficial	Barely noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new

Magnitude of Impact	Typical Criteria Descriptors
	characteristic elements.
Minor Beneficial	Slight improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Moderate Beneficial	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Major Beneficial	Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

Table 8.2: Matrix for the Definition of Landscape Sensitivity and Typical Examples (derived from IAN 135/10)

Sensitivity	Typical Descriptors and Examples
Major Adverse	<p>Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> • Of high quality with distinctive elements and features making a positive contribution to character and sense of place. • Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale. • Areas of special recognised value through use, perception or historic and cultural associations. • Likely to contain features and elements that are rare and could not be replaced.
Moderate Adverse	<p>Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> • Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place. • locally designated, or their value may be expressed through non-statutory local publications. • Containing some features of value through use, perception or historic and cultural associations. • Likely to contain some features and elements that could not be replaced.
Low	<p>Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be:</p> <ul style="list-style-type: none"> • Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place. • Not designated.

Sensitivity	Typical Descriptors and Examples
	<ul style="list-style-type: none"> Containing few, if any, features of value through use, perception or historic and cultural associations. Likely to contain few, if any, features and elements that could not be replaced.

Table 8.3: Matrix for the Definition of Landscape and Visual Significance of Effects (derived from IAN 135/10)

Landscape sensitivity	Magnitude of Impact				
	No Change	Negligible	Minor	Moderate	Major
High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
Moderate	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate

8.8.16. Photography incorporated into the figures accompanying the LVIA will be undertaken in accordance with guidance given in Landscape Institute Advice Note 01/11 “Photography and photomontage in landscape and visual impact assessment” unless stated otherwise.

8.9. Assessment Assumptions and Limitations

8.9.1. The LVIA will be based on, and limited to, the baseline conditions observed at the time of the ZTV survey. Surveys will cover the summer and winter, but will not include other seasons.

8.9.2. The PCF Stage 2 (options selection) LVIA did not consider the candidate sites identified for potential flood compensation, construction compounds, borrow pits and/ or ecological compensation. The LVIA to be reported in the Environmental Statement will consider the landscape and visual assets in such areas and the associated impacts and effects.

9. BIODIVERSITY

9.1. Introduction

9.1.1. The proposed Scheme has the potential to affect statutory and non-statutory designated sites, priority habitats and protected/ notable species, both during construction and operation. This section provides an overview of the potential impacts of the proposed Scheme on biodiversity and describes the proposed assessment methodology for the Environmental Statement.

9.2. Study Area

9.2.1. The biodiversity study area reflects standard best practice and the scoping distances that statutory consultees would typically expect to be considered for identification of ecological features that might experience direct or indirect effects as a result of the proposed Scheme. Definition of the appropriate study area has been informed by published guidance and professional judgement, with reference to the geographic location, nature and scale of the proposed Scheme (refer to Section 9.8 for details).

Desk study

9.2.2. The desk study data collected during the 2015 protected species surveys used to inform the PCF Stage 2 (options selection) Environmental Assessment Report (Ref 9.1) has been updated for the proposed Scheme and includes a larger search area to meet all potential data needs for the assessment of potential ecological impacts and effects. The following study areas will be used for the assessment on biodiversity:

- International nature conservation designations within 30 km of the draft DCO site boundary to identify sites where bats are a primary reason for designation e.g. Special Area of Conservation (SAC).
- Other international statutory nature conservation designations within 10 km of the draft DCO site boundary e.g. SAC, Special Protection Area (SPA) and Ramsar sites.
- National statutory nature conservation designations within 2 km of the draft DCO site boundary e.g. Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) this was extended to 10 km to encompass sites which could be affected by changes in air quality.
- Non-statutory nature conservation designations within 2km of the draft DCO site boundary e.g., Local Wildlife Sites (LWS), Site of Biological Interest (SBI), Biodiversity Action Site (BAS) and Site of Importance for Nature Conservation (SINC) and Ancient Woodland.
- Protected species within 2 km of the draft DCO site boundary.

Field Surveys

9.2.3. Habitat and protected species surveys are all subject to land access. The surveys were all completed in compliance with industry best practice guidance, refer to Section 9.8 for details. The habitat and protected species surveys that have been undertaken to date and which will be used to inform the assessment are as follows:

- Phase 1 Habitat Survey - Habitats were mapped up to 250 m from the draft DCO site boundary (Refer to Figure 9.4 and Appendix 9.1).
- Ancient Semi-Natural Woodland - Woodlands present up to 100 m from the draft DCO site boundary were assessed for species and features (including presence

of deadwood) which indicated that the woodland was Ancient woodland or possible Ancient woodland site (Refer to Figure 9.5).

- Badger (*Meles meles*) - A badger survey was carried out where suitable habitat was present within and up to 50 m of the draft DCO site boundary.
- Tree summer roost survey - Trees within and up to 50 m of the draft DCO site boundary which were identified as providing moderate or high bat roost potential during the Phase 1 Habitat Survey were subject to an aerial inspection using an endoscope to assess any features suitable for a summer roost.
- Tree hibernation survey - Trees within and up to 50 m of the draft DCO site boundary which were identified as providing moderate or high bat roost potential during the Phase 1 Habitat Survey are scheduled to be aerially inspected between December 2018 and February 2019 to record winter roosts.
- Building scoping - Buildings within and up to 100 m of the draft DCO site boundary identified within the Phase 1 Habitat Survey as having bat roost potential were scoped to identify those which could hold bat roosts.
- Building emergence and re-entry surveys – Buildings within and up to 100 m of the draft DCO site boundary identified within the building scoping surveys as buildings with potential to hold roosts were subject to emergence and re-entry surveys.
- Bat transect surveys – Areas within and up to 100 m of the draft DCO site boundary were subject to bat transect surveys to identify any important bat flight lines and foraging areas.
- Barn Owl (*Tyto alba*) - Barn Owl roosting habitat was surveyed for within 250 m of the draft DCO site boundary (Refer to Appendix 9.5).
- Wintering Birds – Wintering bird surveys were carried out within and up to 100 m from the draft DCO site boundary.
- Breeding Birds – Breeding bird surveys were carried out within and up to 100 m from the draft DCO site boundary.
- Great crested newts (GCN) (*Triturus cristatus*) - All waterbodies located within 500 m of the draft DCO site boundary were assessed for their potential to support GCN. Where ponds were highlighted as having potential to support GCN, targeted surveys were undertaken to establish presence / likely absence (Refer to Appendix 9.2).
- Invasive plant species - An invasive plant species survey was undertaken and mapped up to 100 m from the draft DCO site boundary.
- Otter (*Lutra lutra*) and water vole (*Arvicola amphibious*) – Otter and water vole surveys have been undertaken where the proposed Scheme would cross a watercourse. The survey extended 250 m upstream and downstream of the proposed crossing points where access was permitted (Refer to Appendix 9.3).
- Reptile - A survey area of 250 m from the draft DCO site boundary was used for the reptile survey, where access was permitted (Refer to Appendix 9.4).
- Terrestrial Invertebrates - A terrestrial invertebrate habitat assessment survey was undertaken and mapped up to 100 m from the draft DCO site boundary, where access was permitted.

- White clawed crayfish (*Austropotamobius pallipes*) - A white-clawed crayfish scoping survey was undertaken where the proposed Scheme would cross a watercourse. The survey extended 250 m upstream and downstream of the proposed crossing points where access was permitted.

9.3. Legislation, Policy and Guidance

- 9.3.1. The objective of the EclA will be to identify any effects upon ecological features that are likely to arise from construction and/or operation of the proposed Scheme. The following legislative framework and planning policies will apply to nature conservation and biodiversity.

National Policy Statement for National Networks

- 9.3.2. The NPSNN statements 5.20 - 5.38 (Ref 9.2) specifically apply to ecology and biodiversity and includes how such impacts can influence the decision-making process.
- 9.3.3. The NPSNN states that as a general principle, and subject to specific policies, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives.

National Planning Policy Framework

- 9.3.4. The NPPF states the commitment of the UK Government to minimise impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity (Ref 9.3). It specifies the obligations that local authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation, and how this it to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development. If development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impacts are unavoidable, compensation may be required.
- 9.3.5. Supporting advice on protected species has been published by Natural England and the Defra as standing advice for use by local planning authorities when determining planning applications.

Ancient Woodland

- 9.3.6. Ancient woodland is an irreplaceable resource of great ecological value. The NPPF is the key government policy document relating to planning decisions affecting ancient woodland. Paragraph 175 of the NPPF states:
- 9.3.7. "development resulting in the loss or the deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists"

Biodiversity 2020: A strategy for England's Wildlife and Ecosystem Services

- 9.3.8. This biodiversity strategy for England builds on the Natural Environment White Paper and the earlier UK Biodiversity Action Plan. It provides a comprehensive picture of how Government is implementing our international and EU commitments and sets out the strategic direction for biodiversity policy up to 2020 (Ref 9.4). Its mission is to:

9.3.9. “halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.”

9.3.10. In relation to planning and development its priority is to:

“take a strategic approach to planning for nature within and across local areas. This approach will guide development to the best locations, encourage greener design and enable development to enhance natural networks. We will retain the protection and improvement of the natural environment as core objectives of the planning system.”

Key Legislation

9.3.11. Nature conservation policy in England is implemented through a series of protected areas, habitats and species designated under legislation from an international to local level. In relation to the majority of significant habitats and protected species relevant to the proposed Scheme, key legislation is outlined in Table 9.1.

9.3.12. The key legislation for individual species/species groups relevant to the proposed Scheme is summarised in Table 9.2. The species list has been guided by the results of the desk study and species specific surveys undertaken at PCF Stage 2 (options selection).

Table 9.1: Key Ecological Legislation

Legislation	Description
The Conservation of Habitats and Species Regulations 2017	The Conservation of Habitats and Species Regulations 2010 (as amended) came into force on 30 October 1994, and has been subsequently amended in 1997, 2000 (in England only), 2010 & 2017. Containing five Parts and four Schedules, the Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.
The Convention on the Conservation of European Wildlife and Natural Habitats (Ref 9.5) (Bern Convention 1979)	The Bern Convention aims to ensure conservation and protection of all wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to afford special protection to the most vulnerable or threatened species (including migratory species).
EC Wild Birds Directive 1979 (European Directive 79/409/EEC on the conservation of wild birds) (Ref 9.6)	Council Directive 79/409/EEC on the conservation of wild birds, commonly referred to as the Birds Directive creates a comprehensive scheme of protection for all wild bird species naturally occurring in the European Union. The directive recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. It therefore places great emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), especially through the establishment of a coherent network of Special Protection Areas (SPA) comprising all the most suitable territories for these species. Since 1994 all SPAs form an integral part of the Natura 2000 ecological network.
Wildlife and Countryside Act 1981 (as amended) (WCA 1981)	The primary UK mechanism for statutory site designation (Sites of Special Scientific Interest, (SSSIs)) and protection of individual species listed under Schedules 1, 2, 5 and 8 of the Act, each subject to varying levels of protection.

Legislation	Description
(Ref 9.7)	In addition, there are a number of plant species, including Japanese knotweed (<i>Fallopia japonica</i>), giant hogweed (<i>Heracleum mantegazzianum</i>) and Himalayan balsam (<i>Impatiens glandulifera</i>) which are listed in Schedule 9 of the Act which makes it an offence to cause the spread of these species.
The Countryside and Rights of Way Act 2000 (CROW Act 2000) (Ref 9.8)	This legislation strengthens the provision of the WCA 1981 (as amended), both in respect of statutory sites such as SSSIs and protected species. It also places a statutory obligation on Local Authorities and other public bodies to further conservation of biodiversity in the exercise of their functions, thus providing a statutory basis to the Biodiversity Action Plan (BAP) process, which began in 1994. Section 74 of the Act lists the habitat types and species of principal importance in England.
The Hedgerow Regulations 1997 (Ref 9.9)	In England and Wales The Hedgerow Regulations 1997 are intended to protect important countryside hedges from destruction or damage.
Natural Environment and Rural Communities Act 2006 (NERC Act 2006) (Ref 9.10)	This Act makes provision in respect of biodiversity, pesticides harmful to wildlife, protection of birds and invasive non-native species. Section 40 of this Act introduced a new duty on public bodies to have regard to the purpose of conserving biodiversity in the exercise of their functions. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England, as required by the Act. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Table 9.2: Protected Species Legislation

Species	Key Legal Protection
Plants	WCA 1981 (as amended).
Badger	Protection of Badgers Act 1992 (Ref 9.11).
Bats All European species	The Conservation of Habitats and Species Regulations 2017 and WCA 1981 (as amended). (Ref 9.12)
Birds	WCA 1981 (as amended).
Great crested newt	The Conservation of Habitats and Species Regulations 2017 and WCA 1981 (as amended).
Otter	The Conservation of Habitats and Species Regulations 2017 and WCA 1981 (as amended).
Water vole	WCA 1981 (as amended).
Reptiles – common lizard (<i>Zootoca vivipara</i>), adder (<i>Vipera berus</i>), grass snake (<i>Natrix helvetica</i>) and slow worm (<i>Anguis fragilis</i>)	WCA 1981 (as amended).
Terrestrial Invertebrates	The Conservation of Habitats and Species Regulations 2017,

Species	Key Legal Protection
	WCA 1981 (as amended) and NERC Act 2006.
White clawed crayfish	WCA 1981 (as amended).

9.4. Baseline Conditions

9.4.1. This section describes the existing baseline conditions as determined through desk study, the Phase 1 habitat survey and protected species surveys undertaken in 2018. A number of habitat and protected species surveys are ongoing, see paragraphs 9.4.15 to 9.4.17 for details.

Designated sites

9.4.2. There are no Special Areas of Conservation within 30 km of the proposed Scheme where bats are a primary reason for designation.

9.4.3. Designated sites and areas of Ancient Woodland within the study area are detailed in Table 9.3, including the distance from the draft DCO site boundary as well as the relationship of the designated site(s) to the proposed Scheme.

Table 9.3: Designated sites

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
European Designated Sites (as shown on Figure 9.1)			
Cannock Extension Canal SAC	5.8 km east	This 5.47 ha canal has low boat traffic and has been allowed to develop a diverse range of aquatic flora. It has been designated specifically because of the floating water-plantain (<i>Luronium natans</i>) which is an Annex 2 species under the Habitats Directive.	The M6, A462 and A34 are major barriers between the site and the proposed Scheme.
Cannock Chase SAC	7.4 km north-east	This 1264.3 ha site contains a large diversity of semi natural habitats including European dry heath and Northern Atlantic wet heaths, both of which are designated as Annex 1 habitats under the Habitats Directive and the reason why the site is designated as a SAC.	There are no obvious habitat links between Cannock Chase and the proposed Scheme. The A34 and Cannock are major barriers between the site and the proposed Scheme.
Nationally Designated Sites (as shown on Figures 9.2 and 9.3)			
Cannock Chase SSSI	7.4 km north-east	This 1264.3 ha site contains a large diversity of semi natural habitats including the largest area of lowland heath in the Midlands.	There are no obvious habitat links between Cannock Chase and the proposed Scheme. The A34 and Cannock are major barriers between the site and the proposed Scheme.
Stowe Pool and Walk Mill Clay Pit SSSI	1.5 km north-east (only Walk Mill Clay Pit is within the study area)	The only section of this SSSI that is within the proposed Scheme's catchment is Walk Mill Clay Pit. This site has historically supported a large and significant population of white clawed crayfish.	The M6 Toll and the M6 are significant major barriers between the site and the proposed Scheme.
Big Hyde Rough SSSI	7.4 km west	An ancient woodland site that is an example of a valley alder wood on base-rich soils.	The A5 is considered a major barrier between the site and the proposed Scheme.

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
Clayhanger SSSI	7.2 km east	Nationally important for the habitat diversity, species restricted in their national distribution, and well developed emergent vegetation within the sites swamp and fen communities, and species-rich marshy grassland.	The M6, A462 and A34 are major barriers between the site and the proposed Scheme.
Jockey Fields SSSI	8.5 km east	The site consists of several low-lying fields in a stream valley. Designated for the variety and size of habitats present and locally rare flora.	The M6, A462 and A34 are major barriers between the site and the proposed Scheme.
Swan Pool & The Swag SSSI	8.9 km east	The site comprises two pools which are connected by a culvert. The reed beds within the two pools present hold the largest roost for swallows and other hirundines in the West Midlands.	The M6, A462 and A34 are major barriers between the site and the proposed Scheme.
Stubbers Green Bog SSSI	9.7 km east	A small wetland site comprising a shallow pool and fringe valley mire and swamp habitats. Designated for the presence of nationally scarce valley mire habitat, and habitat mosaic present which is locally uncommon within the County.	The M6, A462 and A34 are major barriers between the site and the proposed Scheme.
The Chasewater and South Staffordshire Coalfield Heaths SSSI	6.4 km east	Nationally important for wet and dry lowland heath, fens, standing open water and populations of floating water plantain and round-leaved wintergreen. The SSSI comprises 15 units of which five are within the Local Air Quality Study Area. This is discussed further in Chapter 6: Air Quality	The M6 and A34 are major barriers between the site and the proposed Scheme.
Belvide Reservoir SSSI	8 km north-west	A canal feeder reservoir, notified for wintering and breeding bird assemblage.	Located north-west of the proposed Scheme. The A449 and Shropshire Union Canal separate the SSSI from the proposed Scheme.
Wryley and Essington Canal LNR and LWS	1.4 km east	This site has been restored and converted into a LNR over several years. Bat and great crested newt records are located within this nature reserve.	Warstone Road and the M6 are major barriers between the site and the proposed Scheme.

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
Non-statutory Designated Sites (as shown on Figure 9.2)			
Keeper's Wood, Hilton Park SBI and LWS	712 m east	Mature mixed deciduous/conifer plantation.	The site is linked to the proposed Scheme through arable farmland and hedgerows.
Lower Pool SBI and LWS	Within the area of the proposed Scheme	A large ornamental pool with both emergent and floating vegetation.	The proposed Scheme crosses the western edge of the SBI, with the draft DCO site boundary encompassing the central area of the SBI.
Brookfield Farm, Shareshill, SBI and LWS	Within the draft DCO site boundary	An area of wet woodland comprising alder (<i>Alnus glutinosa</i>) and willow (<i>Salix sp</i>) carr that is drying out in some areas of the site. Sycamore (<i>Acer pseudoplatanus</i>) is common in the drier parts of the wood.	The proposed Scheme crosses the western end of the SBI.
Hatherton Bridge (by) Hatherton SBI	1.6 km north-west	Rough semi-improved field with many ruderal species.	The site is separated from the proposed Scheme by Great Saredon Road.
Coven Heath SBI and LWS	1.6 km west	An area of wet heath, which is now drying, part of which has been ploughed.	Located to the southern end of the proposed Scheme. Separated from the proposed Scheme by Stafford Road.
The Hag retained BAS	404 m east	Woodland dominated by sycamore, with some oak and much hawthorn around the edges. Within the wood is a very steep-sided pond without emergent vegetation.	There is arable land, hedgerows and woodland connecting the BAS to the proposed Scheme. There are no hydrological links between the site and the proposed Scheme.
Saredon Hall Farm retained BAS (south-east of)	268 m north	An area of oak (<i>Quercus sp.</i>) woodland with a small pond.	The site is adjacent to the northern end of the proposed Scheme. The M6 Toll acts as a major barrier between the site and the proposed Scheme.
Moseley Hall SINC	630 m south-west	Mature semi-natural and amenity woodland along course of Waterhead Brook and large former mill pond. Parts of woodland pre-date 1816 and may be 'ancient' as defined	The M54 acts as a major barrier between the site and the proposed Scheme.

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
		by Natural England.	
Westcroft retained BAS (woods north of)	683 m south-west	A mixed wood containing mainly pedunculate oak (<i>Quercus robur</i>), sycamore and Scots pine (<i>Pinus sylvestris</i>). The understorey is dominated by elder (<i>Sambucus nigra</i>) and hawthorn (<i>Crataegus monogyna</i>).	There are major barriers between the site and the proposed Scheme, including the M54 and a large industrial park.
Northcote Farm Parkland	900 m south-west	Mature parkland with areas of recent planted woodland and strip of diverse semi-natural woodland along course of Waterhead Brook (this pre-dates 1830s and may be 'ancient' as defined by Natural England).	The M54 acts as a major barrier between the site and the proposed Scheme.
Northcote Farm Coppice	1 km south-west	Small broad-leaved coppice woodland that pre-dates 1816 and may be 'ancient' as defined by Natural England. Site forms part of Northcote Farm Country Park.	The M54 acts as a major barrier between the site and the proposed Scheme.
Westcroft Farm (land north of), Bushbury, SBI and LWS	1.2 km south-west	A linear strip of alder/crack willow woodland along the stream with sycamore abundant in the canopy away from the stream. Hazel (<i>Corylus avellana</i>) frequents the understorey throughout the woodland, with scattered elder and holly (<i>Ilex aquifolium</i>).	There are major barriers between the site and the proposed Scheme, including the M54 and a large industrial park.
Essington Pools retained BAS	1.9 km south-east	As well as the open water there are two areas of woodland, an area of tall planting and amenity grassland. The amenity grassland is regularly mown.	The village of Essington is a major barrier between the site and the proposed Scheme. There are no hydrological links.
Ashmore Lodge, Essington (disused mineral railway line), Retained BAS	1.5 km south-east	An old dismantled mineral line now covered by neutral grassland with some wooded areas.	The M54 and Bognop Road are major barriers between the site and the proposed Scheme.
Hatherton Branch Canal	1.5 km north	The section of canal between the M6 and Oak Lane is largely choked by reed sweet-grass (<i>Glyceria maxima</i>).	Located approximately 1.5 km north of the northern section of the proposed Scheme. Arable fields,

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
retained BAS			hedgerows and drainage ditches may provide limited connectivity to the northern section of the proposed Scheme.
Hatherton Pines retained BAS	1.6 km north-east	An area of plantation coniferous woodland, situated between the two Hatherton Pools. The area of most importance is the grassland between the plantations which has a rich flora due to poor soil conditions, including kidney vetch (<i>Anthyllis vulneraria</i>) and bilberry (<i>Vaccinium myrtillus</i>).	The M6 Toll, the M6 and the A4601 are major barriers between the site and the proposed Scheme. There are no hydrological links.
Lodge Hill (north-east of) BAS	1.6 km north-east	A small damp depression at the edge of an arable field.	The M6 Toll, the M6 and the A4601 are major barriers between the site and the proposed Scheme. There are no hydrological links.
Hatherton Reservoir, Cheslyn Hay SBI (LWS)	1.6 km north-east	Reservoir with high quality water and diverse emergent and submerged vegetation.	A large industrial estate, quarry and the M6 act as major barriers between the site and the proposed Scheme. There is a potential hydrological connection through Wyrley Brook and Saredon Brook to a pond that is adjacent to the northern end of the proposed Scheme.
Ancient Woodland (as shown on Figure 9.2)			
Burns Wood (east)	1.2 km east	Ancient & Semi-Natural Woodland	The M6 and A462 are major barriers between the site and the proposed Scheme.
Burns Wood (west)	1 km east	Ancient & Semi-Natural Woodland	The land between the site and the proposed Scheme is predominantly agricultural land with small pockets of woodland. No clear pathway to the receptor.
Essington Wood	1.6 km east	Ancient & Semi-Natural Woodland	The M6 is a major barrier between the site and the proposed Scheme.

Designation	Distance from the draft DCO site boundary (approx.)	Reason for Designation	Relationship to the proposed Scheme
Spring Coppice	1 km east	Ancient & Semi-Natural Woodland	The M54 is a major barrier between the site and the proposed Scheme. No pathways to the receptor.
Beech Head	340 m east	Ancient & Semi-Natural Woodland	The M54 is a major barrier between the site and the proposed Scheme. No pathways to the receptor.
Oxden Leasow	Within the draft DCO site boundary	Ancient & Semi-Natural Woodland	The draft DCO site boundary incorporates the northern boundary of the woodland. The alignment of the proposed Scheme is located immediately adjacent to the site.

- 9.4.4. Other areas of potential ancient woodland, not identified in the desk study (woodland of less than 2 ha is not recognised within the MAGIC dataset) were identified during the Phase 1 habitat and Ancient Semi-Natural Woodland (ASNW) surveys and are shown on Figure 9.5. NVC surveys and the interrogation of historical maps are being undertaken to confirm if the woodlands are ASNW or Plantation on Ancient Woodland Site (PAWS).

Habitats and Flora

Priority Habitats

- 9.4.5. Priority Habitat Inventory Data identified on MAGIC indicate that Biodiversity Action Plan priority habitat deciduous, broad-leaved and wet woodland is present within the Phase 1 study area, refer to Figure 9.4.

Phase 1 Habitat Survey

- 9.4.6. The Phase 1 habitat survey (undertaken in summer 2018) identified the following habitat types within the Phase 1 habitat survey area (refer to Figure 9.4). Habitats are listed in descending order of area:

- semi-improved neutral grassland;
- arable land;
- broad-leaved semi-natural woodland;
- built-up areas;
- standing water;
- hedgerows including: species poor intact hedge, species poor defunct hedge, species rich intact hedge;
- scrub;
- improved grassland;
- running water;
- amenity grassland;
- bare ground; and
- lines of trees.

Ancient Woodland

- 9.4.7. Botany assessments were undertaken in April and May 2018 which identified 14 areas of deciduous woodland which had potential for Ancient Woodland Interest status due to the presence of several species of Ancient Woodland Vascular Plant (AWVP) refer to Figure 9.5. Table 9.4 provides a summary of the AWVP species encountered during the surveys with a comment on the potential status of the woodland based on the ecological findings from these surveys.

Table 9.4: Woodlands identified with potential Ancient Woodland Interest status

Woodland label (Fig 9.5)	Habitat type	AWVP (Species Recorded)	Status
1	Wet Woodland	0	Not ASNW or Plantation on Ancient Woodland Site (PAWS)
2	Broad-leaved Woodland	Bluebell (<i>Hyacinthoides non-scripta</i>), dog's mercury (<i>Mercurialis perennis</i>), holly (<i>Ilex aquifolium</i>), ramsons (<i>Allium ursinum</i>), wood anemone (<i>Anemone nemorosa</i>) and wood-sorrel (<i>Oxalis stricta</i>)	Possible PAWS
3	Broad-leaved Woodland	0	Requires survey
4	Wet Woodland	Ramsons	Possible ASNW or PAWS
5	Wet Woodland	Bluebell and ramsons	Possible ASNW or PAWS
6	Broad-leaved Woodland	Large bittercress (<i>Cardamine amara</i>)	Possible PAWS
7	Broad-leaved Woodland	0	Not ASNW or PAWS
8	Broad-leaved Woodland	Bluebell, herb-robert (<i>Geranium robertianum</i>), holly, red campion (<i>Silene dioica</i>) and Possibly forget-me-knot (<i>Mycosotis scorpioides</i>)	Possible ASNW or PAWS
9	Broad-leaved Woodland	Holly	Possible ASNW or PAWS
10	Wet Woodland	0	Possible ASNW or PAWS
11	Broad-leaved Woodland	Dog's mercury and greater stitchwort (<i>Stellaria holostea</i>)	Possible PAWS
12	Broad-leaved Woodland	Bluebell, dog's mercury, greater stitchwort, hazel (<i>Corylus avellana</i>), holly, lords-and-ladies (<i>Arum maculatum</i>), rowan (<i>Sorbus domestica</i>), wood anemone and wood-sorrel	Confirmed ASNW
13	Broad-leaved Woodland	0	Not ASNW or PAWS
14	Broad-leaved Woodland	Dog's mercury	Possible PAWS
15	Broad-leaved Woodland	Bluebell, dog's mercury, hazel, herb-robert, holly, lords-and-ladies, red campion and wych elm (<i>Ulmus glabra</i>)	Possible ASNW or PAWS
16	Broad-leaved Woodland	Dog's mercury, dogwood, hazel, hedge woundwort (<i>Stachys sylvatica</i>), holly and	Possible ASNW or PAWS

Woodland label (Fig 9.5)	Habitat type	AWVP (Species Recorded)	Status
		red campion	
17	Wet Woodland	Red currant (<i>Ribes robrum</i>)	Possible ASNW or PAWS
18	Broad-leaved Woodland	Hazel, herb-robert and ramsons	Possible ASNW or PAWS
19	Broad-leaved Woodland	Ramsons	Possible ASNW or PAWS

9.4.8. Of the 18 sites surveyed, one site was confirmed as Ancient Woodland due to it being signposted on site as Ancient Woodland and had nine AWVP present. A further 12 sites were evaluated as possible ASNW or PAWS. Woodlands with fewer AWVPs should not be discounted as there were a number of access restrictions. The botany assessment was undertaken in April and May and although this is within the optimal period for botany surveys there is the potential that species more apparent at other times of the year may not have been identified during the survey. Woodlands with no indicator species found should also be considered candidates if they are in close proximity to sites with AWVPs. Tree species in the majority of sites would indicate that these are more likely to be replanted woodlands (PAWS) rather than semi-natural (ASNW).

Invasive Plant Species

9.4.9. Invasive species identified during the course of the Phase 1 habitat survey were recorded and are shown on Figure 9.4. The following species were noted as being present within or immediately adjacent to the study area:

- Japanese knotweed (*Fallopia japonica*);
- Himalayan Balsam (*Impatiens glandulifera*); and
- Rhododendron (*Rhododendron sp.*).

9.4.10. Stands of Japanese knotweed were identified to the south of the study area, within areas where there were high levels of public presence. It is anticipated that the stands will have resulted from incidences of fly-tipping.

9.4.11. Areas of Himalayan balsam were identified along and adjacent to one watercourse which would be crossed the proposed Scheme.

9.4.12. Large bushes of rhododendron were located throughout the woodland within Lower Pool LWS.

Protected Species

9.4.13. The desk study conducted in 2017 and site surveys undertaken in 2018 returned records for protected / notable species. Records within the study area from the surveys in 2018 and the desk study are detailed in Table 9.5 which also summarises the conservation status of each species and provides comment on the likelihood of presence.

9.4.14. Species present on site are those for which recent direct observation or field signs have confirmed presence. Species which are possibly present are those for which there is potentially suitable habitat based on the results of the field study. Species

unlikely to be present are only mentioned where there are desk study records, but there is no suitable habitat in the zone of influence, or there are other reasons why presence is unlikely.

Table 9.5: Protected and Notable Species Relevant or Potentially Relevant to the Proposed Scheme

Species	Legally Protected Species?	Species of Principal Importance?	Present on Site?	Possibly Present on Site?	Present/Potentially Present in Wider Zone of Influence?	Supporting Comments
Birds	✓	✓	✓		✓	<p>The data search returned hundreds of bird records from Essington quarry pool (SJ 9478 0350), with a large range of species. Habitats present within the proposed Scheme footprint provide suitable breeding and feeding habitat for bird species.</p> <p>Wintering bird surveys were undertaken in the winter of 2017-2018, the results of which will be reported in the Environmental Statement.</p> <p>Breeding bird surveys were undertaken between April and July 2018. These surveys identified a total of 46 bird species. With two species designated as red listed BoCC species and species of high Conservation Concern (Eaton et al, 2009). A single amber listed BoCC species was confirmed breeding on site.</p> <p>The results indicate that the site is of moderate importance for common breeding bird species preferring woodland, hedgerows and open water areas. No significant populations of breeding birds have been recorded on site and most species recorded here are common and widespread within the county.</p>
Barn owl (<i>Tyto alba</i>)	✓	✓			✓	<p>Barn owl records were returned within 2 km of the proposed Scheme as part of the desk study, including along the M54 corridor near Junction 2.</p> <p>No signs of roosting barn owls were identified during surveys in 2018 and areas accessed within the draft DCO site boundary did not identify suitable roosting areas.</p> <p>During the bat transect surveys in the north-western section of the survey area sightings of barn owls were recorded. Local landowner indicated that roosting owls have been present in a barn within 100 m of the proposed Scheme.</p>
Bats	✓	✓	✓		✓	<p>Six records of bats within the last 10 years are within 2 km of the draft DCO site boundary; five records are for individual bat sightings but a roost has been identified within the village of Shareshill.</p> <p>The landscape within the draft DCO site boundary provides foraging opportunities for bat species. The woodland areas have potential to support species such as brown long-eared bats (<i>Plecotus auritus</i>); and such species were recorded during the transect and Bat roost potential surveys. The majority of the draft</p>

Species	Legally Protected Species?	Species of Principal Importance?	Present on Site?	Possibly Present on Site?	Present/Potentially Present in Wider Zone of Influence?	Supporting Comments
						<p>DCO site boundary is considered isolated from the wider landscape due to the presence of the four major roads (M6, M6 Toll, M54 and A460) within and adjacent to the study area.</p> <p>Ground-based external scoping assessments identified 143 trees or groups of trees which had low to high bat roosting potential and two clusters of buildings with various levels of potential for bat roosts which required additional surveys.</p> <p>Emergence and re-entry surveys for the building clusters identified smaller day roosts of locally common species. Further details regarding the roosts identified can be found in the bat assessment report.</p> <p>Bat transects were conducted along the length of the proposed Scheme. Each transect identified varying activity levels and flight routes of several bat species. Results will be reported in the Bat Assessment Report to support the Environmental Statement.</p>
Badger	✓	✓	✓		✓	<p>The desktop study revealed seven badger setts present within 2 km of the draft DCO site boundary. Several badger dung pits and setts were identified during the badger surveys completed in April and May 2018. These included active and inactive setts, main, outlier and possible badger setts. The details of these results are confidential.</p> <p>Due to limitations, such as access and vegetation cover, not all areas could be fully assessed, therefore there may be additional setts within the survey area.</p> <p>The wider landscape is considered to isolate the proposed Scheme by the four major (M6, M6 Toll, M54, and A460).</p> <p>Further surveys are recommended and will be undertaken in 2019 to indicate activeness of setts, and territorial boundaries of clan(s) present.</p>
Great Crested Newt	✓	✓			✓	<p>There are records of GCN within 500 m of the draft DCO site boundary. An extensive Habitat Suitability Index (HSI) and presence/absence surveys on ponds within 500 m of the proposed Scheme was undertaken in 2015, Ref 9.13) none of the surveys returned positive results for GCN. Updated HSI and presence/absence surveys were completed in 2018.</p> <p>The GCN HSI assessments from 2018 highlighted three ponds to have average or above suitability for GCN.</p>

Species	Legally Protected Species?	Species of Principal Importance?	Present on Site?	Possibly Present on Site?	Present/Potentially Present in Wider Zone of Influence?	Supporting Comments
						<p>The ponds were subject to presence/absence surveys for GCN and revealed no presence of GCN within the ponds.</p> <p>The results of the 2018 surveys reaffirms the results of the previous surveys conducted in 2015; and indicates that GCN are likely to be absent from the draft DCO site boundary.</p>
Reptiles	✓	✓			✓	<p>There are no records of reptiles within 2 km of the draft DCO site boundary.</p> <p>Habitats considered suitable for reptiles were highlighted within the Phase 1 habitat surveys undertaken between April and May 2018. Two areas were considered to offer suitable habitat, albeit low, for reptiles. These two areas were subject to artificial refugia and visual encounter surveys during May and September 2018. No reptiles were recorded during the surveys.</p>
Otter	✓	✓		✓	✓	<p>There is one record of otter within 2 km of the draft DCO site boundary. A single otter record is present in Walk Mill Clay pits SSSI and is in territory range of canals that link to a pond adjacent to the site. No signs of otter were recorded during the surveys undertaken in 2015 (Ref 9.14).</p> <p>Watercourses were assessed for otter signs and habitat suitability in 2018. No signs were identified. All watercourses within the draft DCO site boundary were evaluated to have low suitability to support the species.</p> <p>Not all watercourses were accessed due to land access restrictions. In addition, several watercourses which were revisited in September were restricted due to dense vegetation obscuring the banks of the watercourse.</p>
Water vole	✓	✓		✓	✓	<p>Two records of water vole were recorded within 2 km of the draft DCO site boundary. No water vole signs were recorded during the surveys undertaken in 2015 (Ref 9.14). Watercourses were assessed in 2018 for water vole signs and habitat suitability. No signs were identified. All watercourses within the draft DCO site boundary were evaluated to have low suitability to support the species.</p> <p>Not all watercourses were accessed due to land access restrictions. In addition, several watercourses which were revisited in September were restricted due to dense vegetation obscuring the banks of the watercourse.</p>

Species	Legally Protected Species?	Species of Principal Importance?	Present on Site?	Possibly Present on Site?	Present/Potentially Present in Wider Zone of Influence?	Supporting Comments
White clawed crayfish	✓	✓		✓	✓	Watercourses and waterbodies were assessed for signs and habitat suitability for white-clawed crayfish during the Phase 1 habitat surveys within April and May 2018. The waterbodies and watercourses present were considered unsuitable for white-clawed crayfish due to the absence of features favoured by the species such as rock stream beds and deep slow-flowing pools. Not all watercourses were accessed due land access restrictions.
Invertebrates	✓	✓		✓	✓	No protected invertebrate records are present within 2 km of the draft DCO site boundary. Terrestrial invertebrate surveys revealed high potential for the presence of endangered species within the draft DCO site boundary. The highest potential for such species are located within the woodlands present within the proposed Scheme, in particular the woodland areas which are possibly replanted ancient woodland. If such species are present within the proposed scheme, it is likely that metapopulations will include populations within 'newer' woodland provided these contain suitable features for the species.
<p>Key to symbols: ✓ = yes, see Supporting Comments for further rationale</p> <p><u>Legally protected species</u> are those listed under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended); and, Schedules 2 and 4 of The Conservation of Habitat & Species Regulations 2017.</p> <p><u>Species of Principal Importance</u> as those listed under S41 of the NERC Act 2006. Planning Authorities have a legal duty under Section 40 of the same Act to consider such species when determining planning applications.</p> <p><u>Other notable species</u> include native species of conservation concern listed in the LBAP (except species that are also of Principal Importance), those that are Nationally Rare, Scarce or Red Data List, and non-native controlled weed species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).</p>						

- 9.4.15. Further surveys required to support the Environmental Statement include the following:
- badger bait marking;
 - badger sett monitoring;
 - national vegetation classification surveys;
 - targeted terrestrial invertebrate surveys within the woodlands;
 - aquatic invertebrate surveys (including white-clawed crayfish); and
 - winter hibernation roost surveys for bats.
- 9.4.16. Liaison with the County Ecologist will be undertaken to discuss where the proposed Scheme is anticipated to have direct impacts upon Lower Pool, SBI (LWS), Brookfield Farm SBI (LWS) (north east of) and Shareshill SBI (LWS).
- 9.4.17. Additional surveys will be required to provide full site coverage of the study areas where access was restricted, or additional survey requirements identified during the 2018 surveys. The following infill surveys will be undertaken in 2019:
- phase 1 habitat mapping;
 - badger survey;
 - bat roost potential surveys;
 - ancient woodland scoping survey;
 - invasive species survey; and
 - terrestrial invertebrate surveys.

9.5. Potential Impacts

- 9.5.1. Potential construction and operational impacts of the proposed Scheme on ecological features are described in Table 9.6.

Table 9.6 Justification for Further Assessment

Ecological feature	Characterisation of Impact	Scoped in/ out of further assessment
Designated sites		
Cannock Extension Canal SAC	It is considered that there are no pathways by which this site could be adversely affected by the proposed Scheme.	Scoped out
Cannock Chase SAC	Potential indirect impact from: Emissions to air. Further work is required to determine the significance of air quality effects on the site, discussed in Chapter 6.	Scoped in
(Stowe Pool and) Walk Mill Clay Pit SSSI	Potential indirect impact from: Emissions to air. Further work is required to determine the significance of air quality effects on the site, discussed in Chapter 6.	Scoped in
The Chase-water and South Stafford-shire	Potential indirect impact from: Emissions to air	Scoped in

Ecological feature	Characterisation of Impact	Scoped in/ out of further assessment
Coalfield Heath SSSI	Further work is required to determine the significance of air quality effects on the site, discussed in Chapter 6.	
Belvide Reservoir SSSI	Potential indirect impact from: Emissions to air Further work is required to determine the significance of air quality effects on the site, discussed in Chapter 6.	Scoped in
Lower Pool, SBI (LWS)	Potential impacts from: <ul style="list-style-type: none"> • loss of habitat; • hydrological changes; and • emissions to water and air. 	Scoped in
Brookfield Farm (north east of), Shareshill SBI (LWS)	Potential impacts from: <ul style="list-style-type: none"> • loss of habitat; • habitat severance; • hydrological changes; and • emissions to water and air. 	Scoped in
Wryley and Essington Canal LNR and LWS	It is considered that there are no pathways by which this site could be adversely affected by the proposed Scheme.	Scoped out
Keeper's Wood, Hilton Park; Lower Pool; Brookfield Farm (north east of), Shareshill; Hatherton, Bridge (by) Hatherton; Penny-more Hay Farm; Four Ashes; Coven Heath; The Hag; Saredon Hall Farm; Westcroft; Westcroft Farm; Essington Pools; Ashmore Lodge, Essington; Hatherton Branch Canal; Hatherton Reservoir, Cheslyn Hay; Hatherton Pines and Lodge Hill (north-east of)	All sites are located between approximately 268 m – 2.2 km from the proposed Scheme. There are no pathways, terrestrial or hydrological, by which the integrity or nature conservation value of these sites could be adversely affected by the proposed Scheme. Potential indirect impact from emissions to air. Further work is required to determine the significance of air quality effects on the site, discussed in Chapter 6.	Scoped in
Burns Wood (east) - Ancient & Semi-Natural Woodland	There are no pathways by which the integrity or nature conservation value of the woodland could be adversely affected by the proposed Scheme.	Scoped out
Burns Wood (west) - Ancient & Semi-Natural Woodland	There are no pathways by which the integrity or nature conservation value of the woodland could be adversely affected by the proposed Scheme.	Scoped out
Essington Wood - Ancient & Semi-Natural Woodland	There are no pathways by which the integrity or nature conservation value of the woodland could be adversely affected by the proposed Scheme.	Scoped out
Spring Coppice - Ancient	There are no pathways by which the integrity or	Scoped out

Ecological feature	Characterisation of Impact	Scoped in/ out of further assessment
& Semi-Natural Woodland	nature conservation value of the woodland could be adversely affected by the proposed Scheme.	
Beech Head - Ancient & Semi-Natural Woodland	There are no pathways by which the integrity or nature conservation value of the woodland could be adversely affected by the proposed Scheme.	Scoped out
Oxden Leasow Wood - Ancient & Semi-Natural Woodland	Potential impacts from: <ul style="list-style-type: none"> • root compaction; • hydrological changes; and • emissions to water and air. 	Scoped in
Woodland identified as potential ASNW or PAWS	Potential impacts from: <ul style="list-style-type: none"> • root compaction; • hydrological changes; and • emissions to water and air. 	Scoped in
Priority & Other habitats		
Hedgerows (important and non-important)	Potential impacts from: <ul style="list-style-type: none"> • loss and severance of connectivity; and • temporary disturbance including dust deposition and root compaction. Potential impacts are considered to be minimal as mitigation is likely to include new planting.	Scoped in
Ponds	Direct impact on five ponds; three likely to be lost, two partially lost. Indirect impacts may arise due to hydrological changes and air pollution.	Scoped in
Running water	Direct impact on five watercourses. Operation of the road may alter the flow, quality and quantity of surface water entering the watercourse.	Scoped in
Other habitats		
All other habitats	The Route predominantly impacts arable farmland, causing habitat loss and severance. Land-take from other habitats include: <ul style="list-style-type: none"> • semi-improved grassland; • marshy grassland; and • woodland habitats listed as priority habitat, but not designated as a LWS/ancient woodland (this could be considered permanent impact). Loss of these habitat types is not considered to be significant as they are common in the wider landscape.	Scoped in
Protected species		
Badger	Potential construction impacts:	Scoped in

Ecological feature	Characterisation of Impact	Scoped in/ out of further assessment
	<p>loss of a number of active and disused setts as well as disturbance to active badger setts within close proximity to the proposed Scheme;</p> <ul style="list-style-type: none"> • loss of foraging habitat; and • disturbance from lighting requirements. <p>Operation impacts:</p> <ul style="list-style-type: none"> • potential for severance of setts from adjacent foraging habitat and woodlands; and • potential increase in badger road kill during operation. 	
Bats	<p>Anticipated construction and operational impacts include:</p> <ul style="list-style-type: none"> • severance of flight corridors; • potential loss of foraging habitat; • no known roosts are anticipated to be lost (however, there are additional trees within 50 m of the proposed Scheme that have not been scoped out of having a potential summer or winter bat roost); and • possible disturbance caused by additional lighting requirements during construction. <p>These impacts will affect the local bat population. Detailed mitigation will be required to ensure the impact is insignificant.</p>	Scoped in
Birds	<p>Anticipated construction and operational impacts include:</p> <ul style="list-style-type: none"> • disturbance during construction of foraging areas, with noise disturbance during operation also; • reduction in air quality during operation; • temporary habitat loss during construction for compounds and access tracks; and • hedgerow habitat loss and severance. 	Scoped in
Barn owl	<p>No barn owls have been recorded roosting within or immediately adjacent to the proposed Scheme during the desk top study or field surveys (Refer to Appendix 9.5). No construction or operational impacts anticipated.</p>	Scoped out
Great Crested Newt	<p>No GCN have been recorded within or immediately adjacent to the proposed Scheme during the desk top study or field surveys (Refer to Appendix 9.2). No construction or operational impacts anticipated.</p>	Scoped out
Otter	<p>No otter(s) have been recorded within or immediately adjacent to the proposed Scheme during the desk top study or field surveys (Refer to Appendix 9.3). No construction or operational impacts anticipated.</p>	Scoped out

Ecological feature	Characterisation of Impact	Scoped in/ out of further assessment
Water vole	No water vole(s) have been recorded within or immediately adjacent to the proposed Scheme during the desk top study or field surveys (Refer to Appendix 9.3). No construction or operational impacts anticipated.	Scoped out
Reptiles	No reptiles have been recorded within or immediately adjacent to the proposed Scheme during the desk top study or field surveys (Refer to Appendix 9.4). No construction or operational impacts anticipated.	Scoped out
Terrestrial Invertebrates	Until detailed surveys are complete, it is not considered appropriate to assess the impacts/effects on such species at this stage. Targeted surveys required.	Scoped in
White-clawed crayfish	Until detailed surveys are complete, it is not considered appropriate to assess the impacts/effects on such species at this stage. Targeted surveys required.	Scoped in

9.6. Description of the Likely Significant Effects

Construction

- 9.6.1. The following construction impacts may result in potentially significant effects on important ecological features as associated with the proposed Scheme:
- **Habitat loss:** direct loss and severance of wildlife habitats through land take in various locations with potential to affect various species including bats, badgers, breeding and wintering birds and terrestrial invertebrates.
 - **Indirect impacts:** noise; watercourse pollution/ sedimentation; dust; lighting; increased human disturbance; potential for invasive non-native species introductions from site works.
- 9.6.2. The proposed scheme has the potential to generate significant negative effects upon the following ecological features during construction (based upon existing baseline information) in the absence of mitigation:
- Lower Pool SBI and Brookfield Farm through permanent loss of habitat.
 - Oxden Leasow Wood ANSW from noise and air pollution.
 - Hedgerows, watercourse, and ponds through severance, loss and compaction.
 - Bats, breeding birds, terrestrial invertebrates, and badgers through loss and severance of habitat, and noise and increased human disturbance.
- 9.6.3. The implementation of the Construction Environmental Management Plan will reduce the above impacts.
- 9.6.4. No other significant effects have been identified at this stage, although further surveys of areas subject to access restrictions are required along with targeted species surveys once a final design has been provided.

Operation

- The following operational impacts may result in significant effects on important ecological features as associated with the proposed Scheme:
 - mortality of wildlife due to collision with traffic;
 - noise disturbance to wildlife from traffic;
 - lighting impacts on nocturnal species;
 - polluted surface water run-off; and
 - disturbance from salt spray/changes in air quality (emissions).
- 9.6.5. The proposed Scheme has the potential to generate significant effects upon the following ecological features during operation (based upon baseline information) in the absence of mitigation:
- 9.6.6. Cannock Chase SAC, Stowe Pool and Walk Mill Clay Pit SSSI, The Chasewater and South Staffordshire Coalfield Heath SSSI, Belvide Reservoir SSSI through potential air pollution.
 - Lower Pool SBI and Brookfield Farm through hydrological changes, noise and air pollution, and introduction of invasive species along the new road corridor.
 - Hedgerows through hydrological changes, and air quality, in addition to introduction of invasive species along the new road corridor.
 - Badgers, bats, breeding birds, terrestrial invertebrates through severance of wildlife corridors, and increase in road traffic collisions.
- 9.6.7. No further significant operational effects have been identified at this stage. Final design may highlight additional effects.

9.7. Design, Mitigation and Enhancement Measures

- 9.7.1. The location of designated sites and priority habitats is understood; however, habitat and full protected species surveys and analysis of acquired data have not been completed in full across the proposed Scheme. The completion of these surveys is required to confirm the presence/absence of protected species scoped in and habitats of ecological value (ecological features) in some areas of the study area, to inform the EclA, enable the consideration of avoidance options and iterative design, and to identify appropriate mitigation measures to address any specific and design constraints, in these areas.
- 9.7.2. Additional scheme specific mitigation will be proposed where potential significant ecological effects are identified. Based upon existing baseline information, the following mitigation measures are likely to be implemented in relation to designated and non-designated sites, habitats and species to reduce the effect of potentially significant impacts:
 - the installation of barriers to protect woodland from dust and pollution;
 - the inclusion of noise reduction measures;
 - ensuring there is a buffer from retained woodlands of at least 15m where possible;
 - planting new areas of woodland;
 - restoration of plantation woodland planted on ancient woodland sites;

- where watercourses are crossed, oversized structures should be considered to ensure channel and bank structure can be maintained;
- replacement wildlife ponds to compensate for loss of existing ponds;
- mammal underpasses in association with guide fencing to minimise habitat severance effects;
- mammal ledges on watercourse crossing structures to ensure that faunal species can still easily move along watercourses;
- mammal fencing to minimise the risk of large mammals such as badger gaining access to the road;
- tree and scrub planting to guide animals away from the road;
- landscaping planting to provide replacement foraging, resting and breeding habitat; and
- provision of breeding sites such as bat and bird boxes, log piles and artificial setts.

9.7.3. If the potential ASNW and PAWS woodland areas are confirmed as Ancient Woodland, mitigation may be required if the sites are to be permanently lost to the proposed Scheme. This may include replanting of woodland and translocation of soil from the ancient woodland area being lost, allowing for ground flora to develop in the receptor site.

Enhancement Measures

9.7.4. There may be the potential to provide enhancement measures as part of or in combination with the proposed Scheme, these could include the following:

- construction of otter holts along watercourses;
- construction of wildlife ponds;
- hibernacula piles adjacent to wildlife ponds to provide hibernation shelter for amphibians and other species including reptiles, hedgehogs, terrestrial invertebrates etc.; and
- bat boxes set up within any suitable woodland (away from the proposed Scheme to avoid road collisions).

9.7.5. These will be considered following the completion of the habitat and protected species surveys in areas where access has been restricted and a full evaluation of the final design undertaken.

9.8. Assessment Methodology

9.8.1. The method used for the Ecological Impact Assessment (EclA) will be based upon the following guidance:

- DMRB Volume 11 Section 3 Part 4 Ecology and Nature Conservation (Ref 9.15).
- DMRB Volume 10 Section 4 Nature Conservation (Ref 9.18).
- IAN 130/10 (Ecology and Nature Conservation: Criteria for Impact Assessment) (Ref 9.19).
- Guidelines of Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, Second Edition 2016) (Ref 9.20); and Professional judgement.

- 9.8.2. The scope of the ecological impact assessment will cover the following:
- Assigning/ confirming nature conservation resource importance (or value) to nature conservation resources present within the applicable study area. The importance of the identified features will be assigned to their relevant geographic scale, namely: international or European; UK or national; regional; county or unitary authority area, or local.
 - Characterisation of ecological impacts on specific features (i.e. receptors as confirmed during the baseline surveys in 2017 & 2018) (taking into account impact avoidance design measures and standard management activities).
 - Determination of the significance of effects by the importance of the ecological feature and the characterisation of the ecological impact on each specific feature.
 - The further ecological surveys to be conducted in 2019 will confirm/identify the presence/probable absence of species and habitats in areas not previously surveyed.
- 9.8.3. Options to avoid/ reduce/ mitigate/ compensate for any identified significant potential effects will be considered in line with the Highways England 2015 Biodiversity Plan (Ref 9.21) to the point where any residual effects are not considered to be significant. In addition, opportunities will be sought for the enhancement of biodiversity at both on and off-site locations as associated with the proposed scheme (taking into account the sustainability objectives as set out in the Highways England 2015 Biodiversity Plan).

Data Sources

Desk study

- 9.8.4. A desk study has been carried out to identify nature conservation designations in the study area and to obtain existing records of protected and notable habitats and species potentially relevant to the proposed Scheme. Data was obtained from online publicly available sources and from the organisations detailed below, along with surveys and reports produced during PCF Stage 2 (options selection):
- MAGIC Map Application (Ref 9.22);
 - Staffordshire Ecological Records;
 - EcoRecord (Ecological database for Birmingham and the Black Country (Ref 9.23));
 - Highways England (2015) M54–M6/M6 Toll Link Road PCF Stage 2 Environmental Assessment Report;
 - Highways England (2015) M54–M6/M6 Toll Link Road PCF Stage 2 Environmental Assessment Report Addendum (Ref 9.24);
 - Highways England (2015) M54–M6/M6 Toll Link Road Scheme, European Protected Species Report – Bats (Ref 9.25);
 - Highways England (2015) M54–M6/M6 Toll Link Road Scheme, Protected Species Report – Great Crested Newt Surveys 2015; and
 - Highways England (2015) M54-M6/M6 Toll Link Road Scheme, Protected Species Report – Otter and Water Vole.

Consultation

- 9.8.5. Detailed consultation with statutory and non-statutory bodies has not been carried out to date, however communication was received as a result of the landowner liaison in the area.

Field Surveys

Habitats and Flora

- 9.8.6. A Phase 1 habitat survey (Appendix 9.1) was carried out in 2018 in accordance with the Joint Nature Conservation Committee 'Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit' (Ref 9.26), which recorded habitats within the study area. The scope of the Phase 1 survey was extended to identify the presence and / or potential presence of protected / notable species and areas of Ancient Woodland. The survey to determine potential ancient woodland interest was undertaken in accordance with the recommended guidance for undertaking Ancient Woodland Inventory (AWI) surveys based on Natural England Commissioned Report NECR284, Invasive plant species were additionally mapped as per the guidelines in the Japanese knotweed code of practice (Ref 9.27).

Fauna

- 9.8.7. A list of surveys proposed / undertaken, guidance and best practice which has been/is to be followed is detailed in Table 9.7.

Table 9.7: Fauna surveys

Survey	Dates	Guidance
Badgers	Completed: 18, 23 & 25 April 2018 15 & 16 May 2018 Proposed: Ongoing – 2019 Badger bait marking 2019	Harris S, Cresswell P and Jefferies D <i>Surveying Badgers</i> (Ref 9.28). Bang, P. Dahlstrom, P. <i>Animal Tracks and Signs</i> (Ref 9.29) Neal, E. & Cheeseman, C. <i>Badgers</i> (Ref 9.30) Harris, S., Jeffries, D., Cheeseman, C., & Booty, C. <i>Problems with badgers?</i> (Ref 9.31) Andrews, R. <i>The Classification of badgers Meles Meles setts in the UK</i> (Ref 9.32) Delahay, R. J. et al., <i>The use of marked bait in studies of the territorial organization of the European Badger (Meles meles)</i> (Ref 9.33)
Bats	Completed: Scoping surveys 18, 23 & 25 April 2018 15 & 16 May 2018 Activity surveys April – October 2018 Emergence / re-entry surveys August – September 2018 Tree aerial inspection surveys August 2018 Proposed:	Bat Conservation Trust <i>Bat Surveys for Professional Ecologists: Good Practice Guidelines</i> (3rd edition) (Ref 9.34) Bat Conservation Trust <i>Bats and Buildings</i> (Ref 9.35) British Standards Institute <i>Surveying for Bats in Trees and Woodland</i> (Ref 9.36) Chartered Institute of Ecology and Environmental Management (CIEEM) <i>Competencies for Species Surveys: Bats</i> (Ref 9.37)

Survey	Dates	Guidance
	Tree aerial inspection hibernation surveys Proposed 2019	
GCN	Completed: 24 & 26 April 2018 ¹⁶ & 22 May 2018 (Appendix 9.2)	English Nature Great Crested Newt Mitigation Guidelines (2001) (Ref 9.38) Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (<i>Triturus cristatus</i>) (Ref 9.39)
Invasive plant species	Completed: 18, 23 & 25 April 2018 15 & 16 May 2018 Proposed: 2019	Japanese Knotweed Code of practice
Otter / water vole	Completed: 18, 23 & 25 April 2018 15 & 16 May 2018 26 September 2018 (Appendix 9.3)	Chanin P. Ecology of the European Otter (Ref 9.40). Dean, M et al. The Water Vole Mitigation Handbook (Ref 9.41).
White-clawed crayfish HSI	Completed: 18, 23 & 25 April 2018 15 & 16 May 2018 Proposed: 2019	Peay S, Monitoring the White-clawed Crayfish (Ref 9.42) Peay S, Guidance on works affecting white-clawed crayfish (Ref 9.43) Bradley P & Peay S, Competencies for species surveys: White-clawed Crayfish (Ref 9.44) Holdich D, Ecology of the White-clawed Crayfish (Ref 9.45) Natural England – Standing Advice Species: White-clawed crayfish (Ref 9.46)
Birds (including both wintering and breeding)	Completed: 30 April 2018 08 & 31 May 2018 06 & 22 June 2018 25 & 31 August 2018	Bibby, C.J.et al., Bird Census Techniques (Ref 9.47). RSPB. Birds of Conservation Concern 4 BoCC: the Red List for Birds leaflet (Ref 9.48). Gilbert, G., et al. Bird Monitoring Methods (Ref 9.49). Eaton, M.A. et al. Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man (Ref 9.50).
Reptile	Completed: 11, 18 & 21 May 2018 24, 25, 26 & 27 September 2018 (Appendix 9.4)	Froglife. Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation (Ref 9.51) Chartered Institute of Ecology and Environmental Management (CIEEM) <i>Competencies for Species Surveys: Reptiles</i> (Ref 9.52) Natural England. Technical Information Note (TIN 102); <i>Reptile Mitigation Guidelines</i> (Ref 9.53) Gent, A.H., & Gibson, S.D. <i>Herpetofauna workers' manual</i> (Ref 9.54)
Terrestrial	Completed:	Drake et al., 2007. Surveying terrestrial and freshwater invertebrates for conservation evaluation

Survey	Dates	Guidance
Invertebrate	24 April & 23 May 2018 Proposed: 2019	(Ref 9.55) Webb, J.et al. Pantheon - database version 3.7.6 (Ref 9.56)
Aquatic Invertebrate	Proposed: 2019	Drake et al., 2007. Surveying terrestrial and freshwater invertebrates for conservation evaluation Webb, J.et al. Pantheon - database version 3.7.6 Chalkley. A site analysis for freshwater invertebrate surveys (Ref 9.57).

9.9. Assessment Assumptions and Limitations

- 9.9.1. The assessment has partly been based on data received from databases held and maintained by third parties. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular habitat or species does not necessarily mean that the habitats or species do not occur in the study area. Likewise, the presence of records for particular habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the proposed Scheme.
- 9.9.2. Due to limited survey information at this stage the assessment for habitats and protected species is high level and it has not been possible to anticipate all impacts from the proposed Scheme within this assessment due to land access and areas requiring further survey.
- 9.9.3. Whilst some targeted habitat and species specific surveys have been undertaken, the survey coverage was restricted in areas due to limited access. For areas with restricted access survey data on the relative nature conservation value and habitat extent or population size is not available.
- 9.9.4. In accordance with these limitations, assumptions are made using a precautionary principle approach and professional experience. By necessity, some aspects of the assessment is very high level and will be subject to further review and update as further targeted surveys are undertaken and new information becomes available.

10. GEOLOGY AND SOILS

10.1. Introduction

10.1.1. This section provides an overview of the potential impacts of the proposed Scheme on geology and soils resources and describes the assessment methodology for the Environmental Statement. During the construction and operation phases, the proposed Scheme has the potential to affect and be affected by:

- superficial (drift) and bedrock geology;
- structural and engineering geology;
- geological Sites of Special Scientific Interest (SSSI) and Local Geological Sites (LGS);
- agricultural soil resources; and
- land contamination.

10.2. Study Area

10.2.1. The following study areas will be used for the assessment of effects on geology and soils:

- Geology: within the draft DCO site boundary;
- Geological designated sites: within 250m of the draft DCO site boundary;
- Historical land uses and potential sources of contamination: within 250m of the draft DCO site boundary;
- Controlled waters: within 500m of the draft DCO site boundary; and
- Agricultural land: land within the draft DCO site boundary.

10.2.2. The study area listed above is considered appropriate for the consideration of historical and current potentially contaminative land uses based on professional judgement for defining land contamination and agricultural land study areas for EIA.

10.3. Legislation, Policy and Guidance

10.3.1. The assessment of impacts on geology and soils receptors and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents:

- National Networks National Planning Statement (2014), paragraphs 5.18 and 5.176 (Ref 10.1);
- National Planning Policy Framework (2018), paragraphs 118(c), 170(a) and (e), 170(f), 171, 178(a) and (b), 179 and 180 (Ref 10.2);
- DMRB, Volume 11, Section 3, Part 11 (Ref 10.3); and
- South Staffordshire Local Plan (2012) Core Strategy Development Plan Document, policies EQ1, EQ7 and Core Policy 3 (Ref 10.4).

10.3.2. These policies identify the need for site specific land contamination/ ground instability assessments. These are required to provide information on the level of risk to the natural and local environment from soil and water pollution or land instability that may be caused by both new, and existing, development. Should contaminated or unstable land be identified during assessments, the policies state that it is the

responsibility of the developer, or landowner, to remediate and mitigate as appropriate to secure a safe development.

- 10.3.3. With regards to agricultural land, the NPSNN (2014) requires the both development applicants and decision makers to take into account the economic and other benefits of best and most versatile (BMV) agricultural land.

10.4. Baseline Conditions

Published Geology

- 10.4.1. The 1:50,000 scale Solid and Drift geological map for Wolverhampton (Ref 10.5) and the British Geological Survey (BGS) GeoIndex (Ref 10.6) (accessed 05/10/2018) mapping provide information on the published geology in the area of the proposed Scheme.
- 10.4.2. Made Ground described as 'artificial ground' is present at the existing M54 Junction 1. The area further south of the M54 Junction 1 consist of Made Ground described as 'infilled ground' likely to be Colliery Spoil associated with the former Hilton Colliery. Made Ground described as 'worked ground' is also present at Junction 11 of the existing M6.
- 10.4.3. The BGS maps indicate that the majority of the study area is underlain by Devensian Till – Diamicton described by the BGS as "variable lithology, usually sand, silty clay with pebbles, but can contain gravel rich, or laminated sand layers; varied colour and consistency". A strip of Alluvium associated with the unnamed watercourse runs north-east to south-west across the A460 and M6. The Alluvium is described as "normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present". No superficial deposits are present in areas around the Tower House Farm (North of M54), Rosemary House (on Hilton Lane) and the immediate south of the Alluvium strip.
- 10.4.4. The BGS maps indicate that the majority of the study area is underlain by the Chester Formation (Sandstone and Conglomerate Interbedded) of the Sherwood Sandstone Group. To the east of the M54 Junction 1 a relatively thin strip of the Chester Formation (Mudstone) crosses the M54 in a north to south orientation, overlying the interbedded Sandstone and Conglomerate. The Chester Formation in the West Midlands area generally comprises conglomerates and reddish brown, cross-bedded, pebbly sandstones with subordinate beds of red-brown mudstone. The BGS website describes this formation as "pebble conglomerates and reddish brown sandstones. The sandstones are cross-bedded and pebbly. The conglomerates have a reddish brown sandy matrix and consist mainly of pebbles of brown or purple quartzite, with quartz conglomerate and vein quartz".
- 10.4.5. Sections of the proposed Scheme alignment (to the south-east of Dark Lane and the south-east of the Brookfield Farm) are underlain by Clent Formation and Enville Formation (Undifferentiated) - Mudstone And Sandstone described by the BGS as "Breccia, sub-angular, with red-brown mudstone matrix, clasts predominantly volcanic rock and subordinate Lower Palaeozoic rocks. Red pebbly mudstone and sandstone in Wolverhampton area and Red mudstone and red-brown, fine to coarse grained sandstone, locally pebbly, and lenticular beds of conglomerate. Sandstone mostly sublitharenite; conglomerate clasts mostly Carboniferous limestone and chert".
- 10.4.6. The small section of the proposed Scheme along the A462 (east of M6) is underlain by the Halesowen Formation (Mudstone, Siltstone and Sandstone).

10.4.7. The Holy Bank Fault trending north-east to the south intersects the draft DCO site boundary on the A462 and the M6. An unnamed fault trending north-west to south-east intersects the study area in the area south of the A460 and east of the M6.

10.4.8. There are no LGS (formerly referred to as Regionally Important Geological Sites) or SSSI designated for their geology within the study area.

Current Land Use

10.4.9. The current land use in the vicinity of the M54 Junction 1 is predominantly fields / farmland and some wooded areas. As the route heads north-east through farm land/fields it by-passes the villages of Featherstone and Shareshill to the west and skirts a wooded area of Hilton Park to the east, passing in close proximity to Lower Pool SBI. The area between Hilton Lane and M6 Junction 11 is predominantly in agricultural use, with Brookfield Farm located to the west of the proposed Scheme. The alignment of the proposed Scheme then joins the existing M6 at Junction 11.

Potential Sources of Land Contamination

10.4.10. A previous Preliminary Source Study Report (Ref 10.7), site sensitivity maps and historical maps, from 1888 to present day, have been reviewed. Potential sources of land contamination within the draft DCO site boundary of the proposed Scheme are summarised as follows:

- Made Ground (infilled land) associated with the historical Hilton Colliery is present at the existing M54 Junction 1.
- Infilled ponds present to the east of A460 and north of M54.
- Historical landfill present to the immediate north of A460 and west of M6 Junction 11.

Mining History

10.4.11. The Coal Authority Interactive online map (Ref 10.8) shows that the proposed Scheme alignment is within a Coal Mining Reporting Area and Coalfield Consultation Area, but not within a Development High Risk Area. Historical underground mining in the area was undertaken at depth and there are no records of shallow underground workings in the area of the proposed Scheme according to the Coal Authority.

Agricultural Land Use

10.4.12. The Natural England Provisional Agricultural Land Classification (ALC) 1:250,000 map for West Midlands Region (Ref 10.9), the Natural England ALC Grades - Post 1988 survey maps (Ref 10.10) and the Natural England Technical Information Note (TIN049) (Ref 10.11) have been reviewed to determine the agricultural land classification within the draft DCO site boundary. The Natural England Information Technical Note defines best and most versatile (BMV) land as Grades 1, 2, and 3a.

10.4.13. The Natural England ALC Grades - Post 1988 Survey map is only available for the area north of Hilton Lane. The map indicates that majority of the area, through which the proposed Scheme would run, is classified as Grade 2 agricultural land. There are small areas along the route of the proposed Scheme classified as Grades 3a and 3b agricultural land. The area located to the north-east of the A462 is classified as Grade 3a agricultural land.

10.4.14. The Natural England Provisional ALC 1:250,000 map classifies the area within the proposed Scheme and the surrounding area to the south of Hilton Lane as Grade 3. The land in this area has not been subdivided into Grades 3a or 3b.

Hydrology and Hydrogeology

- 10.4.15. There are multiple small ponds throughout the agricultural land and wooded areas. The surface waterbodies within the study area are discussed in details in Chapter 14 Road Drainage and the Water Environment. The main surface waterbodies within the study area are:
- several fisheries lakes associated with Millride Country Sports near Hill Farm, immediately south-east of M54 Junction 1 (centred on SJ 94690 04342); a lake at Tower House Farm, immediately north-east of M54 Junction 1 (SJ 94484 04778);
 - four lakes within the grounds of Hilton Hall, south of Hilton Lane (centred on SJ 95104 05178);
 - a lake and several large fishery ponds at Brookfield Farm, located to both the south-east and north-west of the farm buildings, and some of which are online with Latherford Brook (centred on SJ 95126 06325);
 - several lakes and large ponds at Villa Farm to the west of the proposed Scheme area, west of the A460 Cannock Road (centred on SJ 94478 05862); and
 - a large pond approximately equidistant between Brookfield Farm and the M6 Junction 11 (SJ 95411 06531).
- 10.4.16. The superficial deposits are designated as a Secondary 'A' and Secondary (Undifferentiated) Aquifers. The Kidderminster Sandstone is designated a 'Principal' Aquifer by the Environment Agency. The Clent and Enville Formation, the Alveley Member and the Etruria Formation are all designated as 'Secondary A' aquifers.
- 10.4.17. The proposed Scheme alignment is not within a Source Protection Zone. The closest Source Protection Zone is a Zone 3 which is located approximately 950 m west of the A460 and west of Featherstone. There is no recorded groundwater abstraction within 1 km of the draft DCO site boundary.

10.5. Potential Impacts

Construction

- 10.5.1. The construction of the proposed Scheme has the potential to result in direct and indirect impacts on geology and soils. The following potential environmental effects will be considered for the proposed Scheme:
- potential contamination status of Made Ground materials;
 - potential contamination status of natural soil materials;
 - potential impact of ground gas generation, migration and accumulation on the proposed Scheme;
 - potential impact of leachate generation, migration and accumulation on controlled waters;
 - use of imported materials;
 - risk of pollution of surface and/or groundwater during construction (e.g. due to spillage or the disturbance of potential contaminated land);
 - risk of groundwater and surface water pollution from operational phase;
 - potential risks associated with ground stability/mining issues will be considered;
 - potential impacts on agricultural businesses; and

- potential loss of agricultural soil resources.
- 10.5.2. Where the proposed Scheme passes through areas with contamination, the following additional impacts may also occur:
- The planned or unforeseen disturbance of contaminated materials, resulting in the release of contaminated material to the environment, may be inhaled, ingested or deposited, either directly or by wind-blown dust.
 - The accidental or inadvertent release of contaminated materials during the transport of contaminated spoil off-site, may affect receptors along the route.
- 10.5.3. Toxic or hazardous contaminants that are released may pose a threat to human health, to controlled waters, to ecological systems and to property (including buildings, crops and livestock). Construction workers have the potential to come into contact with soil and groundwater contamination associated with contamination sources, fuels and other chemicals during construction activities, posing a potential risk to human health through dermal contact, ingestion and inhalation.
- 10.5.4. The construction of the proposed Scheme would require the temporary use of agricultural land for construction activities and thus potential effects may be experienced by farming operations. Construction impacts on agricultural land and farm based-enterprises would include land requirements, severance and the loss of, or disruption to buildings and operational infrastructure. Other potential construction effects would include the deposition of dust on sensitive crops, land uses or buildings; disruption to drainage, irrigation and water supply systems; and construction noise on farm and farm-based enterprises.

Operation

- 10.5.5. During operation of the proposed Scheme, road users, and the road infrastructure would be introduced as new receptors. Any contamination deemed by risk assessment to have posed a significant risk to the proposed Scheme, will have been removed or remediated during the construction phase. Previous risk assessment and any subsequent mitigation measures would have already been undertaken to satisfactorily close out any residual risks identified as part of the construction phase.
- 10.5.6. Following the opening of the proposed Scheme, soils adjacent to the road may be affected by spray or airborne contaminants generated during routine maintenance and operation of the road, or released during road accidents/emergency situations. There is also the possibility of cutting and embankment slopes being susceptible to erosion.
- 10.5.7. During the operational phase, it is possible that agricultural operations might be permanently disrupted owing to potential land take, severance of land parcels following the construction of the proposed Scheme.

10.6. Design, Mitigation and Enhancement Measures

Construction

- 10.6.1. A CEMP would be prepared and implemented by the construction contractor which would include a range of measures associated with mitigating potential impacts as associated with land contamination. Such measures would accord with legal compliance and best practice guidance when working with or around contaminated materials. Potential impacts on off-site receptors would be addressed through the adoption of the following measures:
- damping of ground with water to minimise dust;

-
- sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant;
 - groundwater level controls (as required);
 - adequate fuel/ chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response/ spillage control procedures;
 - well maintained plant and associated emergency response/ spillage control procedures;
 - any temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated;
 - a ground investigation has been designed to investigate geo-environmental, geotechnical and mining issues along the route of the proposed Scheme. A Ground Investigation Report will be prepared following the site works and monitoring; and
 - a Geotechnical Design Report will be prepared which will assess the requirements for design mitigation measures for ground stability and land contamination which will be undertaken as part of the construction phase of works.
- 10.6.2. The proposed Scheme construction and maintenance phases would be undertaken in a manner that appropriately protects the health and safety of workers. Potential impacts specific to construction workers during site construction phase will be mitigated by working in accordance with CIRIA C692 3rd Edition 'Environmental Good Practice on Site (2010)' and by the following measures:
- Provision of appropriate personal protective equipment (PPE), such as gloves, overalls, barrier cream etc. to minimise direct contact with soils.
 - Monitoring of confined spaces for potential ground gas accumulations restricting access to confined spaces, i.e. by suitably trained personnel, and use of specialist PPE where necessary.
 - Preparation and adoption of a site and task specific health and safety plan, taking into account the findings of the proposed ground investigation.
- 10.6.3. The prevention of pollution would be achieved via the mitigation measures as detailed in Chapter 14: Road Drainage and Water Environment. Mitigation measures to protect controlled waters would take into account the results and findings of the proposed ground investigation and prepare an appropriate strategy to remediate areas posing risks to controlled waters. The mitigation measures would also aim to ensure that the surface water run-off from the construction site (site preparation, earthworks and construction activities) do not have a detrimental effect on any receiving watercourses in the area. Construction involving piling and/ or penetrative ground improvement would require a location-specific risk assessment to establish the means of mitigating the risks of causing new pollutant linkages and/ or worsening existing ones with respect to risks to controlled waters at the construction stage.
- Operation**
- 10.6.4. The proposed Scheme operation would not include any activities that are likely to generate contaminants that could pose significant risk to controlled waters and surrounding soil resources. However, there would be potential for environmental

risks as associated with spillages due to road accidents or faulty vehicles. To mitigate such impacts during the proposed Scheme operation stage, the highway drainage system (refer to Chapter 14: Road Drainage and Water Environment) would incorporate appropriate measures to minimise impacts associated with accidents and spillages. In addition, any spillages following road accidents would be routinely managed by Highways England who is responsible for the maintenance of Highways England assets.

10.7. Description of the Likely Significant Effects

10.7.1. Given the appropriate design of the proposed Scheme, adherence to appropriate construction and operational practices that accord with legal compliance and best practice guidance when working with or around contaminated materials, effects associated with soils and geology are generally predicted to be of no more than minor adverse and therefore not significant. The exception to this is the impact on Grade 2 and 3a agricultural soils associated with the construction phase of the proposed Scheme. This effect is considered to be of large/moderate significance considering the potential impact on agricultural soils associated with:

- the loss of between approximately 20 and 50 ha of 'BMV agricultural land' grades 1, 2 and 3a;
- impacts on farm holding and agricultural businesses;
- damage to/or loss of half of topsoil resource; and
- the spread of potentially contaminated material/contamination arising via construction of the road.

10.7.2. No significant effects on geology and soils are anticipated during operation of the proposed Scheme.

10.8. Assessment Methodology

Data Sources

10.8.1. Baseline information will be collated by reference to the following data sources:

- Information available in a 'Envirocheck' Report (Landmark Information Group) including historical ordnance maps, environmental and site sensitivity information for the study area.
- Data from British Geological Survey (BGS) Solid and Drift Geology Sheets showing the geological and hydrogeological information for the study area.
- BGS borehole logs, where available showing the encountered ground conditions in the study area.
- Information from historical assessment reports and proposed site investigation factual and interpretative reports.
- Natural England Agricultural Land Classification maps.
- Environment Agency Data Catchment Explorer showing groundwater and surface water catchments.
- Defra MAGIC website showing aquifer and land designations within the study area.
- Local planning policies and available environmental information for the study area from the local authorities.

- 10.8.2. Factual and interpretative geotechnical and geo-environmental reports relating to site investigations, soil surveys and agricultural land classification surveys will be reviewed and reported as applicable in the Environmental Statement. This will include the results of any risk assessments undertaken if any land contamination is identified.

Proposed Level and Scope

- 10.8.3. The geology and soils assessment will be undertaken as defined in DMRB Volume 11, Section 3, Part 11 Geology and Soils. The objective of this stage is to undertake sufficient assessment of the proposed Scheme to identify any significant effects on geology and soil and where appropriate any particular environmental issues associated with contaminated land.
- 10.8.4. Land effects associated with agricultural land use will be reported within the Geology and Soils chapter of the Environmental Statement. The assessment of agricultural soils will be undertaken in accordance with the guidance within DMRB Volume 11, Section 3, Part 6, Land Use (Ref 10.12).
- 10.8.5. The proposed scope of the assessment would focus on receptors including human health (off-site receptors, future scheme users), controlled waters (groundwater, surface waters, surrounding land uses (residential, agricultural land) and soil quality.

Assessment of Effects

- 10.8.6. The DMRB Volume 11, Section 3, Part 11 Geology and Soils defines the scope of the assessment, but does not provide formal guidance on the assessment of impacts and effects. The effects assessment methodology applied will take into account technical guidance that has been produced in the UK for the assessment of ground conditions and water resources by the government (i.e. Defra and its predecessor and successor departments); agencies such as the Environment Agency's Model Procedures for the Management of Land Contamination and British Standards BS10175:2011+A2:2017 Code of Practice for Investigation of potentially contaminated sites (Ref 10.13).
- 10.8.7. With regard to impacts upon agricultural soils, the assessment methodology will take into account the statutory consultation procedures in the Town and Country Planning (Development Management Procedure) Order 2010 in which Natural England has to consider proposals which individually or cumulatively involve the loss of more than 20 ha of best and most versatile land.
- 10.8.8. The criteria outlined in Table 10.1 have been used to define the value/sensitivity of receptors potentially affected by the proposed Scheme. Defining the importance/sensitivity of a receptor takes into consideration the following:
- surrounding land uses, based on mapping and site visits and existing planning designations;
 - proposed end-use, based on the nature of the proposed Scheme;
 - soil resource losses as associated with the proposed Scheme;
 - construction operations that are necessary by the proposed Scheme; and
 - geology, hydrogeology and hydrology of the study area and the surrounding area.

Table 10.1: Descriptive Scale for Importance/Sensitivity of Geology and Soil Receptors

Sensitivity / Value of Receptor	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Geological and Soil Resources	Agricultural Land and Farm Holdings
High	<p>Future site users (residential development). Residential areas or schools within 50m of construction works.</p> <p>Construction workers involved in below ground works.</p> <p>Water features deemed to be of high value</p> <p>Ecological features deemed to be of high value.</p> <p>Allotments, arable farmland, livestock or market gardens on or adjacent to the site.</p>	<p>Internationally and nationally designated sites.</p> <p>Regionally important geological sites with limited potential for substitution.</p> <p>Soils of high landscape importance</p> <p>Presence of significant mineral reserves and within a Mineral Consultation Area.</p>	<p>Excellent quality agricultural soils (Grade 1).</p> <p>Farm types in which the operation of the enterprise is dependent on the spatial relationship of land to key infrastructure, and where there is a requirement for frequent and regular access between the two, or dependent on the existence of the infrastructure itself, for example:</p> <ul style="list-style-type: none"> • dairying, in which milking cows travel between fields and the parlour at least twice a day; and • irrigated arable cropping and field-scale horticulture, which are dependent on irrigation water supplies.
Medium	<p>Future site users (commercial development). Residential areas or schools within 50 to 250m of construction works.</p> <p>Commercial areas within 50m of construction works.</p> <p>Construction workers involved in above ground works.</p> <p>Water features deemed to be of medium value.</p> <p>Ecological features deemed to be of medium value.</p> <p>The built environment including buildings and infrastructure.</p>	<p>Regionally important geological sites with potential for substitution.</p> <p>Soils of medium landscape importance.</p> <p>Locally designated geological sites with limited potential for substitution.</p> <p>Site within a Mineral Consultation Area.</p>	<p>Very Good and Good quality agricultural soils (Grade 2 and Grade 3a).</p> <p>Farm types in which there is a degree of flexibility in the normal course of operations, e.g.:</p> <ul style="list-style-type: none"> • combinable arable farms; and • grazing livestock farms (other than dairying).
Low	<p>Future site users (car park, highways and railway related development).</p>	<p>Undesignated sites of local geological interest.</p>	<p>Moderate or poor quality agricultural soils (Grade 3b or 4).</p>

Sensitivity / Value of Receptor	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Geological and Soil Resources	Agricultural Land and Farm Holdings
	Residential areas >250m from construction works. Commercial areas within 50 to 250m of construction works. Water features deemed to be of low value. Ecological features deemed to be of low value.	Soils of low landscape importance. Limited potential for mineral reserves and site not within a Mineral Consultation Area.	Off-lying areas of land that are not contiguous with the main farm holding.
Very Low	Areas where there are no built structures, crops, or livestock. Commercial areas within >250m of construction works. Ecological features deemed to be of negligible value.	No sites of geological interest. Negligible potential for mineral reserves to exist.	Very poor quality agricultural soils (Grade 5) Off-lying areas of agricultural land used on a non-commercial basis.

10.8.9. The magnitude of potential impacts on identified receptors, as associated with the proposed Scheme, has been determined using the 4 point scale as detailed in Table 10.2 taking into account the potential pathways through which an impact source/hazard may affect identified receptors.

Table 10.2: Criteria for Assessing the Magnitude of Impact upon Features/ Attributes – Geology and Soils

Impact Magnitude	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Land and Farm Holdings
Major (Results in loss of attribute and/or quality and integrity of the attribute)	<p>Human Health: Acute risk to human health.</p> <p>Surface waters and/or groundwater: Substantial acute pollution or long term degradation of sensitive water resources (Principal Aquifer, groundwater source protection zone, surface waters of good or very good quality)</p> <p>Ecology: Significant change to the number of one or more species or ecosystems</p> <p>Built Environment: Catastrophic damage to buildings, structures or the environment</p> <p>Landscaping/Agriculture: Loss in value of livestock or crops as a result of death, disease, or physical damage.</p>	<p>Loss of feature or attribute.</p> <p>Earthworks resulting in high volume of surplus soil for off-site disposal</p> <p>Classification of surplus soil as Hazardous Waste where the intention is to discard.</p> <p>Damage to/ or loss of all topsoil resource.</p> <p>Soil sealing >75%.</p>	<p>Agricultural Land: Loss of over 50 ha of BMV agricultural land Grades 1, 2 and 3a.</p> <p>Farm Holdings: >20% land take of all land farmed.</p> <p>No access to severed land.</p> <p>Direct loss of farm dwelling, building or structure.</p> <p>Disruption discontinues land use or enterprise.</p>
Moderate (Results in effect on integrity of attribute, or loss of part of attribute)	<p>Human Health: Chronic risk to human health</p> <p>Surface water and/or groundwater: Pollution of non-sensitive water resources or small scale pollution of sensitive water resources (Principal or Secondary Aquifers of water courses of fair quality or below)</p> <p>Ecology: Change to population densities of non-sensitive species.</p> <p>Built Environment: Damage to buildings, structures or the environment</p> <p>Landscaping/Agriculture: Non-permanent health effects to vegetation/crops from disease or physical damage, which results in a reduction in value.</p>	<p>Impact on integrity of or partial loss of feature or attribute</p> <p>Earthworks resulting in moderate volume of surplus soil for off-site disposal.</p> <p>Damage to/ or loss of half of topsoil resource</p> <p>Soil sealing >50%</p>	<p>Agricultural Land: Loss of between 20 and 50 ha of BMV agricultural land Grades 1, 2 and 3a.</p> <p>Farm Holdings: 10 – 20% land take of all land farmed.</p> <p>Access available to severed land via the public highway.</p> <p>Loss of or damage to infrastructure affecting land use.</p> <p>Disruption necessitates change to scale or nature of land use or enterprise.</p>
Minor (Results in some measurable change in	<p>Human Health: Slight reversible short-term effects to human health</p> <p>Surface waters and/or groundwater: Slight pollution of non-sensitive water resources</p>	<p>Minor impact on feature or attribute.</p> <p>Earthworks resulting in low volume of surplus</p>	<p>Agricultural Land: Loss of less than 20 ha of BMV agricultural land Grades 1, 2 and 3a or</p>

Impact Magnitude	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Land and Farm Holdings
attributes quality or vulnerability)	<p>Ecology: Some change to population densities of non-sensitive species with no negative effects on the function of the ecosystem</p> <p>Built Environment: Easily repairable effects of damage to buildings or structures</p> <p>Landscaping/Agriculture: Slight or short term health effects which result in slight reduction in value</p>	<p>soil for off-site disposal.</p> <p>Re-use of all topsoil resource within the development.</p> <p>Soil sealing <50%</p>	<p>the loss of any quantity of land not considered 'best and most versatile agricultural land' Grades 3b, 4 or 5.</p> <p>Farm Holdings: 5 – 10% land take of all land farmed. Access available to severed land via private way.</p> <p>Infrastructure loss / damage does not affect land use.</p> <p>Disruption does not affect land use or enterprise.</p>
Negligible (Results in effect on attribute, but of insufficient magnitude to affect the use or integrity)	<p>Human Health: No measurable effects on humans</p> <p>Surface waters and/or groundwater: Insubstantial pollution to non-sensitive water resource</p> <p>Ecology: No significant changes to population densities in the environment or in any ecosystem</p> <p>Built Environment: Very slight non-structural damage or cosmetic harm to buildings or structures</p> <p>Landscaping/Agriculture: No significant reduction in landscape value.</p>	<p>Impact of insufficient magnitude to affect use or integrity of feature or attribute</p> <p>No off-site disposal of surplus soil required.</p> <p>Minor disturbance to soils. Soil sealing unlikely to occur.</p>	<p>Agricultural Land: No loss of BMV agricultural land.</p> <p>Farm Holdings: 5% or less land take of all land farmed.</p> <p>No new severance</p> <p>No impact on farm infrastructure.</p> <p>No disruption to land use or enterprise.</p>

10.8.10. When assessing the potential significance of effects, impact avoidance measures included in the design of the proposed Scheme as well as standard management activities will be taken into account. If potentially significant effects are still anticipated, further mitigation and management actions may need to be defined as necessary. The overall significance of effect is calculated by use of the matrix indicated in Table 10.3.

Table 10.3: Criteria for Assessing the Significance of Effect on Geology and Soils Resources

Sensitivity/Value of Resource/ Receptor	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
High	Large	Large	Moderate	Slight
Medium	Large	Moderate	Slight	Neutral
Low	Moderate	Slight	Neutral	Neutral

Sensitivity/Value of Resource/ Receptor	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
Negligible	Slight	Neutral	Neutral	Neutral

10.8.11. Effects predicted to be slight or neutral are considered to be manageable and are therefore 'not significant', whereas effects assessed as moderate or major are considered to be 'significant'.

10.9. Assessment Assumptions and Limitations

10.9.1. Ground Investigation works have not been undertaken at this stage. An intrusive investigation has been proposed and the design is being undertaken. The data from the proposed investigation will be utilised to refine assessments of risks to human health, controlled waters, and off-site receptors. The results from the ground investigation will be reviewed to support the environmental assessment and will be taken into account to develop appropriate mitigation proposals.

10.9.2. An ALC survey will be required in areas where Grade 3 land has been identified but where there is no distinction between Grades 3a and 3b.

11. MATERIAL ASSETS AND WASTE

11.1. Introduction

11.1.1. The proposed Scheme has the potential to affect material resources and waste management facilities, both during construction and operation. This section provides an overview of the potential impacts of the proposed Scheme on material assets/resources and waste and describes the proposed assessment methodology for the Environmental Statement.

11.1.2. For the purposes of this scoping report, materials are defined as comprising:

- the use of material resources; and
- the generation and management of waste.

11.1.3. Material resources are defined by IAN 153/11 (Ref 11.1) as “the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material resources include primary raw materials such as aggregates and minerals, and manufactured construction products”.

11.1.4. Waste is defined as per the Waste Framework Directive (2008/98/EC) (Ref 11.2) as “any substance or object which the holder discards or intends or is required to discard.”

11.2. Study Area

11.2.1. The study area for the use of material resources in the construction of the proposed Scheme and for consideration of the sterilisation of mineral safeguard sites and/or peat resources is defined by the draft DCO site boundary.

11.2.2. The study area for alternative materials (secondary and recycled aggregates) is the West Midlands region.

11.2.3. The study area for waste generation is defined by the draft DCO site boundary, within which waste would be generated. The study area is deemed to include the footprint of the proposed Scheme, together with any temporary land requirements during the construction. This may include temporary offices, compounds and storage areas.

11.2.4. The study area for waste management comprises the wider region within which waste management infrastructure, specifically landfill capacity is located i.e. the West Midlands region (this includes the counties of Staffordshire, Warwickshire, Worcestershire, Herefordshire and Shropshire).

11.3. Legislation, Policy and Guidance

11.3.1. The assessment of impacts on material resources and waste and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents:

- National Planning Statement for National Networks (December 2014);
- National Planning Policy Framework (July 2018);
- Interim Advice Note 153/11. Guidance on the Environmental Assessment of Material Resources (Highways England);
- Waste Framework Directive (2008/98/EC);

- Design Manual for Roads and Bridges Advice Note HA200/08: Aims and Objectives of Environmental Assessment (Highways England);
- Waste (England and Wales) Regulations 2011 (as amended);
- The Environmental Permitting (England and Wales) Regulations 2016;
- Hazardous Waste (England and Wales) Regulations 2005 (as amended);
- Environmental Protection Act 1990 (as amended);
- Waste Management Plan for England (2013); and
- National Planning Policy for Waste (2014).

11.4. Baseline Conditions

- 11.4.1. Baseline information will consist of the current landfill capacity in the waste disposal authority (Staffordshire), and in the wider West Midlands region as defined in paragraph 11.2. 4.
- 11.4.2. Detailed information on baseline waste conditions will be collected from sources including local planning documents published by Staffordshire County Council, and data on landfill capacity published by the Environment Agency.
- 11.4.3. The Environment Agency's Waste Management Information for England 2017 (published in 2018 (Ref 11.3) includes the following information about waste sent to landfills and remaining landfill capacity in Staffordshire, and in the wider West Midlands region in 2017.

Table 11.1: Landfill capacity for Staffordshire and the West Midlands 2017

Landfill Type	Landfill Capacity 2017 (000 m ³)	
	Staffordshire	West Midlands
Hazardous Merchant	-	-
Hazardous Restricted	-	535
Non Hazardous with SNRHW* cell	2,453	10,010
Non Hazardous	7,830	32,360
Non Hazardous Restricted	108	108
Inert	4,731	14,377
Total	15,123	57,390

*SNRHW = selected non-reactive hazardous waste

- 11.4.4. The baseline target for recovery of construction and demolition waste is 70% by weight, as set out in the EU Waste Framework Directive and the Waste Plan for England. Uncontaminated excavated soil and stones (European Waste Code 17 05 04) are specifically excluded from this target.
- 11.4.5. The baseline targets for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) are set out in the National and Regional Guidelines for Aggregates Provision in England 2005 to 2020

and are summarised in Table 11.2 below (Ref 11.4). The relevant target for proposed scheme is the 27% guideline for the West Midlands region.

Table 11.2: National and Regional Guidelines for Aggregates Provision

Region	Total aggregate provision (million tonnes)	Alternative materials targets (secondary and recycled aggregates)
South East	502	26%
London	197	48%
East	382	31%
East Midlands	784	14%
West Midlands	370	27%
South West	656	22%
North West	392	30%
Yorkshire & the Humber	431	31%
North East	193	26%
England (total)	3908	25%

11.4.6. The Minerals Local Plan for Staffordshire (2015-2030) (Ref 11.5) was adopted by Staffordshire County Council on the 16 February 2017. The proposed Scheme is located within a Mineral Safeguarding Area as illustrated in the Policies and Proposals Map included in the Minerals Local Plan. There are no active or allocated minerals extraction sites within the draft DCO site boundary. This aspect of the assessment has therefore been scoped out of the Environmental Statement.

11.5. Potential Impacts

Construction

11.5.1. There is potential for the following impacts relating to material resources and waste arising to occur during construction of the proposed Scheme:

- impacts on-site generated materials (e.g. soils) and waste arisings have on the existing capacity of landfill; and
- impacts on the use of primary (i.e. non-recycled) material resources used for construction.

11.5.2. Table 11.3 below summarises the types of materials used and wastes that may potentially be generated during construction.

Table 11.3: Potential Material Use and Waste Arisings – Construction

Project Activity	Material use	Potential waste arisings
Site remediation/ preparation/ earthworks	Fill material for construction purposes Primary aggregates for ground stabilisation	Surplus excavated materials. Stripping of topsoil and subsoil. Potential to encounter contaminated soils

Project Activity	Material use	Potential waste arisings
Demolition	Materials are not required for demolition works	Waste arisings from the demolition of any existing buildings or structures
Site construction	Construction materials including: <ul style="list-style-type: none"> • Concrete • Asphalt and bituminous material • Cement bound granular material • Well graded granular material • Precast concrete kerb • Timber • Plywood • Cementitious grout • Reinforcing steel • Reinforcing fabric • Geotextile • Geo-composite drainage system • Pipe bedding aggregate • Filter drain material 	Packaging material. Excess construction materials and broken/ damaged construction materials. Existing highway infrastructure and technology as removed by excavation works. Waste oils from construction vehicles. Construction worker generated wastes.

Operation

11.5.3. Table 11.4 below summarises the types of materials used and wastes that may potentially be generated during operation.

Table 11.4: Potential Material Use and Waste Arisings – Operation

Project Activity	Material use	Potential waste arisings
Operation and maintenance	Routine maintenance of infrastructure and technology including surfacing asphalt and servicing of electronic equipment.	Waste arising during operation and maintenance expected to be minimal.

11.5.4. Since material use and waste generation is expected to be very small during operation of the proposed Scheme, these aspects have been scoped out of the assessment.

11.6. Design, Mitigation and Enhancement Measures

11.6.1. The proposed Scheme will aim to prioritise waste prevention, followed by preparing for re-use, recycling and recovery and lastly disposal to landfill as per the internationally recognised waste hierarchy (see Figure 11 1).

11.6.2. The following mitigation measures will be considered and implemented during the design phase and subsequent construction work:

- waste arisings will be prevented and designed out where possible;
- opportunities to re-use material resources will be sought where practicable;

- opportunities to support the circular economy will be considered during the design phase; and
- where re-use and prevention are not possible, waste arisings will be managed in line with the waste hierarchy).



Figure 11.1: Waste Hierarchy

11.6.3. A Construction Environmental Management Plan (CEMP) would be produced by the construction contractor prior to works commencing in accordance with IAN 183/14, which would include the implementation of industry standard practice and control measures for environmental impacts arising during construction, such as the control of dust and the approach to waste management on site. The CEMP would include a Site Waste Management Plan (SWMP).

11.7. Description of the Likely Significant Effects

11.7.1. Based on the PCF Stage 2 (options selection) assessment (Ref 11.6), it is not considered likely that the proposed Scheme would result in a significant adverse effect on material resources. Should the proposed Scheme be unable to meet the target of 27% for use of recycled and secondary aggregate this would result in a moderate adverse effect. This would constitute a significant effect in terms of sustainable use of material resources. This would affect the ability to achieve a regional target, however there would be no direct impact on sensitive receptors within or around the proposed Scheme itself.

11.7.2. Through adherence to the mitigation and best practice measures outlined in a CEMP and SWMP effects associated with waste are anticipated to be slight adverse, which is not considered to be significant ($\leq 1\%$ reduction or alteration in the regional capacity of landfill likely). The quantities of material resources required to construct the proposed Scheme, the likely waste arising from the construction phase and the use of secondary and recycled aggregate are currently unknown, and therefore it is not yet possible to rule out significant effects related to material assets and waste.

11.8. Assessment Methodology

Data Sources

11.8.1. The following data sources will be used to inform the assessment of material resources and waste impacts on receptors as a result of the proposed Scheme:

- National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 (Ministry of Housing, Communities & Local Government, 2009).
- Waste management data for England: 2017 (Environment Agency, 2018).

Proposed Level and Scope

11.8.2. A Detailed Assessment, as defined in IAN 153/11, will be undertaken to assess the impacts of the material resources and waste arisings from the proposed Scheme. As part of this detailed assessment, the following tasks will be carried out:

- relevant waste legislation, policies and guidance will be reviewed to identify material use and waste management objectives and targets;
- the likely types of material resources and waste arisings will be identified and quantities estimated for the proposed Scheme;
- impacts will be evaluated against the relevant targets for recovery of material resources;
- opportunities to reduce, re-use, recover and/ or recycle material resources and waste arisings will be identified through a review of the proposed Scheme (including proposed building materials, construction methods and design, where available) and in accordance with industry best practices; and
- coordinated and documented consideration and identification of circular economy opportunities during the proposed Scheme's early design stage.

11.8.3. The main outputs from the detailed assessment will be:

- the identification of the environmental impacts associated with material resources and waste arisings; and
- the measures which will be implemented to mitigate the impacts.
- The receptors for this assessment are:
 - waste management infrastructure in West Midlands region (specifically the landfill capacity); and
 - material resources used for construction.

Assessment of Effects

11.8.4. The magnitude of effects and significance of waste management impacts will be assessed by:

- establishing the baseline for landfill capacity in the West Midlands region;
- estimating the likely types and quantities of waste that would be generated by the proposed Scheme; and
- comparing the likely waste arisings from the proposed Scheme to the baseline landfill capacity and assessing the likely impact on capacity.
- The magnitude of effects and significance of material impacts will be assessed by:
 - estimating the likely types and quantities of the main construction materials that would be required by the proposed Scheme;
 - estimating the likely proportion of construction and demolition waste that would be recovered;

- estimating the proportion of secondary or recycled aggregate that would be used in the assessment for construction of the proposed Scheme; and
- comparing the likely recovery rate and proportion of recycled and secondary aggregate to the relevant national targets.

11.8.5. The criteria used for assessing the magnitudes of effects and their significance are shown in Table 11.5 below.

Table 11.5: Magnitude and Significance of Effects

Magnitude of Effect	Significance	Material Assets/ Resources	Waste
Neutral	Not Significant	Project achieves >99% overall material recovery / recycling (by weight) of non-hazardous Construction Demolition Waste (CDW) to substitute use of primary materials; and Aggregates required to be imported to site comprise >99% re-used / recycled content.	No reduction or alteration in the capacity of waste infrastructure at a regional scale.
Slight	Not Significant	Project achieves 70-99% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional or national percentage target.	≤1% reduction or alteration in the regional capacity of waste infrastructure; and Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.
Moderate	Significant	Project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content below the lower of the relevant regional or national percentage target.	>1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project; and 1-50% of project waste requires disposal outside of the region.
Large	Significant	Project achieves <70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise <1% re-used / recycled content; and Project sterilises ≥1 mineral safeguarding site and/or peat resource.	>1% reduction in the regional capacity of waste infrastructure as a result of accommodating waste from a project; and >50% of project waste requires disposal outside of the region.

Magnitude of Effect	Significance	Material Assets/ Resources	Waste
Very Large	Significant	Not applicable	<p>>1% reduction or alteration in national capacity of waste infrastructure, as a result of accommodating waste from a project; or</p> <p>Project would require new (permanent) waste infrastructure to be constructed to accommodate waste.</p>

11.9. Assessment Assumptions and Limitations

- 11.9.1. The environmental impacts associated with the extraction of raw materials and the manufacture of products is not included in the scope of the assessment. These impacts will occur off site and may possibly occur outside the UK. They include the depletion of non-renewable resources and the production of waste at the point of extraction and during manufacturing.
- 11.9.2. Material use and waste generation is expected to be very small during operation of the proposed Scheme, therefore these aspects have been scoped out of the assessment.
- 11.9.3. The materials assessment will be undertaken on the basis of information available at the time of the assessment. It is anticipated that some of the information required for a full detailed assessment may not be known during the EIA, such as the exact sources / origins of materials. As such, the assessment will be undertaken based on what information is available at the time of assessment (including any information from a construction contractor). Any assumptions made for the assessment and the limitations this presents will be reported in the Environmental Statement.

12. NOISE AND VIBRATION

12.1. Introduction

- 12.1.1. The proposed Scheme has the potential to affect noise and vibration levels, during both construction and operation. This section provides an overview of the potential impacts of the proposed Scheme at sensitive receptors and describes the proposed assessment methodology for the Environmental Statement.

12.2. Study Area

- 12.2.1. Potentially sensitive receptors within the study area have been determined from the OS address base dataset and OS mapping. As part of the EIA process discussions will be held with South Staffordshire District Council to confirm the relevant potentially sensitive receptors have been identified. DMRB defines residential properties, educational buildings, medical buildings, community facilities (such as places of worship) designated sites (such as SAC, SPA and SSSI), scheduled monuments and public footpaths as potentially sensitive to noise and/or vibration.

Construction

- 12.2.2. The study area for the quantitative assessment of construction phase noise and vibration impacts will focus on the closest identified potentially sensitive receptors to the various works. The selected receptors will be representative of neighbouring properties in their vicinity. By choosing a selection of the closest identified potentially sensitive receptors the reported impacts will, therefore, be typical of the worst affected receptors and all potentially significant effects will be identified. At receptors further away from the works the impact would be reduced. It is standard practice to consider vibration impacts from construction works up to a maximum distance of around 100 m from the works, as no impact would be anticipated beyond this. This approach will be adopted for this assessment.

Operation

- 12.2.3. The study area for the assessment of operational phase noise impacts will be defined as outlined below, following the guidance set out within the Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 HD 213/11 – Revision 1 (hereafter referred to as DMRB) (Ref 12.1).
- 12.2.4. The study area will comprise the proposed Scheme and the existing A460/M54/M6 which is bypassed by the proposed Scheme. In addition, all surrounding existing roads are included that are predicted to be subject to a change in traffic noise level as a result of the proposed Scheme of:
- 1dB or more in the short term (Do-Minimum (DM) opening year to Do-Something (DS) opening year); or
 - 3dB or more in the long term (DM opening year to DS 15 years after opening), subject to a minimum change of 1dB between the DM and DS 15 years after opening.
- 12.2.5. These roads are defined as 'affected routes' and will be identified by analysis of the traffic data. The identification of affected routes will consider all roads with 18 hour (06:00-00:00) weekday traffic flows above the 1,000 lower cut off of the Calculation of Road Traffic Noise (CRTN) Ref 12.2) prediction methodology in all scenarios.
- 12.2.6. The study area for the detailed quantitative assessment of noise impacts will comprise a 600 m calculation area corridor either side of the proposed Scheme carriageway, 600 m either side of the existing A460/M54/M6 bypassed by the

proposed Scheme, and 600 m either side of all affected routes within a 1km maximum study area around the proposed Scheme and existing A460/M54/M6 bypassed by the proposed Scheme.

- 12.2.7. For residential properties and other sensitive receptors that are within the 1km maximum study area around the proposed Scheme and the existing A460/M54/M6 bypassed by the proposed Scheme, but more than 600 m from an affected route, the proposed Scheme or existing A460/M54/M6 bypassed by the proposed Scheme, a qualitative assessment of the traffic noise impacts will be completed.
- 12.2.8. For affected routes which are outside the 1 km study area around the proposed Scheme and existing A460/M54/M6 bypassed by the proposed Scheme, an assessment will be undertaken by estimating the CRTN Basic Noise Level (BNL) for these routes with and without the proposed Scheme. A count of the number of dwellings and other sensitive receptors within 50 m of these routes will be undertaken.
- 12.2.9. The study area for the assessment of operational phase airborne vibration annoyance impacts will be defined, in accordance with DMRB, as 40 m from the proposed Scheme, the existing A460/M54/M6 bypassed by the proposed Scheme and identified affected routes within the 1 km study area. The 1 km study area is illustrated in Figure 12.1.

12.3. Legislation, Policy and Guidance

- 12.3.1. A range of legislation is applicable to the construction and operation of the proposed Scheme. During construction the provisions of Part III of the Environmental Protection Act 1990 relating to statutory nuisance, and the controls available under the Control of Pollution Act 1974, will be applicable. With regards to operational impacts the provisions of the Land Compensation Act 1973 relating to compensation for loss of value, and the duties and powers of the Noise Insulation Regulations 1975 (as amended 1988) relating to noise insulation of residential properties, will be applicable.
- 12.3.2. The following planning policies will be considered as part of the noise and vibration assessment where these inform the identification of receptors; the assessment methodology; the potential for significant environmental effects; and required mitigation. These policies include those as detailed below:
- National Policy Statement for National Networks (NPSNN) – paragraph 5.195 (Ref 12.3);
 - National Planning Policy Framework (NPPF) – paragraph 180 (Ref 12.4);
 - Noise Policy Statement for England Explanatory Note (NPSE) (Ref 12.5); and
 - Planning Practice Guidance on Noise (PPG-N) (Ref 12.6).
- 12.3.3. The aims in the NPSNN provide the guiding principles for the consideration of mitigation of the impacts of the proposed Scheme. It states in paragraph 5.195 that the Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:
- avoid significant adverse impacts on health and quality of life from noise as a result of the new development;
 - minimise and mitigate other adverse impacts on health and quality of life from noise from the new development; and

- contribute to improvements to health and quality of life through the effective management and control of noise, where possible.
- 12.3.4. The NPPF closely aligns with the aims set out in the NPSNN.
- 12.3.5. The Explanatory Note within the NPSE introduces the following concepts to aid in the establishment of significant effects:
- No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
 - Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected; and
 - Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur.
- 12.3.6. The NPSE recognises that 'it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations'. The levels are likely to be different for different noise sources, for different receptors and at different times of the day. Section 12.8, Methodology defines the LOAEL and SOAEL proposed for each potential impact. The setting of these levels has been informed by the additional guidance in the web-based PPG-N on the concepts of NOEL, LOAEL and SOAEL.
- 12.3.7. The assessment will follow the approach set out in DMRB and the associated Interim Advice Note (IAN) 185-15 (Ref. 12.7).

12.4. Baseline Conditions

Overview

- 12.4.1. The study area consists of a mixture of agricultural land use, built up areas, including Featherstone, Shareshill and Essington, individual or small groups of properties and major transport infrastructure including the M54, M6 and M6 Toll. These motorways and the 'A' roads A460, A462 and A4601 are the main existing noise sources in the area.
- 12.4.2. Residential properties are concentrated in the built up areas of Featherstone, Shareshill and Essington. Smaller areas of residential properties are located close to the proposed Scheme at Dark Lane, Hilton Lane and Brookfield Farm. Non-residential potentially sensitive receptors including educational buildings, medical buildings and community facilities are concentrated in Featherstone, Shareshill, Essington and the edge of Cheslyn Hay in the north-east of the study area.
- 12.4.3. Under the Environmental Noise Directive (END) strategic noise mapping of major roads, railways, airports and agglomerations has been completed across England, including for the major roads in the study area. Nine 'Noise Important Areas' (those areas most exposed to noise) were identified in the Round 2 strategic noise mapping (carried out in 2012) in the 1km study area. Two are located along the M6 (7381 and 7363), one on the M54 (7365), one at the junction of the M6 and M54 (7380), two on the A462 (11498 and 11499), one on the A4601 north of the M6 Toll (7368) and two on the A460 (11490 and 7364). Five of the noise important areas are the responsibility of Highways England (7381, 7363, 7365, 7380 and 7364) i.e. those on the motorways and the A460 between the M6 and M6 Toll. The remainder are the responsibility of the local highways authority Staffordshire County Council (11498, 11499, 7368 and 11490).

- 12.4.4. Figure 12.1 illustrates the identified potentially sensitive receptors in the study area and the designated Noise Important Areas.

Baseline Noise Monitoring

- 12.4.5. Limited baseline noise monitoring on the A460 was completed in 2006 - 2008, as referred to in the 2015 EAR (Ref 12.8). A baseline noise survey is proposed as part of the EIA. Subject to access to secure locations being available, long term monitoring over a minimum of one week is proposed at a selection of locations in close proximity to the proposed Scheme. The monitoring procedures will be based on the approach in BS 7445: 2003 'Description and Measurement of Environmental Noise' (Ref 12.9) and CRTN. Details of the proposed monitoring locations and methodology will be discussed in advance with South Staffordshire Council.

Existing Noise Barriers

- 12.4.6. Within the study area a section of existing timber noise barrier has been identified from the Highways England Pavement Management System (HAPMS) database on the M54 eastbound carriageway at Junction 1. The HAPMS database does not include any details of the barrier height; however, based on Lidar data the barrier height has been determined as 1.8m. A solid metal parapet is included across the two sections of overbridge at the junction. As a conservative approach these two sections will not be included as a noise barrier as a site visit has determined that there is a gap between the base of the metal parapet and the bridge.
- 12.4.7. The existing barrier at Junction 1 of the M54 is assumed to be retained with the proposed Scheme, though some slight adjustment for the proposed Scheme would be required.

Existing/Future Low Noise Surfacing

- 12.4.8. In agreement with the design team, and taking into account surfacing information in the HAPMS database, new low noise surfacing will be assumed to be in place on the M54, M6, M6 Toll and A449 throughout the study area, in the opening year and future assessment year, without the proposed Scheme. Low noise surfacing is proposed as part of the proposed Scheme within the proposed Scheme extents.
- 12.4.9. In accordance with the guidance in DMRB, low noise surfacing is assigned a correction of -3.5 dB at speeds ≥ 75 km/hr. At speeds below 75 km/hr low noise surfacing is assigned the same correction as a standard surface of -1 dB.
- 12.4.10. All other roads included in the detailed quantitative noise modelling will be assumed to be standard hot rolled asphalt (HRA) in all scenarios. The road surface correction for standard HRA surfacing is -1 dB at speeds < 75 km/hr and -0.5 dB at speeds ≥ 75 km/hr.

12.5. Potential Impacts

Construction

- 12.5.1. The main construction activities that would take place are site clearance, earthworks, bridge construction works and road construction works.
- 12.5.2. The construction of the proposed Scheme has the potential to result in temporary adverse noise impacts at the closest receptors to the works. The potential for temporary construction vibration impacts is dependent on the need for construction activities which are a potentially significant source of vibration, such as works using vibratory rollers / compactors and some types of piling.

- 12.5.3. The addition of construction traffic onto existing roads can have a temporary impact on sensitive receptors located along the existing roads used by these vehicles. The potential for such impacts is dependent on the volume and route of construction traffic. Diversions or night-time road closures, if required, can cause short term changes in traffic conditions and therefore traffic noise levels. In addition, re-routing of existing traffic onto alternative roads during the construction works is also a potential source of temporary impacts.

Operation

- 12.5.4. The operation of the proposed Scheme has the potential to result in both beneficial and adverse permanent traffic noise impacts as traffic is moved closer to some receptors and further from other receptors. The closure of some roads, such as the link between Hilton Lane and the A460 via Dark Lane, would result in traffic re-routing. In addition, the presence of the proposed Scheme would attract traffic into the area as the existing traffic issues on the A460 are addressed by the proposed Scheme.
- 12.5.5. The magnitude of the operational traffic noise impact at a receptor is dependent on a range of factors including the traffic flow, composition, speed, road surface, ground topography, the presence of intervening buildings/structures and the distance to the road.

12.6. Design, Mitigation and Enhancement Measures

Construction

- 12.6.1. A CEMP would be prepared and implemented by the construction contractor. This would include relevant noise criteria, any proposed surveys and a range of best practice measures associated with mitigating potential noise and vibration impacts.
- 12.6.2. During the construction phase appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (e.g. web-based, newsletters, newspapers, radio announcements etc.).
- 12.6.3. An information web-page would be provided and kept up-to-date on the Highways England website to reflect construction and community liaison requirements. Residents would be provided with a point of contact for any queries or complaints. In addition, the Highways England Customer Contact Centre would also be available to deal with queries from the public. This includes an information line staffed by Highways England 24/7.
- 12.6.4. A complaint management system would be in place, in line with systems used by Highways England on other major infrastructure projects. Any noise and vibration complaints would be investigated and appropriate action taken as required. The complainant would be provided with a response outlining the results of the investigation and any action taken.

Operation

- 12.6.5. Traffic noise reduction measures will be incorporated into the design of the proposed Scheme by means of the vertical and horizontal alignment and through the proposed use of a thin surfacing system (low noise surface), which results in lower levels of noise generation than a standard hot rolled asphalt surface.
- 12.6.6. The need for further measures, such as noise barriers, will be determined as part of the EIA process in conjunction with other environmental disciplines, to avoid secondary impacts (including, for example, upon landscape and visual).

12.7. Description of the Likely Significant Effects

Construction

- 12.7.1. Given the very close proximity of some receptors to the proposed Scheme there is the potential for significant adverse construction noise effects at the closest receptors.
- 12.7.2. The risk of construction vibration induced building damage is considered to be very low. However, there is the potential for significant construction vibration annoyance effects at the very closest receptors, if works which are a potential source of vibration are proposed in close proximity.

Operation

- 12.7.3. The proposed Scheme would transfer traffic off the existing A460 between the M54 and M6 onto the proposed Scheme, which would result in a reduction in traffic noise levels at receptors close to this section of the existing A460 and a corresponding increase at receptors close to the proposed Scheme such as Dark Lane, Hilton Lane and Brookfield Farm. The closure of Dark Lane to through traffic would result in the transfer of traffic onto Hilton Lane. These increases and decreases in traffic noise levels are likely to be significant at the closest affected receptors.
- 12.7.4. The overall trend in the study area is likely to be a negligible/minor (not significant) increase in traffic noise levels as the proposed Scheme would result in a slight overall increase in traffic in the area. Negligible/minor (not significant) decreases in traffic noise are likely in specific locations where re-routing of traffic due to the proposed Scheme occurs.

12.8. Assessment Methodology

Data Sources

- 12.8.1. The following data sources will be used to inform the assessment of noise and vibration impacts on receptors as a result of the proposed Scheme:
- Baseline noise survey;
 - Land use - OS mastermap (including building heights), OS addressbase, and data.gov.uk datasets of designated sites, combined with any specific information from South Staffordshire District Council;
 - Ground heights – topographical survey along the route of the proposed Scheme, proposed Scheme design and wider area 2 m contour data;
 - Traffic Data – sourced from the traffic modelling of the proposed Scheme; and
 - Highways England HAPMS and ENVIS databases of road surfacing information and existing noise barriers.

Proposed Level and Scope

- 12.8.2. The assessment will follow the approach set out in DMRB and the associated Interim Advice Note (IAN) 185-15 (Ref. 12.7).
- 12.8.3. The general principle of DMRB is to allocate an assessment method according to risk - this process uses three levels of assessment: Scoping, Simple and Detailed. The assessment level proposed for the proposed Scheme is the most comprehensive Detailed assessment, as the proposed Scheme is considered to have the potential to result in potentially significant changes in traffic noise.

- 12.8.4. The scope of the construction noise and vibration assessment will be dependent on the level of detail available on the proposed construction works.
- 12.8.5. The scope of the operational noise and vibration assessment will be in accordance with the requirements of DMRB.

Assessment of Effects

Construction

- 12.8.6. A quantitative assessment of construction noise impacts is proposed based on estimates of reasonable worst case construction noise levels for a selection of the closest identified potentially sensitive receptors to the works. Reasonable worst case construction noise levels will be estimated in accordance with the methodology in BS 5228: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' (Ref 12.10). Before contractors have been appointed to construct the proposed Scheme, precise information on the construction works will not be available. However, it is anticipated that a contractor will be available to provide reasonable assumptions on the likely works.
- 12.8.7. BS 5228 contains a number of example methodologies for identifying significant construction noise effects based on fixed thresholds or noise level changes. For the purposes of this assessment the 'ABC' method is proposed. This approach is based on setting the threshold for the onset of potentially significant adverse effects (i.e. the SOAEL) depending on the existing ambient noise level. Receptors with low existing ambient noise levels (Category A) have a lower threshold than those with high existing ambient noise levels (Category C). Higher thresholds are set for normal daytime construction working hours, compared to the more sensitive evening/weekend and night time periods. As a conservative approach, the threshold for the onset of any adverse effect (i.e. the LOAEL) is set at a construction noise level equal to the existing ambient noise level. Construction noise levels between the LOAEL and the SOAEL have the potential to result in adverse effects but would not normally be classed as significant adverse effects. However, noise mitigation measures would still be considered/ applied in such locations to seek to keep all effects to a minimum. Table 12.1, which is adapted from Table E.1 in BS 5228, sets out the construction noise SOAEL and LOAEL proposed for this assessment.

Table 12.1: Construction noise SOAEL and LOAEL for all receptors

Time of Day	SOAEL $L_{Aeq,T}$ dB (façade)			LOAEL $L_{Aeq,T}$ dB (façade)
	A ¹	B ²	C ³	
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75	Existing ambient
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	55	60	65	Existing ambient
Night-time (23:00 – 07:00)	45	50	55	Existing ambient

¹ Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values

² Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A values

³ Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than the category A values

NOTE: if the ambient noise level exceeds the Category C threshold values then the SOAEL and LOAEL are defined as equal to the existing ambient

- 12.8.8. Construction traffic noise impacts along existing roads will be estimated based on the CRTN methodology BNL at a reference distance of 10 m from the nearside carriageway, both with and without the construction traffic, for each road link in the traffic model.
- 12.8.9. Construction vibration impacts will be assessed for all construction activities which are a potentially significant source of vibration proposed in close proximity of any identified potentially sensitive receptors such as works using vibratory rollers/compactors. Vibration levels will be estimated in accordance with the relevant methodologies in BS 5228.
- 12.8.10. The transmission of ground-borne vibration is highly dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken. BS 5228 provides data on measured levels of vibration for various construction works. Impacts are considered for both damage to buildings and annoyance to occupiers. Table 12.2 details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration effects on human receptors, based on guidance contained in BS 5228.

Table 12.2: Construction vibration criteria for human receptors (annoyance)

Peak Particle Velocity Level	Description
10 mms ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
1.0 mms ⁻¹	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
0.3 mms ⁻¹	Vibration might be just perceptible in residential environments.
0.14 mms ⁻¹	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

- 12.8.11. For human receptors the LOAEL is defined as a PPV of 0.3 mms⁻¹ (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0 mms⁻¹, this being the level at which construction vibration can be tolerated with prior warning.
- 12.8.12. In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (i.e. 1.0 mms⁻¹), then it is highly unlikely that buildings would be damaged by construction vibration. BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration' (Ref 12.11) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228. Guide values for transient vibration, above which cosmetic damage could occur, are given in Table 12.3.

Table 12.3: Transient vibration guide values for cosmetic damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mms ⁻¹ at 4Hz and above	
Unreinforced or light framed structures Residential or light commercial buildings	15 mms ⁻¹ at 4Hz increasing to 20 mms ⁻¹ at 15Hz	20 mms ⁻¹ at 15Hz increasing to 50 mms ⁻¹ at 40Hz and above
NOTE 1: Values referred to are at the base of the building. NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

12.8.13. BS 7385-2 states that for transient vibration, such as from individual impacts, the probability of building damage tends towards zero at levels less than 12.5 mms⁻¹ PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value. It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 'Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures' (Ref 12.12) defines three different categories of building damage:

- cosmetic – formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/concrete block constructions;
- minor – formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/block; and
- major – damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

12.8.14. BS 7385-2 states that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration level twice that of minor damage. Therefore, this guidance can be used to define the potential impact identified in Table 12.4 for continuous vibration.

Table 12.4: Construction vibration criteria for assessing building damage

Damage Risk	Continuous Vibration Level PPV mms ⁻¹
Major	30
Minor	15
Cosmetic	6
Negligible	<6

12.8.15. The main factor in identifying construction noise and vibration annoyance significant effects is the magnitude of the impact relative to the SOAEL. In general, construction noise or vibration levels above the SOAEL would be considered significant, and levels below the SOAEL not significant. However, in line with best practice this initial decision on the significance of an effect is then combined with professional judgement which takes into account a range of other factors including:

- the duration of the impact: Based on the guidance in BS 5228 construction noise or vibration levels above the SOAEL for less than 10 days (or 10 evenings/weekends or nights) in any 15, or less than 40 days (or 40 evenings/weekends or nights) in any six month period would not normally be considered significant. At the time of writing the Environmental Statement information on the exact timing and duration of individual activities will not be known, therefore a conservative judgement will be made of the likelihood of the duration criteria being exceeded based on the available information;
 - the timing of the impact: night time impacts being more likely to be considered significant than daytime impacts;
 - the location of the impact at the receptor: for example, a receptor may contain areas which are more or less sensitive than others, e.g. in a school, office spaces or kitchens would be considered less sensitive than classrooms; and
 - the nature, times of use and design of the receptor: e.g. a receptor which is not used at night would not be considered sensitive to night time construction works.
- 12.8.16. The magnitude of the impact of construction traffic on public roads will be assigned based on the anticipated change in traffic noise level, in accordance with the same criteria as used for short term operational road traffic noise impacts, as detailed in Table 12.6. The significance of the effect of construction traffic will be considered in the same way as operational traffic noise as detailed below.

Operation

- 12.8.17. Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of heavy duty vehicles (HDV)), gradient, type of road surface, distance from the road and the presence of any obstructions between the road and the receptor.
- 12.8.18. Noise from a stream of traffic is not constant, but to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the Government in CRTN to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean. As recorded in DMRB, a reasonably good correlation has been shown to exist between this index and the perception of traffic noise by residents over a wide range of noise exposures.
- 12.8.19. CRTN provides the standard methodology for predicting the $L_{A10,18h}$ road traffic noise level. Noise levels are predicted at a point measured 1 m horizontally from the external façade of buildings. The CRTN methodology applies a 'low flow' correction between 18 hour flows of 1,000 and 4,000. The low flow correction procedure amplifies the impact of changes in traffic flows which are already low, in particular at receptors very close to the road. The 1,000 18 hour flow cut off is the lower limit of the CRTN prediction methodology.
- 12.8.20. Although the main focus of the assessment is on daytime impacts, DMRB also requires an assessment of night-time traffic noise levels using the parameter $L_{night, outside}$, which is the traffic noise level over the period 23:00 to 07:00. However, this parameter is not calculated by the standard CRTN methodology. DMRB refers to three methods for calculating night-time traffic noise levels developed by the Transport Research Laboratory (TRL Ref 12.13). The most widely used is 'Method 3'

which factors the $L_{\text{night, outside}}$ from the LA10,18h, based on the typical diurnal pattern of traffic flows in the UK. This method is proposed for the assessment.

- 12.8.21. DMRB also requires consideration of the likely annoyance to residents caused by traffic noise, in both the short and long term. Individuals vary widely in their response to the same level of traffic noise. However, the average or community response from a large number of people to the same level of traffic noise is fairly stable and, therefore, a community average degree of annoyance caused by traffic noise can be related to the long-term steady state noise level. In addition, DMRB notes that people are more sensitive to abrupt changes in traffic noise, for example, following the opening of a new road, than would be predicted from the steady state relationship between traffic noise and annoyance (as described above). These effects last for a number of years. However, in the longer term, the perceived noise annoyance tends towards the steady-state level due to familiarisation.
- 12.8.22. The objective of the assessment, as set out in DMRB, is to gain an overall appreciation of the noise and vibration climate, both with (DS) and without (DM) the proposed Scheme. This is used to identify where noise impacts occur and to determine where mitigation to reduce these impacts may be appropriate. These conditions are assessed for the baseline year (the year of opening) and the future assessment year (15 years after opening).
- 12.8.23. DMRB outlines the steps to be carried out at the Detailed assessment stage, which will be followed for this assessment:
- 12.8.24. Identify the study area and predict 18-hour (06:00 - 00:00) and night-time (23:00 - 07:00) traffic noise levels at all residential properties within the 600 m calculation area for all assessment scenarios.
- 12.8.25. Carry out the following comparisons for each property in order to identify the number of properties where residents may experience an increase or decrease in traffic noise levels and annoyance:
- The Do-Minimum scenario in the opening year against the Do-Minimum scenario 15 years after opening (long-term);
 - The Do-Minimum scenario in the opening year against the Do-Something scenario in the opening year (short-term); and
 - The Do-Minimum scenario in the opening year against the Do-Something scenario 15 years after opening (long-term).
- 12.8.26. For night-time traffic noise levels, undertake comparisons for the two long-term comparisons and for properties where the $L_{\text{night, outside}}$ level is 55 dB(A) or more in the relevant scenarios;
- 12.8.27. Assess the impact on sensitive receptors, other than residential properties, within the 600 m calculation area. This is based on 18 hour (06:00 - 00:00) traffic noise levels and considers the same three comparisons as outlined in above for residential properties;
- 12.8.28. Complete a qualitative assessment of sensitive receptors which are within the 1 km boundary around the proposed Scheme and the existing A460/M54/M6, but outside the 600 m calculation area; and
- 12.8.29. For affected routes which are outside the 1km boundary around the proposed Scheme and the existing A460/M54/M6, complete an assessment by estimating the CRTN BNL on these roads (the traffic noise level at 10 m) with and without the

proposed Scheme. Count the number of dwellings and other sensitive receptors within 50 m of these routes.

- 12.8.30. Different façades of the same property can experience different changes in traffic noise level depending on their orientation to the noise source. DMRB requires that each of the above comparisons of traffic noise levels is based on the façade which experiences the least beneficial change i.e. the largest increase, or, if all façades undergo a decrease, the smallest decrease. Additionally, DMRB requires that the above comparisons of annoyance use the highest levels of annoyance in the first 15 years. For properties which experience an increase in noise due to the proposed Scheme, the greatest annoyance is likely to be immediately after the proposed Scheme opens to traffic. For properties which experience a decrease in noise (and also in the Do-Minimum comparison), the greatest annoyance is the steady-state level of annoyance in the long term.
- 12.8.31. A preliminary indication of any properties likely to qualify under the Noise Insulation Regulations will be provided in the assessment. A full assessment would be completed once the detailed design is finalised and in accordance with the timescales set out in the Regulations. Predicted daytime and night-time traffic noise levels will be generated using noise modelling software. The model will be based on traffic data generated by a traffic model of the proposed Scheme and surrounding area. The traffic flow and % HDV data will be taken directly from the model. However, the traffic speeds will be subject to a process called 'speed banding' which assigns one of four speeds to all non-motorway roads and one of three speeds to motorways, as set out in IAN 185/15. The model will also include the ground topography, ground type and buildings to form a 3D representation of the study area.
- 12.8.32. The SOAEL and the LOAEL for road traffic noise to be used in the assessment are detailed in Table 12.5.

Table 12.5: Traffic noise SOAEL and LOAEL for all receptors

Time period	SOAEL	LOAEL
Daytime	68 dB $L_{A10,18h}$ (façade)	55 dB $L_{A10,18h}$ (façade)
	63 dB $L_{Aeq,16h}$ (free-field)	50 dB $L_{Aeq,16h}$ (free-field)
Night	55 dB $L_{night,outside}$ (free-field)	40 dB $L_{night,outside}$ (free-field)

- 12.8.33. For daytime, the SOAEL is set at 68 dB $L_{A10,18h}$ (façade), which is consistent with the daytime trigger level in the Noise Insulation Regulations. For consistency with the Noise Insulation Regulations, levels of 67.5 dB are rounded up to 68 dB. The daytime LOAEL is set at 50 dB $L_{Aeq,16h}$ (free field), based on the guidance provided in the WHO Guidelines for Community Noise regarding the onset of moderate community annoyance (Ref 12.14).
- 12.8.34. For night-time, the SOAEL is set at 55 dB $L_{night,outside}$ (free field). This aligns with the interim night-time outdoor target level provided in the WHO Night Noise Guidelines for Europe (Ref 12.15). The LOAEL is set at 40 dB $L_{night,outside}$ (free field), which is defined as the LOAEL for night time noise in the WHO Night Noise Guidelines for Europe. The road traffic noise SOAEL and LOAEL are used to consider how the proposed Scheme complies with the three policy aims in paragraph 5.195 of the NPSNN, within the context of Government policy on sustainable development.
- 12.8.35. The assessment will set out what mitigation measures have been incorporated into the proposed Scheme to meet the three aims, and also any measures which were not considered reasonable or practical to include.

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- 12.8.36. Vibration from traffic can be transmitted through the air or through the ground. Airborne vibration is produced by the engines and exhausts of road vehicles, with dominant frequencies typically in the range of 50 – 100 Hz. Ground borne vibration is produced by the interaction of the vehicle tyres and the road surface with dominant frequencies typically in the range of 8 – 20 Hz. The passage of vehicles over irregularities in the road surface can also be a source of ground borne vibration.
- 12.8.37. Traffic vibration can potentially affect buildings and disturb occupiers. DMRB reports that extensive research on a wide range of buildings has found no evidence of traffic induced ground borne vibration being a source of significant damage to buildings and no evidence that exposure to airborne vibration has caused even minor damage. Airborne vibration is noticed by occupiers more often than ground borne vibration, as it may result in detectable vibrations in building elements such as windows and doors.
- 12.8.38. DMRB states that perceptible vibration only occurs in rare cases and identifies that the normal use of a building, such as closing doors and operating domestic appliances, can generate similar levels of vibration to that from traffic in most circumstances.
- 12.8.39. It is a requirement of new highway constructions that the highway surface be smooth and free from any discontinuities. Paragraph A5.25 of DMRB highlights that in relation to ground borne vibration ‘no evidence has been found to support the theory that traffic induced vibrations are a source of significant damage to buildings’. Paragraph A5.26 of DMRB also states: ‘Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances’. Hence, no significant effects from traffic induced ground borne vibration due to the passage of vehicles over irregularities on the proposed Scheme, in terms of either disturbance or damage to buildings (or other structures) are anticipated and no further assessment has been completed.
- 12.8.40. To assess the magnitude of the impact of traffic induced airborne vibration on residents, a parameter is needed which reflects a person’s subjective rating of vibration disturbance. DMRB recommends the use of the $L_{A10,18h}$. The relationship between the $L_{A10,18h}$ and annoyance due to vibration is similar to that for annoyance due to steady state traffic noise, except that the percentage of people bothered by vibration is lower. For a given level of noise exposure, the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for annoyance due to traffic noise. Below 58 dB(A) the percentage of people bothered by traffic induced vibration is assumed to be zero.
- 12.8.41. The potential for vibration impacts is limited to the immediate vicinity of a road, and the relationship between annoyance due to vibration and traffic noise level in DMRB is based on properties located within 40 m of a road. Therefore, at each property within 40 m of the proposed Scheme, the existing AA460/M54/M6 replaced by the proposed Scheme or other affected routes, and at which traffic noise levels are predicted to be 58 dB, $L_{A10,18h}$ or more, the percentage of people likely to be bothered very much or quite a lot by vibration will be calculated.
- 12.8.42. An initial identification of significant effects is carried out based on the magnitude of change in traffic noise levels due to the proposed Scheme. DMRB provides two example classifications for the magnitude of the traffic noise impact for a proposed road scheme, as shown in Table 12.6. These relate to short-term changes and long-term changes in noise levels. The short term classification detailed in Table 12.6 is the main driver of the initial identification of significant effects.

Table 12.6: Magnitude of traffic noise impacts

Short term change		Long term change	
Noise level change (rounded to 0.1dB) $L_{A10,18h}$ dB	Magnitude of impact	Noise level change (rounded to 0.1dB) $L_{A10,18h}$ dB	Magnitude of impact
0	No change	0	No change
0.1 – 0.9	Negligible	0.1 – 2.9	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
5.0+	Major	10.0+	Major

12.8.43. In general, a negligible or minor magnitude of impact is not normally considered significant and a moderate or major magnitude of impact is normally considered significant. However, in line with best practice this initial decision on the significance of an effect is then combined with professional judgement which takes into account a range of other factors including:

- the absolute noise levels e.g. if traffic noise levels are already very high (above the SOAEL) then a smaller noise level change than outlined in Table 12.6 may be considered significant. Conversely if traffic noise levels are very low (below the LOAEL) then a larger noise level change may be required to be considered significant;
- where the magnitude of change in the short term lies relative to the boundaries between the bands outlined in Table 12.6, e.g. in some circumstances a change of e.g. 2.9 dB, which just falls into the minor category, may be considered significant;
- if the magnitude of change in the long term is different than the short term, e.g. if the short term change is minor (not significant) but the long term change is moderate (significant) then a significant effect may be identified;
- the circumstances of the receptor, e.g. a receptor may contain areas which are more or less sensitive than others, e.g. office spaces or kitchens in a school, would be considered less sensitive than classrooms. Alternatively, if a receptor is particularly vulnerable, such as a school for hearing impaired children;
- the acoustic character of an area, e.g. if a scheme introduces road noise into an area where road noise is not currently a major source;
- the likely perception of a traffic noise change e.g. does the noise change combine with other changes, such as an increase in the visibility of a road, which may increase the perceived impact; and
- the proportion of a designated site that is affected, e.g. comparing the proportion of a designated site within the noise study area, that is above the LOAEL or SOAEL in each assessment scenario.

12.9. Assessment Assumptions and Limitations

12.9.1. The information available at this stage is considered to be sufficient to define the scope of the noise and vibration assessment.

- 12.9.2. The construction noise and vibration impact assessment will be based on the best available information. It is anticipated that detailed information/assumptions will be available to enable predictions of construction noise and vibration levels to be made at a selection of representative receptors for the main construction works. It is anticipated that sufficient construction traffic data will be available to enable an assessment of construction traffic impacts on the existing road network to be completed. As with all construction noise and vibration assessments the exact details will not be available before a specific contractor is appointed to complete the works and determines their exact construction methods and programme.

13. POPULATION AND HEALTH

13.1. Introduction

13.1.1. The proposed Scheme has the potential to affect non-motorised users (NMUs), vehicle travellers, community severance, land use and health, both during construction and once the road is operational. This section provides an overview of the potential impacts of the proposed Scheme on population and health and describes the proposed assessment methodology for the Environmental Statement.

13.2. Study Area

13.2.1. The assessment of Population and Health considers topics largely grouped into, impacts on NMUs (pedestrians, cyclists and equestrians), motorised users, land use (private assets, community land and development land) and human health. The study area for assessment will vary depending on the impact or type of resource and/or receptor being assessed. The following study areas are proposed:

- NMUs: The study area will consider NMU facilities (Public Rights of Way (PRoW), cycle routes and footways) within 500m of the DCO site boundary.
- Motorised Users: This assessment will consider two aspects:
 - Views from the Road: The study area for the assessment of views from the road would use the Zone of Theoretical Visibility (ZTV) which identifies the likely extent of visibility of the proposed Scheme). The ZTV is outlined in Chapter 8: Landscape and Visual, Section 8.2.
 - Driver stress: The study area will consider motorised users on local roads within 500 m and users of the strategic network within 2 km of the DCO site boundary. 2 km has been proposed to consider the change in traffic flows on the A449 which provides an existing link between the M54 and M6.
- Private Assets and Development Land: The study area will consider land within the DCO site boundary that has the potential to be directly impacted. This will consider the temporary and permanent loss of land or property as a result of the proposed Scheme.
- Community Severance: The study area for community facilities and severance would consider the direct and indirect impacts and effects of the proposed Scheme associated with motorised severance for the communities of Featherstone, Shareshill and Hilton and the main traffic routes within 500 m of the DCO site boundary.
- Human Health: The study area will consider residents within the wards of, Essington, Featherstone & Shareshill and Cheslyn Hay North & Saredon due to their proximity to the proposed Scheme.

13.3. Legislation, Policy and Guidance

13.3.1. The assessment of impacts on population and health and the design of appropriate mitigation and or enhancement will be carried out according to established prediction and assessment methodologies that are governed or guided by the following key documents:

- National Networks National Planning Statement, paragraphs 5.165-5.168, 5.174, 5.180, 5.184 and 5.203-5.205 (Ref 13.1);
- National Planning Policy Framework (Ref 13.2);

- DMRB, Volume 11, Section 3, Part 6: Land Use (Ref 13.3);
- DMRB, Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects (Ref 13.4);
- DMRB, Volume 11, Section 3, Part 9: Vehicle Travellers (Ref 13.5);
- DMRB, Volume 11, Section 3, Part 1: Air Quality (Ref 13.6) and IAN 185/15 (Ref 13.7), IAN 175/13 (Ref 13.8), IAN 174/13 (Ref 13.9), IAN 170/12 (Ref 13.10);
- DMRB, Volume 11, Section 3, Part 7: Noise & Vibration (Ref 13.11);
- DMRB, Volume 11, Section 3, Part 10: Road Drainage & The Water Environment (Ref 13.12); and
- IEMA, Health in Environmental Impact Assessment: A Primer for a Proportionate Approach.

13.4. Baseline Conditions

Non-Motorised Users

- 13.4.1. There are a number NMU facilities located within the study area these are listed in Table 13.1 and are largely located to the north of Hilton Lane.

Table 13.1: PRow and Public Access Routes

PRow and Public Accesses	
Footpaths	Saredon 1R, 7, 8, 9 and 14 Shareshill 3, 4, 5, 7 and 17 Featherstone 6 and 8
Bridleways	Saredon 13 Shareshill 1 Featherstone 2 and 3
Other route with public access	Featherstone 8
Recreational route	At Mosley Old Hall

- 13.4.2. There is a continuous footway along the northbound carriageway of the A460. The footway is narrow at points and not always well maintained. Through the villages of Featherstone and Shareshill there is a footway adjacent to the southbound carriageway of the A460, however, this is discontinuous and does not run the full length of the A460.
- 13.4.3. There are a number of formal crossing points on the A460, these include:
- an uncontrolled at grade crossing point at Shareshill;
 - a signalised crossing point at the northern extent of Featherstone;
 - signalised crossing points on New Road and northern arm of the A460 at the New Road/A460/Dark Lane junction (the other arms of the junction utilise traffic lights however there are no signalised crossing points in place); and
 - an uncontrolled at grade crossing point south of the Avenue.
- 13.4.4. NMUs utilising these facilities along the A460 are exposed to heavy traffic, a high proportion of which are HGVs. There are a number of school and local buses which utilise bus stops along the A460.

- 13.4.5. There are no routes designated under the National Cycle Network or specific cycling facilities available within the study area. However, there is a short approximate 80m section of cycleway painted on the carriageway of the northbound A460 south of New Road. This cycleway does not appear to be connected to additional cycling infrastructure and therefore is considered to have low sensitivity. The 'Cycle Map and Information Guide' for South Staffordshire, produced by Staffordshire County Council shows an 'advisory cycle route' along Hilton Lane and Dark Lane.

Motorised Users

- 13.4.6. The main road network surrounding the proposed Scheme consists of:
- A460 – a single carriageway road which runs in a north-easterly direction across southern Staffordshire, providing a connection between the M54 and M6. Speed limit: 40 mph.
 - M54 - a two-lane dual carriageway running in an east/west direction through Shropshire and Staffordshire connecting to the M6 via a spur just north of Essington to the south-east of the proposed Scheme extent. Speed limit: 70 mph.
 - M6 - a three-lane dual carriageway running in a north/south direction connecting to the M54 and the M6 Toll within the study area. Speed limit: 70 mph.
 - M6 Toll – a three-lane dual carriageway which runs between M6 J11A (within the study area) and the M6 J3a. Speed limit: 70 mph.
 - A449 – a two-lane dual carriageway running in a north/south direction connecting the M54 to the A5 and the M6. Speed limit: 40mph and 60mph.
 - A5 – a single carriageway road which runs in an east/west direction between Tamworth and Telford. Speed limit: 60 mph.

Views from the Road

- 13.4.7. Views from the existing road network, the M6, M54 and A460 are quite limited with drivers experiencing intermittent views of the surround area. The A460 is generally at ground level with existing vegetation lining the road to the east and west. Through Featherstone and Shareshill the vegetation to the west is replaced by views of residential and commercial properties with wider views blocked by this built form.

Driver Stress

- 13.4.8. The existing road network currently experiences high levels of traffic, particularly during peak hours. As a result the M54 Junction 1 and the M6 Junction 11 are heavily congested during peak hours. The A460 and A449 are also under pressure from high levels of traffic including HGVs using the route as a direct route between the M54 and M6. This results in extended and unreliable journey times. The congestion of the A460 can make it difficult for local traffic from Featherstone and Shareshill to enter and exit from the A460. This may result in driver frustration and an increased fear of accidents occurring as a result of the impatience displayed by other drivers.

Community and Private Assets

- 13.4.9. The study area surrounding the proposed Scheme is predominantly rural in nature consisting of arable land and small areas of scattered woodland. To the south of the study area there is an area of historic parkland associated with 18th century Hilton Hall.

- 13.4.10. There are a number of small settlements in proximity to the draft DCO site boundary; these include the villages of Featherstone Shareshill and Hilton. There are also a number of isolated dwellings and farm holdings.

Private Assets

- 13.4.11. There are a number of private businesses within the study area. These include:

- Hilton Hall Business Centre– office, corporate function and wedding venue;
- Brookfield Livery and Events Centre;
- Brookfields Fishery; and
- Featherstone Car Boot.

- 13.4.12. There are no known residential properties located within the study area.

- 13.4.13. Areas of agricultural land would be directly impacted by the proposed Scheme. This is covered under Chapter 10 Geology and Soils.

Development Land

- 13.4.14. There are at the time of writing this assessment, no existing planning applications within the study area.

- 13.4.15. There is one site allocated (Hilton Cross Business Park) as a strategic development site by South Staffordshire District Council (Ref 13.13) to the south of the study area.

Community Facilities

- 13.4.16. Community facilities within the village of Featherstone include Featherstone Academy primary school, Featherstone Methodist Church, Featherstone and Hilton Community Centre, Featherstone Family Health Centre, a post office and a number of local shops. Community facilities within the village of Shareshill include Havergal Church of England Primary School, St Mary and St Luke Church, Shareshill Village Hall, a post office and a number of local shops. There are no community facilities located within Hilton, it is considered that the residents of Hilton would utilise community facilities within Featherstone.

- 13.4.17. There are no secondary schools within the villages of Featherstone or Shareshill. The catchment school for these villages is Cheslyn Hay Sport and Community High School in Cheslyn Hay.

- 13.4.18. There are no areas of land designated for use by the community such as village greens, community land or areas of public open space within the study area.

Human Health

- 13.4.19. The proposed Scheme is located in the County of Staffordshire within the district of South Staffordshire which has an estimated population of 111,900 (Ref 13.14). In 2016, the total population of the wards of Featherstone & Shareshill, Cheslyn Hay North & Saredon and Essington was estimated to be 16,658 people, with the largest population within the ward of Featherstone & Shareshill, at 7,573 people (Ref 13.15).

- 13.4.20. Table 13.2 provides a comparison of local health indicators with the national (England) averages. A brief summary of each ward is provided below.

- 13.4.21. In Featherstone & Shareshill the proportion of the population which are considered to have a health classification of 'bad or very bad' or are considered to have a long term illness or disability, is below the national average. Featherstone & Shareshill

records a higher ratio of adults and children considered to be obese than the national average.

13.4.23. In Essington the proportion of the population which are considered to have a health classification of 'bad or very bad' or are considered to have a limiting long term illness or disability is considered to be statistically significantly worse than the national average. Records in Essington document a higher ratio of obesity within adults and children than recorded nationally.

13.4.24. In Cheslyn Hay North & Saredon the proportion of the population which are considered to have a health classification of 'bad or very bad' or are considered to have a limiting long term illness or disability is higher than the national average. Cheslyn Hay North & Saredon records a higher ratio of obesity in adults and children than recorded nationally, however, the life expectancy for both males and females is considered to be higher than the national average.

13.4.25. All of the wards have a much lower percentage of pensioners living alone than the national average.

Table 13.2: Human health profile within the study area

Local Health Indicator	Ward			England
	Featherstone & Shareshill	Essington	Cheslyn Hay North & Saredon	
Population	7,573	5,216	4,485	55,268,067
Population aged under 16 (%)	11.1%	17.2%	17.5%	19.1%
Population aged over 65 (%)	12.6%	24.5%	21%	18.0%
Income deprivation (people living in income-deprived households as % of population)	13.7	12.0	10.8	14.6
Long term unemployment (measures as claimants of jobseekers allowance (per 1,000 population aged 16-64) for over 12 months)	3.1	5.5	2.3	4.6
General health - bad or very bad (%)	5.1	8.7	6.2	5.5
Limiting long term illness or disability (%)	16.6	21.5	20.3	17.6
Obese adults (%)	28.3	28.6	29.2	24.1
Obese children (reception year) (%)	10.1	10.7	12.8	9.3
Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (SAR)	54.6	77.7	66.1	100
Life expectancy at birth - males, 2011-2015 (years)	80	78.9	79.9	79.4
Life expectancy at birth - females, 2011-2015 (years)	84.5	81.3	85.1	83.1

(Standardised Admissions Ratio (SAR): The ratio of the observed number of admissions in a ward to the number expected if the ward had the same age-specific rates as England.

Standardised Mortality Ratio (SMR): The ratio of the observed number of deaths in a ward to the number expected if the ward had the same age specific rates as England.)

13.4.26. Baseline data for the study areas has been gathered during a desktop study from the following sources:

- South Staffordshire Borough Council, Site Allocations Policy Map (Ref 13.13);
- Natural England, MAGIC maps (Ref 13.16);
- Sustrans, National Cycle Network (Ref 13.17);
- Staffordshire County Council, Cycling Maps (Ref 13.18); and
- Public Health England, Local Health (Ref 13.15).

13.5. Potential Impacts

Non-motorised Users

13.5.1. With regards to NMUs, potential impacts include:

- temporary closures or diversion of NMU facilities severed by the proposed Scheme during construction;
- temporary impacts on severance and connectivity of NMU facilities due to changes in traffic flows as a result of construction traffic and temporary traffic management;
- permanent realignment of NMU facilities as a result of permanent land take to facilitate the footprint of the proposed Scheme; and
- permanent reductions in severance due to the redistribution of traffic to utilise the proposed Scheme, reducing traffic flows on local routes such as the A460.

Motorised Users

13.5.2. With regards to motorised users, potential impacts include:

- temporary increases in driver stress due to increased congestion as a result of construction traffic and temporary traffic management;
- permanent reductions in driver stress due to reduced congestion, improved journey reliability and perceived improvements in safety; and
- change in views from the road associated with the use of a new route.

Private Assets and Development Land

13.5.3. Identified potential impacts on private residences and local businesses:

- temporary loss of land associated with commercial properties required to construct the proposed Scheme;
- permanent loss of land associated with commercial properties to accommodate the footprint of the proposed Scheme and any essential mitigation measures, including land associated with the businesses located at Brookfield Farm and Hilton Hall; and
- an area of 8,500m² of the strategic employment site Hilton Cross Business Park is within the draft DCO site boundary, allocated as a strategic employment site. This has the potential to impact on the use of this site temporarily and permanently.

Community Severance

13.5.4. Potential impacts in terms of community severance include:

- temporary increases in community severance due to increases in congestion as a result of construction activities and associated vehicle movements; and
- permanent reductions in community severance due to the redistribution of traffic away from local routes such as the A460.

Human Health

13.5.5. Potential impacts in terms of human health include:

- temporary changes in air quality, noise and vibration and amenity arising from construction activities and associated vehicle movements;
- permanent changes in air quality, noise and vibration and amenity arising from operation of the proposed Scheme;
- temporary and permanent impacts on access to healthcare service and social infrastructure as a result in changes in severance; and
- temporary and permanent impacts on social cohesion associated as a result of changes in severance.

13.6. Design, Mitigation and Enhancement Measures

13.6.1. Environmental considerations will be taken into account during the further development of the proposed Scheme design, including:

- minimising temporary and permanent land take to minimise impacts of private property and development land;
- the temporary and permanent realignment/ diversion of PRow to minimise severance and reduce disruption to NMUs;
- the use of accommodation bridges to minimise severance;
- changes to route alignment (within the draft DCO site boundary) to minimise impacts on private property; and
- changes in route alignment (within the draft DCO site boundary) to minimise impacts on health from air quality and noise and vibration.

13.6.2. During the construction of the proposed Scheme, a number of measures would be put in place to reduce potential impacts upon people and communities as follows:

13.6.3. Construction of the proposed Scheme would be subject to measures and procedures defined within a CEMP. A CEMP will be prepared and will be further developed and implemented by the selected construction contractor. The CEMP would include a range of good practice measures associated with mitigating potential environmental impacts.

13.6.4. In addition to the CEMP, the construction contractor would define the requirements relating to traffic management. The construction contractor would liaise with South Staffordshire District Council to agree and implement a Traffic Management Plan. The Traffic Management Plan would take account of local public and business access requirements in order to reduce severance and disruption to local traffic movements during construction.

- 13.6.5. During the construction phase appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (e.g. web-based, newsletters, newspapers, radio announcements etc.). An information web-page would be provided on the Highways England website to reflect construction and community liaison requirements. It is envisaged that the web-page would provide information on the progress of the construction works, areas affected by construction, mitigation in place to reduce adverse effects, information regarding planned construction works and works recently completed. These communication approaches would help drivers to plan their journeys and take account of potential disruption due to Scheme construction.

13.7. Description of the Likely Significant Effects

Non-Motorised Users

- 13.7.1. There is the potential for adverse and beneficial impacts on NMUs during construction and operation of the proposed Scheme. It is not anticipated that there would be significant effects on NMUs; however, further information on the use of the NMU routes and the proposed route of permanent PRow realignments/ diversions is required.
- 13.7.2. Indirect impacts of the proposed Scheme, resulting from a reduction in traffic flows along the A460 are considered to result in potential minor/moderate beneficial effects on NMU and severance, however further traffic modelling is required to determine this.

Motorised Users

- 13.7.3. The proposed Scheme would result in temporary increases in driver stress during the construction period as a result of reduced speed, traffic management and increased congestion. Further details regarding construction of the proposed Scheme are required to determine this.
- 13.7.4. The proposed Scheme is anticipated to provide a reduction in traffic on local roads and therefore reduce the conflict between local traffic and long-distance traffic/HGVs. This would improve the reliability of journey times and reduce fear of potential accidents. Therefore, it is considered that operation of the proposed Scheme would have a minor/ moderate beneficial effect on driver stress, however further traffic modelling is required to determine this.

Private Assets

- 13.7.5. Based on existing knowledge, it is considered that the proposed Scheme has the potential to result in significant effects on private properties and businesses. It is not possible to at this stage to determine the full effects of the proposed Scheme on private assets. Consultation with business and landowners will be undertaken to determine the existing land management practises and how the proposed Scheme would impact potential business viability/ operations.

Development Land

- 13.7.6. The current draft DCO site boundary would result in the loss of up to 4.7% of the Hilton Cross Business Park strategic employment site. Though it is likely that this area will be reduced through preliminary design and therefore would not affect the use and viability of the site for its allocated use, further assessment is required.

Human Health

- 13.7.7. There is the potential for significant changes in air quality, noise and vibration and amenity for a number of residential properties in close to the proposed Scheme. Further assessment is required to consider impacts on health.

13.8. Assessment Methodology

Data Sources

- 13.8.1. The following data sources will be used to inform the assessment of population and health impacts on receptors as a result of the proposed Scheme:
- traffic data – sourced from the traffic modelling of the proposed Scheme;
 - pedestrian, cyclist and equestrian survey; and
 - the results of the assessments of air quality, noise and vibration, climate, road drainage and water environment and landscape and visual.

Proposed Level and Scope

- 13.8.2. The proposed scope of the assessment of Population and Health will consider impacts on:
- non-motorised users;
 - motorised users;
 - private assets and development land;
 - community severance; and
 - human health.
- 13.8.3. The assessment of effects on land used by the community has been scoped out of the assessment as there are no areas of land designated for use by the community within the study area such as village greens, community land or areas of public open space.

Assessment of Effects

Non-Motorised Users

- 13.8.4. The potential for effects on NMUs will be considered in accordance with the relevant sections of DMRB Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects (Ref 13.10). The assessment of impacts on NMUs will consider:
- access to existing community facilities and routes used by NMUs; the changes to journey times associated with the proposed Scheme;
 - likely changes in the safety and amenity value of routes used by NMUs; and
 - likely changes in community severance as a result of increased journey lengths and amenity.
- 13.8.5. The assessment considers whether journeys would be lengthened or reduced, whether amenity value would increase or diminish, whether people would be deterred from making journey. Amenity is defined as the relative pleasantness of a journey. The assessment is, therefore, concerned with changes in the degree and duration of people's exposure to traffic (hazards, noise, air quality etc.), the impact of the proposed Scheme on NMU journey lengths, plus any additional visual intrusion

as associated with the proposed Scheme. The same approach to the assessment will apply for both the construction and operation phases of the proposed Scheme.

- 13.8.6. There is no specific guidance within DMRB in terms of how to assess the sensitivity of NMU facilities to temporary disruption/closure or permanent modification. As such, the criteria detailed in Table 13.3 will be used to assess the sensitivity of NMU facilities. The criteria have been developed and based upon the professional judgement of suitably qualified and experienced specialists and which have been applied previously to Highways England infrastructure developments.

Table 13.3: Sensitivity of NMU Routes

Sensitivity	Description
Very high	Key routes used by pedestrians, cyclists and other NMUs. Routes record very high numbers of NMU journeys and/or connect communities with employment land uses and other services with a direct and convenient NMU route. Routes are important since they offer opportunities to meet sustainable transport and public health objectives through active travel modes rather than private car use. Any interruption of these would inconvenience many people and could cause people to switch from active modes to private car use. Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who may be disproportionately affected by small changes in the baseline due to potentially different needs.
High	National or regional trails and routes likely to be used for recreation that record high use. The sensitivity of these routes is judged to be high because of the number of people affected and effects upon regional leisure. Crossing points on busy roads for NMU (roads with more than 8,000 vehicles per day) which may not currently record high use, but for which limited alternatives are available. These points are sensitive because disruption to these may affect the convenience or safety of journeys for NMU.
Medium	Public rights of way and other routes close to communities which are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys. It is likely that direct and efficient journeys are not the priority for the majority of people using these routes so they would be more tolerant of disruptions and diversions. However, people are likely to be sensitive to changes to the amenity and character of the overall route.
Low	Routes which have fallen into disuse such as through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes. Whilst these routes would not be sensitive in terms of disruption from development proposals, they may present opportunities for enhancement if existing barriers or poor amenity can be overcome through development proposals.

- 13.8.7. There is no specific guidance within DMRB for assessing the magnitude of impact on NMU facilities. The criteria set out in Table 13.4 have been used to assess the magnitude of impact.

Table 13.4: Magnitude of Impact

Magnitude	Description
Major adverse	Direct impact on, or severance of, a route used by pedestrians, cyclists or equestrians, resulting in a substantial and permanent loss of amenity and use (NMU facilities of high to very high sensitivity). Increases of 30% or more in traffic flows along a route to increase volumes to over 16,000 vehicles per day which would be

Magnitude	Description
	likely to deter use by most NMU, particularly road cyclists.
Moderate adverse	Introduction of new need to cross a highway for a previously uninterrupted route, or the introduction of new highway in close proximity to a route which was previously tranquil in character. The changes would not cause a significant extension of journey (<500m), but would cause loss of amenity/convenience or substantially alter the character of the route. Increases of 30% or more in traffic flow along route to increase volumes to over 8,000 vehicles per day such that would be likely to deter use by some NMU, particularly road cyclists, or cause noticeably more intimidating conditions. Temporary severance to routes that are used by high numbers of pedestrians, cyclists or equestrians (during construction activities).
Minor adverse	No direct permanent impact, but some loss of amenity. Temporary disruption to routes or short-term loss of amenity (e.g. short-term disruption and diversions to NMU routes during construction activities).
Negligible adverse	No direct impact and no disruption to the route but a loss of amenity due construction work or the new highway being located in the immediate proximity.
No change	No change to route used by pedestrians, cyclists and/or equestrians.
Negligible beneficial	No change in the route but due to landscaping, new signage and/or lighting, there is a perceived increase in safety and amenity.
Minor beneficial	An improved at-grade crossing facility or other provision on an existing route that improves the amenity or convenience for NMU, for example the introduction of a traffic island or pelican crossing.
Moderate beneficial	Introduction of a new crossing or other facility on an existing NMU route that is likely to encourage more use due to improved amenity/ convenience or perception of safety, for example a new cycle lane, grade separated crossing or replacement of grass verge with pavement. Reductions in traffic to below 8,000 vehicles per day or by more than 30% such that conditions for NMU such as road cyclists are less intimidating.
Major beneficial	Provision of a permanent new route useful for NMU where previously there was no route or access was very hazardous or perceived to be hazardous such that NMU did not regularly use the route. Reductions in traffic to below the threshold of 8,000 vehicles per day or by more than 60% such that NMU are more encouraged to take the route, particularly road cyclists.

13.8.8. Judgements relating to the sensitivity of NMUs and the magnitude of impact of the proposed Scheme on that NMU are combined to reach a conclusion regarding the level of effect, and whether it is significant. The significance of effect is subsequently determined using the matrix set out in Section 5.3, Table 5.3.

Motorised Users

13.8.9. A simple assessment of vehicle travellers will be undertaken based on guidance provided in DMRB Volume 11, Part 9: Vehicle Travellers (Ref 13.11). The assessment methodology is detailed below. The assessment methodology applies to both the construction and operation phases of the proposed Scheme.

View from the Road

13.8.10. Views from the road are defined as the extent to which travellers are exposed to the different types of scenery through which a route passes. Aspects considered include:

- the types of scenery or the landscape character;

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- the extent to which travellers may be able to view the scene;
 - the quality of landscape; and
 - features of particular interest or prominence in the view.
- 13.8.11. There are four categories which have been used to assess the traveller's ability to see the surrounding landscape as follows:
- **No view:** Road is in deep cutting or contained by earth bunds, environmental barriers or adjacent structures.
 - **Restricted view:** There are frequent cuttings or structures blocking the view.
 - **Intermittent view:** The road is generally at ground level, but with shallow cuttings or barriers at intervals.
 - **Open view:** The view extends over many miles, or is only restricted by existing landscape features.
- 13.8.12. In assessing the views of travellers, it is essential to understand their sensitivity to changes in the landscape and views from the road. This relates both to the speed at which the landscape is viewed and also the ability of the drivers to concentrate on the road while travelling, particularly during periods of construction. Taking into account the speed at which vehicles would be travelling around the proposed Scheme and limited time motorised users are exposed to construction operations it is considered that motorised users would have low sensitivity to their surroundings.
- 13.8.13. There are no established criteria to define the magnitude of impact that a proposed Scheme has on traveller views. Professional judgement will be used to define the magnitude of impact based on a three point scale, namely: low, medium and high (adverse or beneficial).
- 13.8.14. The level of an effect on motorised users would be calculated based on the sensitivity of the receptor and the magnitude of the impact using a five point scale: negligible, minor, slight, moderate and major (adverse or beneficial). Effects of moderate and major (beneficial or adverse) are considered significant.

Driver Stress

- 13.8.15. Driver stress can be defined as the adverse mental and physiological effects experienced by a driver while travelling along the road network. Driver stress has four main components that are considered in the assessment:
- **Frustration:** Frustration is caused by a driver's inability to drive at a speed consistent with their wishes in relation to the general standard of the road. It increases as speed falls in relation to expectations and may be due to high flow levels, roadworks, or difficulties in overtaking slower moving traffic. Congestion can lead to frustration by creating a situation in which the driver does not feel in control, especially when they wish to arrive at a destination by a particular time, but are held up by traffic congestion whose duration cannot be determined.
 - **Fear of accidents:** The fear of accidents can become particularly acute in adverse weather conditions when spray from vehicles reduces visibility. Adverse weather conditions, coupled with the limited sight distances caused by the scale and mass of HGVs, makes driving and overtaking more stressful and risky, and therefore increases the fear of accidents.
 - **Uncertainty of route:** Road uncertainty is caused primarily by signing that is inadequate for purpose.

- **Traveller care:** The assessment of drivers' stress needs to consider traveller care and whether sufficient traveller care facilities are provided.
- 13.8.16. The level of driver stress is dependent upon the driver's experience and driving skills, knowledge of the route being taken, health and temperament. Factors considered include:
- lane flow
 - travel speed;
 - junction frequency;
 - road surface characteristics; and
 - road layout and geometry.
- 13.8.17. As an indicator of the magnitude of driver's stress/frustration, DMRB Volume 1, Part 9 Vehicle Travellers tabulates the relationship between average peak hourly flows per lane and the average journey speed in order to describe the magnitude of drivers stress on a three point scale (low, moderate, high), see Table 13.5 below.

Table 13.5: Driver stress matrix (magnitude of impact)

For Dual Carriageway Roads			
Average Peak Hourly Flow (per lane, in flow units/ hr)	Average Journey Speed (km/ hr)		
	Under 60	60 – 80	Over 80
Under 1,200	High	Moderate	Low
1,200 – 1,600	High	Moderate	Moderate
Over 1,600	High	High	High
For Single Carriageway Roads			
Average Peak Hourly Flow (per lane, in flow units/ hr)	Average Journey Speed (km/ hr)		
	Under 50	50 – 70	Over 70
Under 600	High	Moderate	Low
600 – 800	High	Moderate	Moderate
Over 800	High	High	High

- 13.8.18. For the purposes of this assessment, relative levels of value (sensitivity) have not been assigned to receptors (vehicle travellers) and all drivers are considered to have the same sensitivity to driver stress (i.e. low).
- 13.8.19. The fear of accidents can become particularly acute in adverse weather conditions when spray from vehicles reduces visibility. Adverse weather conditions coupled with the limited sight distances caused by the scale and mass of HGVs, makes driving and overtaking more stressful and risky, and therefore increases the fear of accidents.

- 13.8.20. A judgement as to the overall significance of effect for driver stress will be made in accordance with Table 13.6 below as developed by professional judgement and which has been applied to previous infrastructure development schemes. Moderate, Large and Very Large (beneficial or adverse) effects are considered to be significant.

Table 13.6 Driver Stress – Significance of Effect

Significance of effect	Description
Very large beneficial or adverse (Significant)	Where there would be a very major reduction/ increase in driver stress resulting from the proposed Scheme
Large beneficial or adverse (Significant)	Where there is a major reduction/ increase in driver stress resulting from the proposed Scheme
Moderate beneficial or adverse (Significant)	Where there is a moderate reduction/ increase in driver stress resulting from the proposed Scheme
Slight beneficial or adverse (Not Significant)	Where there is a minor reduction/ increase in driver stress resulting from the proposed Scheme
Neutral (Not Significant)	Where no effects on driver stress is anticipated from the proposed Scheme, or where the beneficial and adverse effects are considered balanced.

Private Assets and Development Land

- 13.8.21. This assessment will be carried out taking into consideration the guidance provided in DMRB Volume 11, Section 3 Part 6 and Part 8 (Ref 13.9 and 13.10). The assessment is based on a desk top study and determines the sensitivity of receptors, the magnitude of impact and likely significance of the effect. This assessment methodology applies to both the construction and operation phases of the proposed Scheme.
- 13.8.22. In the absence of guidance within the DMRB the sensitivity of receptors is assessed as detailed in Table 13.7.

Table 13.7: Sensitivity Criteria – Community and Private Assets

Sensitivity	Description
Very High	<ul style="list-style-type: none"> Residential, commercial or industrial buildings Building used by the community e.g. schools, community halls Community land that attracts users nationally e.g. national parks Designated public space Religious sites and cemeteries
High	<ul style="list-style-type: none"> Residential, commercial or industrial land e.g. gardens Land used by the community on a regional scale, e.g. country parks, forests and other land managed in such a way as to attract visitors from a regional catchment.
Medium	<ul style="list-style-type: none"> Agricultural land used for arable and pasture uses. Land informally used by the community, e.g. land used for dog walking but does not contain and formal rights of access.
Low	<ul style="list-style-type: none"> Derelict or unoccupied buildings. Locally used community land e.g. local parks and playing fields.

Sensitivity	Description
Negligible	<ul style="list-style-type: none"> • Derelict hardstanding with no buildings, where there is no formal public access.

13.8.23. There is no specific guidance within the DMRB in terms of assessing the magnitude of impact associated with the demolition of or land-take from a private property and of land take. The criterion outlined in Table 13.8 will be used within the Environmental Statement. This criterion has been developed using professional judgement and has been applied to previous infrastructure development projects.

Table 13.8: Private Assets – Magnitude of Impact

Magnitude of Impact	Criteria
Major	<p>Residential: Demolition of the whole of the property, which would affect the quality of life in the neighbourhood such that the loss of housing cannot be replaced in the locality.</p> <p>Non-Residential: Acquisition of the whole or a substantial portion of property and associated buildings, which may lead to closure of the business and a loss to the community which cannot be replaced in the locality.</p>
Moderate	<p>Residential: The land-take/ acquisition is sufficiently large so as to diminish the quality of life in the neighbourhood/at the property, although some replacement can be made in the locality.</p> <p>Non-Residential: Acquisition is sufficiently large so as to result in increased management/operational difficulties for the business, or replacement site is in the locality.</p>
Minor	<p>Residential: Part of the curtilage is acquired, resulting in a decreased enjoyment of the residence, diminishing the quality of life in the neighbourhood, although replacement could be made in the locality.</p> <p>Non-Residential: A small portion of the property/land is acquired resulting in, at most, some slight management/ operational difficulties for the business.</p>
Negligible	<p>Residential: Vegetation at the immediate boundary of the property (either within or outside of the area of land owned) is removed but replacement is possible.</p> <p>Non-residential: Vegetation at the immediate boundary of the property (either within or outside of the area of land owned) is removed but replacement is possible. However, replacement planting would cause a change in the management regime, i.e. requiring additional or reduced management.</p>
Neutral	Residential and Non-Residential: No change to land or property, and or the vegetation at the immediate property boundary.

13.8.24. The significance of effect is subsequently determined using the matrix set out in Section 5.3, Table 5.3.

Community Severance

13.8.25. There is also a need to consider severance at a community level – this is concerned with the role of roads as a 'barrier' between different parts of a community, and the resulting distortion of journey patterns. Guidance on severance assessment is

contained within DMRB Volume 11 Section 3 Part 8 (Ref 13.10). DMRB defines community severance as 'the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows'.

13.8.26. Significance criteria for community severance has been developed based upon guidance contained in DMRB Volume 11 Section 3 Part 8 (Ref 13.10). New severance caused by increases in traffic levels is described on a three point scale: slight, moderate or severe. These criteria are further defined as follows:

- Slight effects are likely to be experienced where journey patterns are generally maintained, but there would be some hindrance to movement such as an increase in journey length by up to 250 m;
- Moderate effects would be expected where some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips would be made longer or less attractive; and
- Severe effects occur where people are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits. Alternatively, considerable hindrance would be caused to people trying to make their existing journeys. Moderate and Severe (adverse) effects are considered to be significant.
- Relief of severance as a result of reduction in traffic levels is also described using the terms slight, moderate or large (beneficial). A negligible effect is defined as less than 10% change in traffic levels.

13.8.27. Severance issues as associated with NMU movements are considered under effects on NMUs.

Human Health

13.8.28. There is no consolidated methodology or practice for the assessment of effects of the proposed Scheme on human health, however the scope of the assessment methodology has been informed by existing Highways England Guidance where relevant. This recognises the specific requirements of the NPSNN for consideration of health, specifically within paragraphs 4.79-4.82 as well as the following guidance:

- Air Quality: HA 207/07 (Ref 13. 12) and IAN 185/15 (Ref 13.13), IAN 175/13 (Ref 13.14), IAN 174/13 (Ref 13.15), IAN 170/12 (Ref 13.16);
- Noise and Vibration: HD 213/11 (Ref 13.17) and IAN 185/15 (Ref 13.13);
- Road Drainage and the Water Environment HD 45/09 (Ref 13.18); and
- Health in Environmental Impact Assessment: A Primer for a Proportionate Approach (Ref 13.19).

13.8.29. This assessment will consider the potential consequences for health and wellbeing from the construction and operation of the proposed Scheme. In particular, it will draw on information and conclusions contained within various assessments reported within the Environmental Statement.

13.8.30. The geographical extent of the impacts considered within this assessment will depend on the type of impacts and receptors. A qualitative assessment of the impact of the proposed Scheme on the surrounding statistical wards will be undertaken. This assessment is a qualitative rather than a quantitative assessment, due to the diverse nature of health determinants and health outcomes which are assessed. Although the assessment of human health effects describes the likely qualitative

health outcomes, it is not possible to quantify the severity or extent of the effects which give rise to these impacts. As such, the potential health impacts during construction and operation will be categorised as outlined in Table 13.9, based on broad categories for the qualitative impacts identified. Where an impact is identified, actions will be recommended as appropriate to mitigate any negative impact on health, or opportunities to enhance health benefits.

Table 13.9: Human Health Impact Categories

Impact Category	Impact Symbol	Description
Positive	+	A beneficial impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse impact is identified
Uncertain	?	Where uncertainty exists as to the overall impact

13.9. Assessment Assumptions and Limitations

- 13.9.1. The assessment of effects on land used by the community has been scoped out of the assessment as there are no areas of land designated for use by the community within the study area such as village greens, community land or areas of public open space.
- 13.9.2. The assessment of effects on agricultural land and farm holdings would not be considered under Population and Health but would be covered under the Geology and Soils chapter of the Environmental Statement.

14. ROAD DRAINAGE AND THE WATER ENVIRONMENT

14.1. Introduction

14.1.1. The proposed Scheme has the potential to affect surface water quality, groundwater quality where it could be affected by future highway runoff, the hydromorphology of water bodies, flood risk and drainage during construction and operation. This section provides an overview of the potential impacts of the proposed Scheme on road drainage and the water environment and describes the proposed assessment methodology for the Environmental Statement.

14.2. Study Area

14.2.1. As part of the assessment process an approximate 1 km study area has been defined around the proposed Scheme. Within this area, the known surface water features and their attributes have been identified, the extent of known flood risk has been determined, and the current ground water conditions described.

14.2.2. The study area will also consider any surface water or groundwater bodies or water dependent ecological sites outside this study area up to 2 km from the draft DCO site boundary if it is considered they are hydraulically linked and impact on determination of waterbody importance.

14.2.3. The flood risk study area will include constructing models to cover the extents of the six watercourses 1 km upstream and 1 km downstream of the crossing locations.

14.3. Legislation, Policy and Guidance

14.3.1. The following legislation, national policy and guidance documents are relevant to the assessment of impacts of the proposed Scheme on the water environment:

- Water Framework Directive 2000/60/EC (Ref 14.1);
- Priority Substances Directive 2008/105/EC (Ref 14.2);
- Groundwater Directives 2008/105/EC and 2006/118/EC (Ref 14.3);
- Floods Directives 2007/60/EC (Ref 14.4);
- The Environmental Liability Directive 2004/35/EC (Ref 14.5);
- The Freshwater Fish Directive 2006/44/EC (Ref 14.6);
- The Water Act 2014 (Ref 14.7);
- The Floods and Water Management Act 2010 (Ref 14.8);
- The Land Drainage Act 1991 (as amended) (Ref 14.9);
- The Water Resources Act 1991 (as amended) (Ref 14.10);
- The Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref 14.11);
- The Reservoirs Act 1975 (as amended) (Ref 14.12);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 14.13);
- The Environmental Permitting (England and Wales) Regulations 2016 (Ref 14.14);
- The Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 14.15);

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- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (Ref 14.16);
 - The Flood Risk Regulations 2009 (Ref 14.17);
 - The Eels (England and Wales) Regulation 2009 (Ref 14.18);
 - The Groundwater (England and Wales) Regulations 2009 (Ref 14.19);
 - The Control of Substances Hazardous to Health Regulations 2002 (as amended) (Ref 14.20);
 - The Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 14.21);
 - National Policy Statement for National Networks (Department for Transport) 2014 (Ref 14.22);
 - National Planning Policy Framework (Department for Housing, Communities and Local Government, 2018) (Ref 14.23);
 - Flood Risk and Coastal Change National Planning Policy Guidance (Department for Communities and Local Government, 2015) (Ref 14.24);
 - Future Water (Defra, 2011) (Ref 14.25);
 - Non-statutory technical standards for SuDS (Defra, 2015) (Ref 14.26);
 - HM Government (2015), Building Regulations 2010, Drainage and Waste Disposal Approved Document H (Ref 14.27); and
 - South Staffordshire County Council (2012) South Staffordshire Core Strategy (Ref 14.28).
- 14.3.2. Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit is required from the Environment Agency for certain works within 8 m of the top of the bank surrounding Main Rivers. A permit may also be required for the discharge to surface waters or ground of any unclean construction site runoff; although permits are not required for the discharge of highway runoff under the Highways Act 1980 providing the discharge does not cause water pollution.
- 14.3.3. Similarly, consent for certain works that may affect the flow in Ordinary Watercourses (i.e. all other watercourses that are not Main Rivers) under The Floods and Water Management Act 2010 and The Land Drainage Act 1991 (as amended) is required from the LLFA, which in this case is Staffordshire County Council. The distance from the watercourse that this applies to will be confirmed with Staffordshire County Council.
- 14.3.4. The National Policy Statement for National Networks (NPSNN) statements 5.90 - 5.115 and 5.219 - 5.231 specifically apply to flood risk and water quality respectively, and how impacts on the water environment affect the decision making process. The NPSNN states that when determining an application, the Secretary of State should be satisfied that flood risk will not be increased elsewhere, and only consider development appropriate in areas at risk of flooding where it can be demonstrated that the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; and development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning. Priority is given to the use of SuDS.

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- 14.3.5. With regard to water quality, NPSNN states that the Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans (RMBPs) and the requirements of the WFD (including Article 4.7 which describes various tests that need to be met to justify new physical modification to a water body when that modification could lead to deterioration or prevent improvement) and its daughter directives, including those on priority substances and groundwater.
- 14.3.6. The NPPF and the Flood Risk and Coastal Change PPG recommends that Local Plans should be supported by a SFRA and should develop policies to manage flood risk from all sources taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as LLFAs and Internal Drainage Boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to public and property and manage any residual risk, taking account of the impacts of climate change, by:
- applying the Sequential Test;
 - applying the Exception Test if necessary;
 - safeguarding land from development that is required for current and future flood management;
 - using opportunities offered by new development to reduce the causes and impacts of flooding; and
 - seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term.
- 14.3.7. An update to the Level 1 SFRA was undertaken in 2014 for Cannock Chase, Lichfield South Staffordshire and Stafford Borough Councils (Ref 14.29). The objective of these assessments was to inform the plan-making process for each of the Council's Local Plans. The aim of the Level 1 SFRA is to present sufficient information to enable the Local Planning Authority to apply the Sequential Test to site allocations, and forms part of the evidence base for the Core Strategy Development Plan Document.
- 14.3.8. SFRAs are focused on the risk of flooding to land allocated for housing and employment uses and may not cover strategic highway improvement or critical infrastructure plans. However, information presented in SFRAs is a critical consideration and provides a useful source of information for flood risk.
- 14.3.9. Planning policy also encourages developers to include SuDS in their proposals where practicable. SuDS provide a way to attenuate runoff from a site to the rate agreed with the Environment Agency to avoid increasing flood risk, but they are also important in reducing the quantities and concentration of diffuse urban pollutants found in the runoff.
- 14.3.10. Defra published in 2015 guidance on the use, design and construction of SuDS (Non-statutory technical standards for SuDS (Ref 14.26). The type of SuDS proposed depends on local circumstances (e.g. ground conditions) and in the following order of preference as set out in the Building Regulations 2010 Approved Document H:
- soakaway or some other adequate infiltration system when that is not practical;
 - to a watercourse. When that is not practical; and if the above are not possible

- to a surface water sewer.

14.3.11. Current best practice guidance on the planning for and design of SuDS treatment is provided by C753 The SuDS Manual (Ref 14.30), The Design Manual for Roads and Bridges (DMRB) HA 103/06 Vegetative Treatment Systems for Highway Runoff (Ref 14.31), and the DMRB HD 33/06 Surface and Subsurface Drainage Systems for Highways (Ref 14.32). In the context of highways developments, the assessment guidance described in the DMRBs HD45/09 Road Drainage and the Water Environment (Ref 14.33) is the most appropriate method of assessment to determine the risk to the water environment and the need for treatment measures and this is described in more detail later in this chapter.

14.4. Baseline Conditions

Topography and Land Use

- 14.4.1. Topographic data for the study area has been obtained from online Ordnance Survey maps (Ref 14.34). The study area slopes from 190 m Above Ordnance Datum (AOD) just south of the M54 at the Essington Industrial Estate towards the Latherford Brook to the north, which flows beneath the M6 to the east of Brookfield Farm (SJ 95930 06067). Latherford Brook flows from close to the south-east of the M6 Junction 10a, and after initially flowing north-east beneath the M6 it then returns under the M6 south of Junction 11 and flows towards the north-west. Where it crosses the M6 south of Junction 11, the elevation is between 130 m and 125 m AOD. The land rises to the west of the Brook, west of M6 Junction 11, towards the village of Shareshill (135 m AOD). To the north of the Brook land rises towards Saredon Hill (154 m AOD) and Great Saredon (135 m AOD), and to the east of the Brook the land rises towards Holly Bush Farm (158 m AOD), which is to the east of the M6.
- 14.4.2. The land use within the study area is generally agricultural. The agricultural area of the catchment comprises arable, as well as sheep and equine pasture. There are also some urban land uses to the west around Featherstone and Hilton. In addition, there is a commercial fishery and equestrian centre located immediately adjacent to the southern extent of the draft DCO site boundary. Hilton Hall is located immediately to the east of the draft DCO site boundary, and its grounds include four large lakes.

Groundwater

- 14.4.3. According to Defra's Multi-agency geographical information for the countryside (MAGIC) map website (Ref 14.35) the bedrock beneath the western extent of the proposed scheme is Principal aquifer. The Environment Agency describes this as "layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer". The eastern extent of the study area is designated as Secondary A aquifer. The Environment Agency describes this as "permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers".
- 14.4.4. The study area contains a strand of Secondary A aquifer (Alluvium) for superficial deposits around Latherford Brook. The remainder of the study area is a mix of secondary (undifferentiated) strata and unproductive strata. The Environment Agency assign secondary (undifferentiated) in cases where it has not been possible

to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. Unproductive strata are defined as rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

- 14.4.5. The published geology of the area is presented within Chapter 10 Geology and Soils.
- 14.4.6. The study area is not designated as a groundwater or source protection zone (SPZ), but land to the west of Featherstone (approximately 1 km to the west of the proposed Scheme) is designated as a SPZ3 (total catchment - defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source).
- 14.4.7. The western half of the study area is within the Staffordshire Trent Valley – Permo Triassic Sandstone Staffordshire WFD groundwater body. This has a surface area of 311.3 km² and has an overall waterbody classification for 2016 of Poor. The quantitative and chemical classifications are both also Poor. The eastern half of the study area is within the Staffordshire Trent Valley – Mercia Mudstone East & Coal Measures WFD groundwater body. This has a surface area of 418.5 km² and has an overall waterbody classification for 2016 of Good, including Good quantitative and chemical status.
- 14.4.8. Data from the Environment Agency and South Staffordshire District Council indicates that there are four groundwater abstractions in the vicinity of the proposed Scheme and two relevant private water supply abstractions. The two private water abstractions are a well and a spring at Latherford Farm Shareshill and Saredon Hall Farm respectively.
- 14.4.9. Two groundwater abstractions are for general agriculture (Hollybush Garden Centre and Essington Fruit Farm). One is for lake and pond through flow at Hilton Park, and the fourth is for Industrial/commercial process water located at Hilton Industrial Estate.

Surface Waterbodies

- 14.4.10. The following surface waterbodies are present in the study area:
- Latherford Brook (Ordinary watercourse and designated as WFD Saredon Brook from Source to River Penk);
 - five Ordinary watercourses (None are WFD designated); and
 - several lakes and ponds of various sizes.
- 14.4.11. The watercourses have been labelled Watercourses 1 to 6 to enable them to be distinguished through the following discussion and are illustrated in Figure 14.1.
- 14.4.12. Watercourse 1 is a very minor watercourse approximately 600 m long that flows in a south-east to north-westerly direction, having risen from its source approximately 0.5 km to the south of M54 Junction 1. It flows beneath the M54 and joins an unnamed watercourse (Watercourse 2) to the south of Featherstone. A review of online maps suggests that the watercourse may have been modified (straightened).
- 14.4.13. Watercourse 2 has its source to the east of M54 Junction 1 close to Tower House Farm. It flows west passing beneath the A460 and along the southern border of Featherstone. Watercourse 1 joins from the south at the south-west corner of Featherstone. From this confluence the watercourse continues in a generally

- easterly direction and crosses the Staffordshire and Worcestershire Canal before joining the Watershed Brook. This then discharges into the River Penk to the south-west of Coven.
- 14.4.14. Watercourse 3 emanates from the ponds at Hilton Park and flows in a north-westerly direction, crossing the A460 before flowing on towards the farm ponds between Hilton and Shareshill. The watercourse then continues west towards Featherstone Lane before again flowing north-west to the Staffordshire and Worcestershire Canal, which is over 1 km from the proposed Scheme and therefore beyond the study area.
- 14.4.15. Watercourse 4 rises to the east of the Hilton Park ponds and flows north and north-east to cross Hilton Lane, before changing direction towards the north-west where it passes through the Brookfield Farm ponds and then flows under the A460. The watercourse continues towards the north-west to meet Watercourse 5 to the north-east of Shareshill and south of Little Saredon.
- 14.4.16. Latherford Brook (Watercourse 5) is a tributary of the Saredon Brook, and is designated under the WFD as 'Saredon Brook from Source to River Penk' (GB104028046740) within the Humber River Basin District. The source is close to the M6 Junction 10a and it flows to the north-east beneath the slip roads at Junction 10a and to the east of the Hilton Park Services. A small tributary that rises to the east of the M6 meets Watercourse 5 to the north of Hilton Lane. The watercourse then flows to the north-west and crosses beneath the M6 approximately 600 m south of Junction 11. It continues north-west beneath the A460 before passing the village of Shareshill on its northern side. It then discharges into Saredon Brook at grid reference SJ 928 082.
- 14.4.17. The Environment Agency Catchment Explorer website indicates that the 'Saredon Brook from Source to River Penk' is designated as a heavily modified water body that is 25.16 km in length and drains a catchment of 70.4 km². The water body is currently at Moderate ecological potential (also Moderate in 2009) but is at Good chemical status. The reasons for not achieving Good ecological potential are invertebrates, dissolved oxygen, ammonia and phosphates concentrations.
- 14.4.18. Watercourse 6 has its source to the east of M6 Junction 11 and Laney Green. It flows in a north-west direction, passing beneath the A460 and the M6 Toll before taking a more northerly direction, crossing Saredon Road. It continues north to discharge into Saredon Brook north of Wood Lane.
- 14.4.19. All of the watercourses described above are located within the Penk Rivers and Lakes Operational Catchment, which is located within the Trent Valley (Staffordshire) Management Catchment, which is located within the Humber River Basin District.
- 14.4.20. There are numerous ponds in the study area that could be impacted by the proposed Scheme, these include:
- several fisheries lakes associated with Millride Country Sports near Hill Farm, immediately south-east of M54 Junction 1 (centred on SJ 94690 04342); a lake at Tower House Farm, immediately north-east of M54 Junction 1 (SJ 94484 04778);
 - four lakes within the grounds of Hilton Hall, south of Hilton Lane (centred on SJ 95104 05178);
 - a lake and several large fishery ponds at Brookfield Farm, located to both the south-east and north-west of the farm buildings, and some of which are online with Latherford Brook (centred on SJ 95126 06325);

- several lakes and large ponds at Villa Farm to the west of the proposed Scheme area, west of the A460 Cannock Road (centred on SJ 94478 05862); and
 - a large pond approximately equidistant between Brookfield Farm and the M6 Junction 11 (SJ 95411 06531).
- 14.4.21. The website for the Brookfield Farm fishery (<https://www.brookfieldsfishery.com/>) states that there are two well stocked pools containing carp (*Carassius carassius*), bream (*Abramis brama*), tench (*Tinca tinca*), barbel (*Barbus barbus*) and all silver fish.
- 14.4.22. The website for the Millride Country Sports fishery (<http://www.millride-country-sports.co.uk/coarse-fishing.html>) indicate that species stocked in the pools include carp (*Carassius carassius*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), bream (*Abramis brama*), perch (*Perca fluviatilis*) and gudgeon (*Gobio gobio*).

Water Resources

- 14.4.23. The study area is located within an existing Nitrate Vulnerable Zone (NVZs) for surface water. However, as the proposed Scheme will not affect this NVZ it will not be considered further.
- 14.4.24. The site is not within a Drinking Water Safeguard Zone or Protected Area.
- 14.4.25. Data provided by the Environment Agency indicates that the nearest surface water abstraction is located to the west-north-west of the M6 Junction 11 on Watercourse 5 (tributary of Saredon Brook), at SJ 94300 07200. This is approximately 1.2 km east of the proposed Scheme. This relates to agricultural spray irrigation with the license number 03/28/03/0127. The maximum daily abstraction is 522.79 m³ and maximum annual abstraction is 4109.58 m³. The abstraction has been in place since 26/11/1982 and has no expiry date. Latest data on surface water abstractions in the study area will be obtained from the Environment Agency for inclusion in the Environmental Statement.
- 14.4.26. Data provided by the Environment Agency indicate that there are seven discharge consents in the vicinity of the proposed Scheme. The data relates to discharges from mineral extraction works (Watercourse 5), sewage treatment (Watercourse 5) and intermittent discharges from the public sewer network (Watercourse 2, and other waste management activities (watercourse 6).
- 14.4.27. The Highways Agency Drainage Data Management System (HADDMS) geographical information system (GIS) mapping website (Ref 14.36) indicates the location of existing road outfalls on the motorway network. Outfalls are categorised in order of their priority in terms of the pollution risk they present to the surface water environment. Outfalls can be classified as being at Low, Moderate, High or Very High risk of causing pollution to the environment, based on catchment area, traffic volume, river volume and proximity to sensitive sites.
- 14.4.28. There are numerous existing outfalls to Latherford Brook (Watercourse 5). Specifically, there are nine low priority outfalls mapped from the M54 slip roads as they meet the M6 Junction 10a. Adjacent to this are two moderate priority outfalls from the M6 to Latherford Brook. There is a further moderate priority outfall to this watercourse east of the Hilton Park service area and a further seven moderate priority outfalls between the service area and Junction 11 of the M6.

- 14.4.29. There are two moderate priority outfalls and one low priority outfall to Watercourse 6 adjacent to the M6 Junction 11. Finally, there are two moderate priority outfalls to Watercourse 1 to the west of M54 Junction 1.
- 14.4.30. Nine pollution incidents of category three or worse - seven Category 3 (affecting Watercourse 5), one Category 2 (affecting Watercourse 6), one Category 1 (affecting Watercourse 3) – have been recorded within the study area over the last six years and have the potential to have impacted the water environment.

Flood Risk

- 14.4.31. The majority of the study area is located within Flood Zone 1 (Ref 14.37) and is therefore considered to have a very low risk of fluvial flooding (less than 1 in 1000 year, or <0.1% Annual Exceedance Probability (AEP) of fluvial or tidal flooding in any given year). It should be noted that Watercourses 1, 2, 3, 4 and 6 are not covered by the online Environment Agency Flood Map for Planning, as they are minor watercourses which have not been modelled previously. However, there is an area of indicative Flood Zone 2 and 3 located around Latherford Brook (Watercourse 5). This land has a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) to 1 in 100 or greater annual probability of river flooding (>1%).
- 14.4.32. The risk of surface water flooding is generally low across the site (i.e. 0.1-1% AEP) [Ref 14.8]. However, there are areas that are at greater risk of surface water flooding, generally around watercourses and waterbodies, with discrete areas of medium risk (1 - 3.3% AEP) and high risk (>3.3%). The proposed Scheme would cross areas at medium to high risk of surface water flooding where the route crosses large ponds and watercourses.
- 14.4.33. Due to the distance from the coast and lack of tidal influence on the identified watercourses there is considered to be no risk of tidal flooding. The UK Government's Long term flood risk assessment for locations in England website (Ref 14.38) indicates that there is no flood risk from reservoirs.
- 14.4.34. Figure SF-CC of the South Staffordshire District Council Level 1 Strategic Flood Risk Assessment (SFRA) identifies recorded incidents of sewer flooding within the local vicinity of the proposed Scheme from Severn Trent Water's (ST) DG5 register (covering the 20 year period prior to 2014).
- 14.4.35. The EA's Areas Susceptible to Groundwater Flooding map (Ref 14.39) illustrates that the site lies within 1 km grid squares of which >25-<50% of their area is considered to be susceptible to groundwater emergence. The type of groundwater flooding the area is at risk from is due to permeable superficial deposits which tend to have a relatively high water table.
- 14.4.36. Figure GW-SS of the South Staffordshire District Council Level 1 SFRA identifies that the study area is located in an area classified as having a 'A' (Limited potential for groundwater flooding to occur: based on rock type and estimated groundwater level during periods of extended intense rainfall) susceptibility to groundwater flooding.

Ecological Attributes of Waterbodies and Designated Sites of Ecological Importance

- 14.4.37. Using the MAGIC online map no statutory designated sites have been identified within the study area. The closest such site is Stowe Pool and Walk Mill Clay Pit SSSI, which is over 1.2 km north-east of the proposed Scheme. The SSSI is unlikely to be impacted as there are significant barriers between the site and the proposed Scheme that prevent any hydrological connectivity.

14.4.38. There are several non-statutory designated sites within the study area:

- Lower Pool Hilton Park Site of Biological Importance (SBI) – open water pool with aquatic and marginal vegetation;
- Brookfield Farm (north-east of) Shareshill SBI – wet woodland and marshy grassland;
- Keepers Wood, Hilton Park SBI – ancient, semi-natural woodland, including several small ponds;
- Saredon Hall Farm Biodiversity Alert Site (BAS) – west of M6 Toll Junction T8 – oak-elm broadleaved woodland and two ponds with diverse flora;
- The Hag BAS – woodland with steep-sided pond; and
- There is a small patch of ‘Priority Habitat – Reedbeds’ to the east of Brookfield Farm.

14.4.39. Further details on sites of ecological importance are given in Chapter 9: Biodiversity.

14.5. Potential Impacts

Construction

14.5.1. During construction the following adverse impacts may occur and so will be considered by the impact assessment:

- Impacts on surface water quality to the numerous waterbodies in the study area due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals or through uncontrolled site run-off.
- Potential increase in volume and rate of surface water runoff leading to an impact on flood risk.
- Impacts on the current drainage regime during construction given the proposed highway will increase the impermeable area.
- Impacts on groundwater following disturbance of contaminated ground or groundwater are presented within Chapter 10 Geology and Soils.

Operation

14.5.2. During operation the following adverse impacts may occur:

- Impacts on the surface or groundwater quality from routine highway run-off (including the use of de-icers) or as a result of accidental spillages.
- Impacts on hydrogeology could occur from contaminant release during accidental spillages.
- Changes in the natural form (e.g. where road cuttings are required) which may have a subsequent effect on surface and groundwater drainage patterns.
- Potential increase in volume and rate of surface water runoff from new impervious areas leading to an impact on flood risk.
- Impacts on hydraulic processes and sediment dynamics in watercourses and their floodplains due to proposed watercourse crossings and road outfalls.
- Physical damage to the morphology of water bodies during construction that could have both temporary and long term impacts on the hydromorphological conditions of the water bodies.

14.6. Design, Mitigation and Enhancement Measures

Construction

- 14.6.1. The proposed Scheme construction contractor would prepare and implement a CEMP which would include a range of measures associated to mitigate potential impacts as associated with water resources. Such measures would accord with legal compliance and best practice guidance when working with or around sensitive water resources.
- 14.6.2. During the proposed Scheme construction phase, any discharges to surface water of 'unclean' runoff would require discharge consent. Works undertaken above or within 8 m of a watercourse would also require appropriate permissions from the Environment Agency or Lead Local Flood Authority (LLFA) (i.e. Staffordshire County Council).
- 14.6.3. Site specific mitigation measures will need to be employed within the construction areas close to existing ponds at Hilton Hall and Brookfield Farm.
- 14.6.4. It is anticipated that monitoring of watercourses at risk of pollution during the construction phase would be required.
- 14.6.5. During construction there would be a requirement to protect construction plant, materials and construction workers from impacts due to flooding. Such measures would include, for example, locating construction compounds and material / plant storage areas outside of areas susceptible to flooding and having in place emergency flood response procedures. The management and subsequent implementation of such measures would also seek to avoid any potential pollution of local watercourses by construction materials in the event of flooding. These would be managed during the construction phase through a CEMP.

Operation

- 14.6.6. The proposed Scheme would cross Watercourse 2, 3, 4 and 5 (Latherford Brook). The existing crossing of Watercourse 1 may also be impacted. The channel designs for these crossings will be developed and informed by hydromorphological, flood risk and ecological assessment, and would aim to ensure that existing flow conditions within the channels are maintained and not significantly impacted by constrictions such that there would be no significant adverse impacts on channel flooding characteristics. The morphological and ecological function of these channels will also be taken into account during the design of new or modified structures and where possible opportunities for enhancement will be explored.
- 14.6.7. An appropriate surface water management system will be developed. The drainage for the proposed Scheme will be designed and constructed in compliance with DMRB and the Manual of Contract Document for Highways Works. The proposed drainage strategy will be developed in consultation with the Environment Agency, Staffordshire County Council (as LLFA and local highway authority), Seven Trent Water and potentially other statutory agencies, taking into account the findings of the FRAs and water risk assessment prepared for the proposed Scheme.
- 14.6.8. The proposed drainage system will include the use of Sustainable Drainage Systems (SuDs) where possible to enable attenuation of surface water flows due to increases in the impermeable area as a result of the construction of the proposed Scheme. Balancing ponds provided for the attenuation of flows would also provide water quality treatment reducing suspended solids, sediment-bound pollutants and soluble metals in the final discharge to receiving watercourses.

- 14.6.9. The drainage design will incorporate appropriate measures to minimise impacts associated with accidents and spillages, if shown to be appropriate, by a spillage risk assessment.

14.7. Description of the Likely Significant Effects

- 14.7.1. The PCF Stage 2 assessment (options selection) (Ref 14.40 and 14.41) indicated that the proposed Scheme has the potential to result in significant adverse effects on river morphology resulting from the requirement for the proposed Scheme to cross a number of watercourses. Watercourse crossings are likely to require either culverting or bridging, which may result in the straightening and possible widening of the watercourse to create a suitable alignment through the structures. Restrictions on flow could cause deposition of sediment being carried during elevated flows, further preventing transport of such material downstream. This may also encourage deposition of fine sediment across the beds that can smother aquatic plants and silt up gravels important for fish spawning. Without appropriate design this has the potential to result in a permanent moderate to large adverse effects, which is considered to be significant.
- 14.7.2. A number of ponds at Hilton Hall and Brookfield may be required to be partly backfilled or permanently lost should they fall within the footprint of the proposed Scheme. These ponds are considered to be of medium importance on the basis of biodiversity provision and aesthetics. Should these ponds be permanently lost or partly backfilled as a result of the proposed Scheme, it is considered that these ponds will experience moderate adverse effects, which is significant.
- 14.7.3. The PCF Stage 2 (options selection) assessment indicated that all remaining construction and operational effects relating to surface water quality and flow, groundwater quality and flow and flood risk would be expected to be of neutral significance, provided that the proposed Scheme design was appropriate and mitigation measures adhered to.

14.8. Assessment Methodology

Data Sources

- 14.8.1. The data sources that will be used to inform the assessment proposed Scheme on the water environment and road drainage include:
- existing scheme information, topographical data, site reports and consultations;
 - online Ordnance Survey and aerial maps;
 - online historic maps;
 - various websites for data on water quality, water resources, hydrology, climate, geology, soils;
 - any/ current RBMP, Catchment Abstraction Management Strategy, and SFRA covering the site;
 - water quality monitoring of potentially impacted watercourses to establish baseline conditions; and
 - data request to the Environment Agency for further information on water quality, resources and biological data for waterbodies in the study area.

Proposed Level and Scope

- 14.8.2. The assessment of road drainage and the water environment will be undertaken with regard to advice and methodologies set out in DMRB Volume 11, Section 3, Part 10:

Road Drainage and the Water Environment. The assessment will consider potential impacts on water quality, morphology, flood risk and groundwater (in terms of impacts from highway runoff only) during proposed scheme construction and operation. A detailed level of assessment is considered to be appropriate due to the fact that numerous waterbodies are in immediate proximity to, or are to be directly crossed by, the proposed Scheme, which could lead to an array of potential adverse effects relating to water quality, morphology and flood risk if appropriate mitigation is not provided.

14.8.3. The following will be undertaken as part of the EIA and reported in the Environmental Statement:

- An assessment of impacts on water quality, both surface and groundwater, due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site run-off.
- An assessment of the potential for increased volume and rate of surface water runoff from new impervious areas leading to an impact on flood risk (further detail on Flood Risk Assessment is given below).
- An assessment of impacts on surface or groundwater quality from routine highway run-off or as a result of accidental spillages in accordance with DMRB HD45/09 Method A and Method D. The impacts on surface water quality from the use of de-icants will be also be considered.
- An assessment of impacts on hydrogeology from contaminant release during accidental spillages or via unlined SuDS.
- An assessment of the impacts on surface water drainage patterns from changes in the natural form.
- An assessment of impacts on hydraulic processes and sediment dynamics in watercourses and their floodplains.
- An assessment of physical damage to the morphology of water bodies during construction that could have both temporary and long term impacts on the hydromorphological conditions of the water bodies.
- An assessment of the impact on relevant WFD objectives for designated waterbodies in the study area, to determine whether there is potential for deterioration or prevention of improvement in the ecological status of these waterbodies.

14.8.4. With reference to best practice (e.g. CIRIA guides) a qualitative assessment of the risk to the water environment during construction works will be undertaken. This will also include mitigation measures to manage and control works during construction to avoid, prevent and minimise the risk of pollution. Liaison with the Environment Agency and LLFA will be undertaken to identify any water related licences / consents / permits that may be required for construction and operation of the new highway.

14.8.5. A Preliminary WFD (pWFD) Assessment will be produced based on a combination of desk study and a hydrogeomorphological walkover survey. The pWFD assessment will consider relevant WFD parameters and the whether the proposed Scheme has the potential to prevent or compromise WFD objectives being met in the waterbodies described above. Depending on the outcome of the Preliminary

WFD Assessment and consultation with the Environment Agency, further more detailed assessment may be required, and will be scoped at a later stage.

- 14.8.6. A detailed Flood Risk Assessment will be undertaken in accordance with the requirements of the NPPF utilising detailed flood maps and modelled flood extents provided by the Environment Agency to assess the impact of the proposed Scheme on flood risk. It is envisaged that the FRA will also summarise the proposed surface water drainage strategy. The preparation of both of these items will include consultation with the LLFA (i.e. Staffordshire County Council), Environment Agency and Severn Trent Water. Results of the assessment will be presented in a standalone FRA with summary text included in the Environmental Statement.

Assessment of Effects

- 14.8.7. The assessment of impacts and effects on water quality and drainage associated with the proposed scheme will regard advice and methodologies set out in HD 45/09. Paragraphs 6.6 to 6.8 of HD45/09 cover the scoping of water environment impact assessment for road schemes. This includes tests as to whether or not the project will affect watercourses, flood plains, and SPZ, how the project may alter road layouts, drainage and traffic flows, and what earthworks are required. Changes to water quality and/or drainage can have an effect on a number of services provided by the water environment. These include biodiversity of aquatic life, water supply, transport and dilution of waste products, fisheries and conveyance of flood flows. The DMRB's HD45/09 guidance describes the types of potential impact which may occur during the life of a road, which includes construction, operation, and maintenance phases.
- 14.8.8. The method for assessing the importance, magnitude and significance of effects will be as outlined in the published version of DMRB Volume 11, Section 3, Part 10 HD45/09 – Road Drainage and the Water Environment, and shown in Table 14.1, 14.2 and 14.3 below.

Table 14.1 Criteria to determine receptor importance

Value ¹	Type of Receptor			
	Groundwater	Surface Water	Morphology ²	Flood Risk
Very High	Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation SPZ1	EC Designated Salmonid/Cyprinid fishery WFD Class 'High' site protected/designated under EC or UK habitat legislation Species protected by EC legislation	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type.	Floodplain or defence protecting more than 100 residential properties from flooding.
High	Principal aquifer providing	WFD Class 'Good' Major Cyprinid	Conforms closely to natural, unaltered state and would often exhibit well-developed and	Floodplain or defence protecting between 1 and 100

Value ¹	Type of Receptor			
	Groundwater	Surface Water	Morphology ²	Flood Risk
	locally important resource or supporting river ecosystem SPZ2	Fishery Species protected under EC or UK habitat legislation	diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures.	residential properties or industrial premises from flooding.
Medium	Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ3	WFD Class 'Moderate'	Shows signs of previous alteration and / or minor flow regulation but still retains some natural features, or may be recovering towards conditions indicative of the higher category.	Floodplain or defence protecting 10 or fewer industrial properties from flooding.
Low	Unproductive strata	WFD Class 'Poor'	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (e.g. trapezoidal) and would probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches would fall into this category.	Floodplain with limited constraints and low probability of flooding of residential and industrial properties.
<p>Note 1: Professional judgement is applied when assigning an importance category to all water features. The WFD status of a watercourse is not an overriding factor and in many instances it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and WFD targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, this does not mean that a poorer quality discharge can be emitted. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.</p> <p>Note 2: Based on the water body 'Reach Conservation Status' presently being adopted for HS2 (and developed originally by Atkins) as the DMRB HD45/09 does not include criteria for morphology.</p>				

Table 14.2 Criteria to determine magnitude of impact

Magnitude of Impact	Description of Criteria
Major Adverse	<p>Results in a loss of attribute and/or quality and integrity of the attribute:</p> <p>Surface water:</p> <ul style="list-style-type: none"> • Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) and compliance failure with EQS values (Method B) • Calculated risk of pollution from a spillage >2% annually (Spillage Risk Assessment, Method D, Annex I) • Loss or extensive change to a fishery • Loss or extensive change to a designated Nature Conservation Site <p>Groundwater:</p> <ul style="list-style-type: none"> • Loss of, or extensive change to, an aquifer • Potential high risk of pollution to groundwater from routine runoff – risk score >250 (Groundwater Assessment, Method C, Annex I) • Calculated risk of pollution from spillages >2% annually (Spillage Risk Assessment, Method D, Annex I) • Loss of, or extensive change to, groundwater supported designated wetlands <p>Flood Risk:</p> <ul style="list-style-type: none"> • Increase in peak flood level (1% annual probability) >100 mm (Hydrological Assessment of Design Floods and Hydraulic Assessment, Methods E and F, Annex I)
Moderate Adverse	<p>Results in impact on integrity of attribute, or loss of part of attribute:</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) but compliance with EQS values (Method B) Calculated risk of pollution from spillages >1% annually and <2% annually • Partial loss in productivity of a fishery <p>Groundwater:</p> <ul style="list-style-type: none"> • Partial loss or change to an aquifer • Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250 • Calculated risk of pollution from spillages >1% annually and <2% annually • Partial loss of the integrity of groundwater supported designated wetlands <p>Flood Risk:</p> <ul style="list-style-type: none"> • Increase in peak flood level (1% annual probability) >50mm
Minor Adverse	<p>Results in some measurable change in attribute's quality or vulnerability:</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • Failure of either soluble or sediment-bound pollutants in HAWRAT • Calculated risk of pollution from spillages >0.5% annually and <1% annually <p>Groundwater:</p> <ul style="list-style-type: none"> • Potential low risk of pollution to groundwater from routine runoff – risk score <150 • Calculated risk of pollution from spillages >0.5% annually and <1% annually • Minor impacts on groundwater supported wetlands <p>Flood Risk:</p> <ul style="list-style-type: none"> • Increase in peak flood level (1% annual probability) >10mm

Magnitude of Impact	Description of Criteria
Negligible	<p>Results in impact on attribute, but of insufficient magnitude to affect the use or integrity: The scheme is unlikely to affect the integrity of the water environment.</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • No risk identified by HAWRAT (Pass both soluble and sediment-bound pollutants) • Risk of pollution from spillages <0.5% <p>Groundwater:</p> <ul style="list-style-type: none"> • No measurable impact upon an aquifer and risk of pollution from spillages <0.5% <p>Flood Risk:</p> <ul style="list-style-type: none"> • Negligible change in peak flood level (1% annual probability) <+/- 10mm
Minor Beneficial	<p>Results in some beneficial impact on attribute or a reduced risk of negative impact occurring:</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • HAWRAT assessment of either soluble or sediment-bound pollutants becomes Pass from an existing site where the baseline was a Fail condition • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually) <p>Groundwater:</p> <ul style="list-style-type: none"> • Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually) <p>Flood Risk:</p> <ul style="list-style-type: none"> • Reduction in peak flood level (1% annual probability) >10mm
Moderate beneficial	<p>Results in moderate improvement of attribute quality:</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • HAWRAT assessment of both soluble and sediment-bound pollutants becomes Pass from an existing site where the baseline was a Fail condition • Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually) <p>Groundwater:</p> <ul style="list-style-type: none"> • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually) <p>Flood Risk:</p> <ul style="list-style-type: none"> • Reduction in peak flood level (1% annual probability) >50mm
Major beneficial	<p>Results in major improvement of attribute quality:</p> <p>Surface Water:</p> <ul style="list-style-type: none"> • Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse <p>Groundwater:</p> <ul style="list-style-type: none"> • Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring, Recharge of an aquifer <p>Flood Risk:</p> <ul style="list-style-type: none"> • Reduction in peak flood level (1% annual probability) >100mm

Table 14.3 Matrix to determine significance of effect

Importance of Attribute	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Very High	Neutral	Moderate/Large	Large/Very Large	Very Large
High	Neutral	Slight/Moderate	Moderate/Large	Large/Very Large
Medium	Neutral	Slight	Moderate	Large
Low	Neutral	Neutral	Slight	Slight/Moderate

14.9. Assessment Assumptions and Limitations

- 14.9.1. The proposed drainage design strategy is subject to review and ongoing development during PCF Stage 3 (preliminary design) – this includes confirmation of highway discharge rates and the exact nature of the watercourse crossings. The proposed drainage strategy will be further developed in consultation with the Environment Agency, Staffordshire County Council, Severn Trent Water and potentially other statutory agencies, taking into account the findings of the FRA as referred to herein.
- 14.9.2. At this stage, there are no further significant assumptions and limitations to the information contained in this chapter of the scoping report.

15. CLIMATE

15.1. Introduction

15.1.1. The proposed Scheme has the potential to affect the climate as a result of greenhouse gas emissions arising during its construction and operation. In addition future climate change, leading to an increase in extreme weather events, has the potential to affect the resilience of the proposed Scheme and receptors in the surrounding environment. This section provides an overview of the potential impacts to and as a result of the proposed Scheme and describes the proposed assessment methodology for the Environmental Statement.

15.1.2. To align with the requirements of the National Policy Statement for National Networks (NPSNN) (Ref. 15.1) and the EIA Directive (Ref.15.2) this assessment will address the following aspects:

- Greenhouse gas (GHG) impact assessment – the effects on the climate of GHG emissions arising from the proposed Scheme, including how the proposed Scheme would affect the ability of government to meet its carbon reduction plan targets;
- Climate resilience assessment – the resilience of the proposed Scheme to climate change, including how the proposed Scheme design would be adapted to take account for the projected impacts of climate change; and
- In-Combination Climate Impacts Assessment - the combined effects of the impacts of the proposed Scheme and potential climate change impacts on the receiving environment.

15.2. Study Area

Greenhouse Gas Impact Assessment

15.2.1. The study area will cover all direct greenhouse gases GHG emissions arising from activities undertaken within the draft DCO site boundary during the construction and operation of the proposed Scheme. It will also include indirect emissions embedded within the construction materials arising as a result of the energy used for their production as well as emissions arising from the transportation of materials and waste to and from the site.

15.2.2. For construction carbon the study area principally takes account of emissions associated with construction activities and their associated transport. The spatial coverage of the assessment is therefore the area of construction works falling within the draft DCO site boundary.

15.2.3. The study area for the assessment of GHG emissions arising during the operation of the proposed Scheme will include both direct emissions arising from energy use within the draft DCO boundary as well as emissions from road users on the whole route network.

Climate Resilience Assessment

15.2.4. The study area for the climate change resilience assessment will be the draft DCO site boundary i.e. it will cover all assets and infrastructure which constitute the proposed Scheme.

In-combination Climate Impacts Assessment

15.2.5. The study area for the in-combination climate impacts assessment will be receptors in the surrounding environment. These are to be specified.

15.3. Legislation, Policy and Guidance

15.3.1. The following national and local legislation, policies and guidance are of relevance and will be considered during the GHG impact assessment and the climate change resilience assessment:

- Climate Change Act 2008 (Ref. 15.3);
- National Policy Statement for National Networks (NPSNN) (Ref. 15.1);
- National Planning Policy Framework (NPPF) (Ref. 15.4);
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Ref. 15.5);
- The West Midlands Strategic Transport Plan (Ref. 15.6);
- Staffordshire Local Transport Plan 2011-2026 (Ref. 15.7);
- South Staffordshire District Council (2012) A Local Plan for South Staffordshire (Ref. 15.8)
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (Ref. 15.9);
- IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (Ref. 15.10); and
- DMRB volume 11, section 3, part 1, HA 207/07 (Ref. 15.11).

15.4. Baseline Conditions

Greenhouse Gas Impact Assessment

15.4.1. The current and future baseline for the GHG impact assessment will be a 'Do-Minimum' (DM) scenario where the proposed Scheme does not go ahead. Under this scenario GHG emissions associated with the future use and maintenance of the existing road network will be considered.

Climate Resilience Assessment

15.4.2. A review of all available and relevant information sources will be undertaken to establish existing and future baseline data and current understanding with regards to climate change and extreme weather risks.

Existing Baseline:

15.4.3. Historic climate data obtained from the Met Office website (Ref. 15.12) recorded by the closest meteorological station to the proposed Scheme (Moseley Old Hall Weather Station) for the period 1981-2010 indicates the following:

- average annual maximum daily temperature was 13.7°C;
- warmest month on average was July (mean maximum daily temperature of 21.5°C);
- coldest month on average was February (mean daily minimum temperature of 1.2°C);
- mean annual rainfall levels were 681.2 mm;
- wettest month on average was October (67.4 mm of rainfall on average for the month); and

- driest month on average was February (39.7 mm of rainfall on average for the month).

15.4.4. The Met Office baseline climate averages for the Midlands region identify gradual warming (although not uniformly so) with increased rainfall between 1968 and 2017. Information on mean maximum annual temperatures (°C) and mean annual rainfall (mm) is summarised in Table 15.1.

Table 15.1: Climate Variations from 1968 to 2017 in the Midlands region

Climate Period	Climate Variables	
	Mean maximum annual temperatures (°C)	Mean annual rainfall (mm)
1968-1977	12.805	739.51
1978-1987	12.552	794.73
1988-1997	13.453	732.83
1998-2007	13.973	838.05
2008-2017	13.749	804.91

Future Baseline

- 15.4.5. The future baseline is expected to differ from the present day baseline described in paragraphs 15.4.3 and 15.4.4. UK Climate Projections published in November 2018 (UKCP18) have been developed by the UK Climate Impacts Programme (UKCIP) (Ref. 15.4) to provide projections for future climate scenarios and trends. The UKCP18 data builds on the UKCP09 data published in 2009 and is the most robust source of information on the UK's future climate. Due to the timing of the release of the UKCP18 data set and initial access constraints, UKCP09 data has been used in this scoping report. The UKCP18 data will be used to inform the Environmental Statement.
- 15.4.6. UKCP09 provides climate change projections for pre-defined 30-year periods (for example 2010-2039, 2040-2069, and 2070-2099), at annual and seasonal levels for changes to mean climatic conditions over land areas. For the purpose of the proposed Scheme, UKCP09 projections for the following average climate variables have been obtained and analysed:
- mean summer temperature;
 - mean winter temperature;
 - mean summer precipitation; and
 - mean winter precipitation.
- 15.4.7. A range of possible scenarios, selected from the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (Ref. 15.13) have been used by UKCP09 to inform differing future emission trends. The three scenarios – low, medium and high – account for the uncertainties that exist about future global trends and behaviour, such as population growth, technological progress, and socio-economic development. IPCC provides evidence to suggest that current global population and urbanisation trends, slow uptake of renewable energy sources, delay in nuclear power growth, and slow development of international climate change policy means that it is most likely that global emissions will follow the

predicted high emissions scenario. Using projections from the high emissions scenario is also becoming industry standard practice in the UK and have therefore been used in this assessment.

15.4.8. UKCP09 also allows for future climate projections across a range of probability levels to be assessed, ranging from 10% probability to 90% probability:

- 10% probability level – this demonstrates what the future change is unlikely to be less than. There is a 90% chance the projected change will be more than this.
- 50% probability level – this is known as the central estimate, with an even chance of it occurring and not occurring.
- 90% probability level – this demonstrates what the future change is unlikely to be more than. There is a 10% chance the projected change will be more than this.

15.4.9. Taking into account the expected design life of the project, the UKCP09 high emissions scenario projections for 2050s were applied to the West Midlands region. Table 15.2 summarises the 2050s climate projections.

Table 15.2: Summary of 2050s Climate Projection

Climate Variable		2050s projection
Change in mean winter temperature (°C)	50% probability (central estimate)	+2.3°C
	Range	+0.9 to +3.5°C
Change in mean summer temperature (°C)	50% probability (central estimate)	+2.9°C
	Range	+1 to +4.8°C
Change in mean winter precipitation (%)	50% probability (central estimate)	+14%
	Range	+1 to +30%
Change in mean summer precipitation (%)	50% probability (central estimate)	-17 %
	Range	-39 to +14%

15.4.10. Staffordshire's Local Transport Plan (Ref. 15.7) refers to the likelihood of severe weather events such as flooding becoming more frequent in the future and outlines a number of associated issues relating to road networks.

In-combination Climate Impacts Assessment

15.4.11. The baseline conditions for the in-combination climate impacts assessment will be the same as the baseline conditions defined for the climate resilience assessment.

15.5. Potential Impacts

Greenhouse Gas Impact Assessment

15.5.1. To assess GHG emissions arising from the construction and operation of the proposed Scheme a lifecycle assessment approach will be undertaken using design, construction and transportation data. This approach is consistent with the principles set out in BS EN 15804 (Ref. 15.14), PAS 2080 (Ref. 15.15) and IEMA guidance (Ref. 15.10). The key GHG emission sources considered in the GHG assessment are set out in Table 15.3 and Table 15.4 for the construction and operation stages, respectively.

Construction

15.5.2. Potential impacts during the construction phase of the proposed Scheme are presented in Table 15.3.

Table 15.3: Key anticipated construction GHG emissions sources

Lifecycle stage	Activity	Primary emissions impacts
Pre-construction stage	Enabling works	<ul style="list-style-type: none"> • Vehicles and fuel use for generators on site • Workers travelling to and from the site
Product stage	Raw material extraction and manufacturing of products required to build the proposed Scheme	Embodied GHG emissions
Construction process stage	<ul style="list-style-type: none"> • On-site construction activity • Transport of construction materials • Transport of construction workers • Disposal of any waste generated by construction processes 	<ul style="list-style-type: none"> • GHG emissions from vehicle use • GHG emissions from disposal of waste

Operation

15.5.3. Potential impacts during the operation phase of the proposed Scheme are set out in Table 15.4.

Table 15.4: Key anticipated construction GHG emissions sources

Lifecycle stage	Activity	Primary emissions impacts
Operation stage	<ul style="list-style-type: none"> • Operation of associated road and signalling • Maintenance including re-surfacing 	<ul style="list-style-type: none"> • GHG emissions from energy and fuel use • Embodied emissions associated with re-surfacing materials
Use stage	<ul style="list-style-type: none"> • Vehicle journeys 	<ul style="list-style-type: none"> • GHG emissions per vehicle km • Energy consumption

Climate Resilience Assessment

15.5.4. The proposed Scheme has the potential to be impacted upon by a changing climate and, in particular, more frequent severe weather events, in the medium to longer-term (2050s and 2080s). Potential impacts on the proposed Scheme during the construction and operational phases are set out in Table 15.5.

Table 15.5: Potential impacts of projected climate change and extreme weather impacts upon the resilience of the proposed Scheme

Climate variable projections (2017-2080)	Impacts
Projected increase in mean summer and winter	<ul style="list-style-type: none"> • Heat damage, deformation, cracking and thermal expansion

Climate variable projections (2017-2080)	Impacts
temperatures	<ul style="list-style-type: none"> • Overheating of electrical equipment • Corrosion of structures • Increased frequency of fog episodes • Changing travel patterns of network users • Longer vegetation growing season/ reduced soil moisture/ increased leaf coverage/ increased likelihood of tree fall • Increasing snow/ice melt leading to flooding
Projected increase in winter rainfall	<ul style="list-style-type: none"> • Damage to roads and drainage systems due to flooding • Surface water flooding and standing waters • Deterioration of structures due to soil moisture levels • Slope instability and landslides • Reduced visibility • Increased debris and mud on roads • Increased scour of roads and supporting structures
Projected decrease in winter snowfall	<ul style="list-style-type: none"> • Reduced ice loading on structures and requirement for snow clearance • Altered soil stability • Increased road user disruption • Freeze-thaw causing increased pavement deterioration
Projected decrease in mean summer precipitation	<ul style="list-style-type: none"> • Drying out of road pavement/ structures
Projected increase in frequency and magnitude of storms/ wind	<ul style="list-style-type: none"> • Increased debris on the network • Damage to utilities • Increased road user disruption/ Operational constraints • Increased wind gusts affecting tall structures

In-combination Climate Impact Assessment

- 15.5.5. The in-combination climate impact assessment will identify the impacts from climate change on receptors in the surrounding environment identified by other disciplines within the EIA. These are to be specified.

15.6. Design, Mitigation and Enhancement Measures

Greenhouse Gas Impact Assessment

- 15.6.1. To reduce GHG emissions during the lifecycle of the proposed Scheme a number of potential mitigating measures are being considered including but not limited to:
- A CEMP, to be prepared and implemented by the selected construction contractor, which would need to include a range of best practice construction measures outlining an environmental management framework, operational control procedures (for example development of a site waste management plan) as well as a pollution control contingency plan.
 - Specification of alternative materials with lower embodied GHG emissions such as locally sourced products and materials with a higher recycled content.

- Low carbon design specifications such as energy-efficient lighting and durable construction materials to reduce energy consumption and maintenance and decrease replacement cycles.

15.6.2. Further options to mitigate GHG emissions will be identified and considered as the design of the proposed Scheme emerges.

Climate Resilience Assessment

15.6.3. A number of general mitigation and adaptation measures to address resilience risks are being considered, many of which will be addressed by other parts of the environmental assessment and through the design of the proposed Scheme. This assessment assumes that the proposed Scheme will be designed to be resilient to impacts arising from current weather events and climatic conditions and in accordance with current planning, design and engineering practice and codes. The assessment is identifying and taking into account existing resilience measures for each climate variable and associated risks either already in place or in development for infrastructure and assets. Mitigation measures being considered include alternative pavement materials with superior properties (such as increased tolerance to fluctuating temperatures) and Sustainable Urban Drainage Systems (SUDS). Adaptation measures could include appropriate emergency systems being in place (including user communications systems such as variable messaging systems).

15.6.4. Further options to adapt the proposed Scheme for the potential impacts of climate change will be identified and considered as the design of the proposed Scheme is developed.

In-combination Climate Impacts Assessment

15.6.5. As in the climate resilience assessment, a number of general mitigation and adaptation measures will be considered, many of which will have been identified by other parts of the EIA and the proposed Scheme design.

15.7. Description of the Likely Significant Effects

Greenhouse Gas Impact Assessment

15.7.1. The NPSNN states that it is unlikely that the impact of a single road development, such as the proposed Scheme, will affect the UK's ability to meet its overarching binding GHG reduction targets. However, the GHG assessment will demonstrate Highways England's contribution to the UK Government's commitment to the reduction of greenhouse gases through an assessment of project emissions against UK government five year carbon budgets.

Climate Resilience Assessment

15.7.2. As the proposed Scheme will include the introduction of impermeable surfacing to an otherwise naturalised catchment, impacts are anticipated in relation to climate change. The proposed Scheme could result in hydrological changes within the catchment in relation to interference with pond structures, with appropriate mitigation these impacts are considered to be lower.

In-combination Climate Impacts Assessment

15.7.3. The in-combination climate impacts assessment will identify any likely significant effects from climate change on receptors in the surrounding environment identified by other disciplines such as Water Resources and Flood Risk, Ecology, Landscape and Visual and Air Quality.

15.8. Assessment Methodology

Proposed Level and Scope

Greenhouse Gas Impact Assessment

- 15.8.1. The GHG emissions arising from the construction and operation of the proposed Scheme are within the scope of this assessment. It is very unlikely that the proposed Scheme would be demolished after its design life as the road would have become an integral part of nationally important infrastructure. End of life assessment of the demolition phase is therefore scoped out of the assessment.

Climate Resilience Assessment

- 15.8.2. The climate change resilience assessment will consider the strategic aims and objectives encompassed within the Government's, Highways England's and local planning strategy and policy, which has the overarching aim of minimising the adverse impacts of climate change, whilst requiring new development to take climate change considerations into account within design. Ways in which resilience of the proposed Scheme to climate change can be enhanced will be assessed and mitigation measures will be identified.
- 15.8.3. Consideration of climate change adaptation within EIAs is an area of emerging practice. There is not a prescribed format for undertaking such assessments, therefore the approach taken will follow new and emerging guidelines (Ref 15.9) and good practice from other similar studies.
- 15.8.4. An assessment of climate change resilience will be conducted for the proposed Scheme which identifies potential climate change impacts, and considers their potential consequence and likelihood of occurrence.
- 15.8.5. The assessment will include all infrastructure and assets associated with the proposed Scheme. It will assess resilience against both gradual climate change and the risks associated with an increased frequency of severe weather events as per the UKCP09 climate change projections (Ref 15.16).
- 15.8.6. The assessment of potential impacts and the proposed Scheme's vulnerability will take into account the mitigation measures designed into the proposed Scheme. As there is a link between the climate change resilience assessment and the assessments reported within other chapters, cross-references will be included where appropriate.
- 15.8.7. Following identification of the future climate projections, the project receptors which are vulnerable to climate change will be identified as below:
- The construction process (i.e. workforce, plant, and machinery etc.);
 - The assets and their operation, maintenance and refurbishment (i.e. pavements, structures, earthworks and drainage, technology assets, etc.); and
 - End-users (members of public, commercial operators etc.).

In-combination Climate Impacts Assessment

- 15.8.8. Projected changes to average climatic conditions, as a result of climate change, and an increased frequency and severity of extreme weather events have the potential to impact the ability of the surrounding natural environment to adapt to climate change. The key parameters of climate change are: changing temperature, changing rainfall quantities and frequency, changing frequency and magnitude of storm events, and changing wind strength.

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- 15.8.9. The in-combination climate impacts assessment will consider the ways in which projected climate change will influence the significance of the impacts of the proposed Scheme on identified receptors in the surrounding environment.
- 15.8.10. The in-combination climate impacts assessment will involve consultation with all other scoped-in environmental disciplines, to determine any relevant receptors and impacts that could be affected by the climate change parameters and in turn, to identify any potentially significant in-combination impacts.

Assessment of Effects

Greenhouse Gas Impact Assessment

- 15.8.11. Emissions from construction will be calculated in line with guidance set out in Highways England's IAN 114/08 – Highways Agency Carbon Calculation and Reporting Requirements (Ref 15.17). This methodology provides guidance on estimating the contribution from construction activities, also referred to as 'construction carbon' and the maintenance/refurbishment activities. The IAN will be supplemented by use of Highways England's Carbon Reporting Tool (Ref 15.18).
- 15.8.12. The approach outlined in IAN 114/08 and the Highways England Carbon Reporting Tool is in line with the World Business Council for Sustainable Development/ World Resources Institute Greenhouse Gas Protocol guidelines (Ref 15.19). Data collection for input to the Carbon Reporting Tool will be based on the following set of standard data quality principles detailed in the Protocol which will be applied so that the results from the GHG assessment are as accurate and representative as possible:
- Age – the GHG assessment is based on activity data and GHG emissions factors applicable to the study period;
 - Geography – activity data reflects the design of the proposed Scheme. GHG emissions factors in the Carbon Tool are representative of the UK construction industry and UK transport sector;
 - Technology – the default solution was to apply data which is representative of the UK construction industry and transport sector.
 - Methodology – activity data was gathered directly from the proposed Scheme's engineering and design teams to enable consistency and completeness of data collection; and
 - Competency – activity data was generated by the engineering and design teams in-line with applicable industry standards.
- 15.8.13. GHG emissions outputs from the Carbon Tool will be reported as tonnes of carbon dioxide equivalent (tCO₂e) and consider the seven Kyoto Protocol gases:
- Carbon dioxide (CO₂);
 - Methane (CH₄);
 - Nitrous oxide (N₂O);
 - Sulphur hexafluoride (SF₆);
 - Hydrofluorocarbons (HFCs);
 - Perfluorocarbons (PFCs); and
 - Nitrogen trifluoride.

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- 15.8.14. GHG emissions for construction and maintenance will be assessed within the Carbon Tool using a calculation-based methodology as per the below equation:
- Activity data x GHG emissions factor = GHG emissions value
- 15.8.15. Road user emissions will be calculated following the guidance provided in DMRB Volume 11, Section 3, Part 1, HA 207/07 – regional assessment methodology (Ref 15.11). This methodology estimates the contribution from traffic on the road, also referred to as ‘road user carbon’.
- 15.8.16. The uptake of lower carbon fuels, electric vehicles and increased vehicle technology is not accounted for under the HA 207/07 approach, however commentary will be provided on the potential impact on GHG emissions from the use of the proposed Scheme due to these technological advances.
- 15.8.17. The UK has legally binding GHG reduction targets and therefore the level of significance considers how the proposed Scheme would contribute to the National GHG inventory and the UK achieving its reduction targets. In addition, the proposed Scheme’s calculated emissions will be assessed against GHG emissions allocated for the UK transport sector within the UK’s carbon budgets.
- 15.8.18. There is currently no guidance regarding significance levels for GHG emission impacts, although the guidance does indicate consideration of the UK National inventory and the effect that the development may have on the UK meeting its reduction targets.
- 15.8.19. Whilst the scope of the assessment covers the lifecycle stages of the project, the GHG assessment comprises two parts reflecting both the level of certainty of future activity and GHG emissions, and the extent that the predicted GHG emissions would be additional to the existing GHG inventory.
- 15.8.20. The first part of the GHG assessment considers the construction of the proposed Scheme itself. The majority of these emissions would be additional to the existing National GHG inventory and would be compared to the relevant UK carbon budgets.
- 15.8.21. The second part of the GHG assessment comprises the operation and ‘use’ of the proposed Scheme i.e. those emissions resulting from mechanical and electrical energy use such as lighting and the impact from a variation in vehicle journeys travelling on the road and surrounding area of assessment. As at least part of the GHG emissions associated with the operation of the proposed Scheme would have been displaced from other parts of the road network (e.g. road users), they are not considered additional to the UK GHG inventory. Identifying and quantifying the balance of what is additional versus displaced with any level of certainty is challenging. The GHG assessment for operation of the proposed Scheme will therefore be done on a scenario basis, with quantification of different scenarios to provide a range for the additional GHG emissions associated with the proposed Scheme.
- 15.8.22. The assessment will consider the following scenarios:
- Do-Minimum (DM): baseline conditions whereby the proposed Scheme is not implemented.
 - Do Something (DS): the proposed Scheme goes ahead and the GHG emissions reductions from the embedded mitigation measures are taken into account.
- 15.8.23. A comparison of the GHG emissions for the Do-Minimum and Do-Something scenarios will be made at the year of scheme opening (2024) and for the future design year (2039), 15 years on from the opening year, in line with HA207/07.

15.8.24. In line with the NPSNN (Ref. 15.1), significance of impacts will be assessed by comparing estimated GHG emissions arising from the proposed Scheme with the relevant UK carbon budgets, and the associated reduction targets.

Climate Resilience Assessment

15.8.25. For the operational phase of the proposed Scheme, once potential impacts have been identified, the likelihood and consequence of each impact occurring to each receptor (where relevant) will be assessed, for the selected future time frame for operation (2080s). Likelihood, consequence and significance definitions will be outlined. Project lifetime is considered to include construction and operational stages, and is taken to be 60 years. With respect to the construction phase, as this is planned to occur over a much shorter period compared to the operation of the road and within the next 10 years, future climate change is less relevant and the assessment of potential impacts will follow a more descriptive approach.

Table 15.6: Measure of likelihood

Likelihood Category	Description (probability and frequency of occurrence)
Very high	The event* occurs multiple times during the lifetime of the project (60 years) e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project (60 years) e.g. approximately once every five years, typically 12 events;
Medium	The event occurs limited times during the lifetime of the project (60 years) e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project (60 years) e.g. once in 60 years.
Very low	The event may occur once during the lifetime of the project (60 years).

* The event is defined as the climate event (such as heatwave) and the hazard (such as overheated electrical equipment) occurring in combination.

Table 15.7: Measure of consequence

Consequence of impact	Description
Very large adverse	National level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large adverse	National level disruption ¹ to strategic route(s) lasting more than 1 day but less than 1 week; or Regional level disruption to strategic route(s) lasting more than 1 week.
Moderate adverse	Regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.
Minor adverse	Regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Disruption to an isolated section of a strategic route lasting less than 1 day.

15.8.26. Significance will be derived through multiplying outcomes from the consequence and likelihood assessments, as shown in Table 15.8.

Table 15.8: Significance matrix

Measure of consequence	Measure of Likelihood				
	Very low	Low	Medium	High	Very High
Negligible	NS	NS	NS	NS	NS
Minor	NS	NS	NS	S	S
Moderate	NS	NS	S	S	S
Large	NS	S	S	S	S
Very Large	NS	S	S	S	S

NS = Not significant
S = Significant

In-combination Climate Impacts Assessment

- 15.8.27. The likelihood of climate hazards leading to an in-combination impact is defined using the likelihood criteria based on the assessment of the UKCP09 Climate Projections and the confidence of the projection and professional judgement.

Table 15.9: Assessing likelihood

Likelihood of Impact Occurring	Confidence of Climate Hazard Occurring	
	Low	High
Low	Low	Medium
High	Medium	High

- 15.8.28. The consequence of in-combination impacts has been based on the change to the significance of the effect of the proposed Scheme on the resource or receptor for each relevant environmental discipline, given existing mitigation measures.

Table 15.10: Assessing consequence

Consequence	Consequence criteria
High	The climate change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/receptor, as defined by the topic, to increase from moderate to major.
Medium	The climate change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/receptor, as defined by the topic, to increase from low to moderate.
Low	The climate change parameter in-combination with the effect of the proposed scheme causes the significance of the impact of the proposed scheme on the resource/receptor, as defined by the topic, to increase from negligible to low.
Very Low	The climate change parameter in-combination with the effect of the proposed scheme does not impact the significance of the impact of the proposed scheme on the resource/receptor, as defined by the topic.

- 15.8.29. Significance of effects is determined using the matrix in Table 15.11. Where environmental disciplines have already explicitly included the effects of climate change in their assessments and have proposed mitigation measures for any potential impacts, an additional in-combination assessment is not been deemed necessary.
- 15.8.30. In accordance with the methodology set out within Chapter 5: Environmental Assessment Methodology of this Scoping Report, the following criteria is applied:
- ‘Moderate’ or ‘major’ effects are deemed to be ‘significant’.
 - ‘Minor’ effects are considered to be ‘not significant’, although they may be a matter of local concern; and
 - ‘Negligible’ effects are considered to be ‘not significant’.

Table 15.11: Assessing significance

Consequence	Likelihood		
	Low	Medium	High
Very Low	Negligible	Negligible	Minor
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

15.9. Assessment Assumptions and Limitations

- 15.9.1. The methodology as detailed in Section 15.8 assumes that the information on construction materials, volumes and processes, energy use, projected maintenance and replacement schedule for the life of the proposed Scheme and transport assessment and projections before and after the construction of the proposed Scheme and surrounding development will be available.
- 15.9.2. Where information is not available assumptions based on industry approximations and professional best practice will be made.
- 15.9.3. Limitations associated with the approach to be taken for the climate resilience assessment relate to uncertainties inherent within UK Climate Projections (UKCP09 and UKCP18 data). By its very nature, climate change is associated with a range of assumptions and limitations. To overcome these issues, leading climate change data and science will be incorporated into the assessment and proven effective approaches undertaken for similar project types have been replicated. UKCP09 are currently the leading climate change projections for the UK; however these are undergoing a major upgrade to make sure decision-makers have the most up-to-date information on the future of our climate. The UKCP18 projections were launched at the end of November 2018. These have not been used in this scoping report, but will be used in the Environmental Statement.
- 15.9.4. All assumptions and limitations, including any exclusions, together with assumptions for choices and criteria leading to exclusion of input and output data will be documented as part of the assessment.

16. ASSESSMENT OF CUMULATIVE EFFECTS

16.1. Introduction

16.1.1. The proposed Scheme has the potential to bring about combined and cumulative effects as a result of multiple impacts affecting a single receptor due to the proposed Scheme or in combination with affects from other developments. Potential effects from the proposed Scheme may not be significant in isolation, but when combined with another impact or multiple impacts on a single resource or receptor, the combined or cumulative effect could become significant. This section provides an overview of the potential impacts to and as a result of the proposed Scheme due to combined and cumulative impacts and describes the proposed assessment methodology for the Environmental Statement.

16.2. Cumulative Assessment Methodology

Combined Effects

16.2.1. Combined effects are defined as the effect resulting from several different impacts from a single scheme (in this case the proposed Scheme) on a single receptor e.g. a single receptor being subject to noise, air quality and visual impacts associated with the proposed Scheme.

Study Area

16.2.2. The study area for the assessment of combined effects will be established using the study areas utilised by the environmental topics set out in Chapters 6 to 15.

Data Source

16.2.3. The main source of data for the assessment of combined effects will be the specialist environmental chapters within the Environmental Statement for the proposed Scheme. The assessment methodology for combined effects will involve the identification of impact interactions associated with the proposed Scheme on an environmental receptor. The significance of construction and operational phase environmental effects reported in the technical chapters of the Environmental Statement will be collated in a matrix, providing a clear summary of potential effects on an environmental receptor.

Assessment of Effects

16.2.4. The significance of residual cumulative effects will be determined taking into account the guidance set out in Section 5.3 of this report in line with DMRB Volume 11, Section 2, Part 5 (HA 205/08) (Ref 16.1).

Cumulative Effects

16.2.5. Cumulative effects are defined as the effect resulting from impacts of the proposed Scheme acting together with an impact or impacts associated with other proposed development schemes on a single receptor. This can be two similar impacts acting on a single receptor (such as increases in air quality emissions as a result of the proposed Scheme and another development), or two different impacts acting on a single receptor (such as an increase in air quality emissions from the proposed Scheme and an increase in noise levels from another development).

16.2.6. The assessment methodology will follow guidance set out by the Planning Inspectorate which requires a four stage approach to the assessment (Ref 16.2).

Stage 1 – Establish a Long-List

- 16.2.7. The study area or ‘zone of influence’ for the assessment of cumulative effects will be established using the study areas set out for each environmental topic in Chapters 6 to 15 and the traffic model area.
- 16.2.8. Once the study area has been established a desk study, including a review of local planning documents and planning applications will be undertaken to produce an initial long-list of ‘other developments’ to be considered in the assessment of cumulative effects. Development will be included in the long-list based on the following criteria set out in guidance by the Planning Inspectorate:
- development currently under construction;
 - approved applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid but have not yet been completed);
 - submitted applications not yet determined;
 - refused applications, subject to appeal procedures not yet determined;
 - development listed on the National Infrastructure Planning Programme of Projects;
 - development identified in the relevant Development Plan (and emerging Development Plans); and
 - development identified in other plans and programmes which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

Stage 2 – Establish a Short-List

- 16.2.9. Following completion of the long-list, criteria will be developed and applied to filter developments into a short list of developments that will be considered as part of the cumulative assessment. Regard will be given to the nature, size, spatial influence of each development and other relevant factors. This process will be documented and the justification for including or excluding development in the short-list will be provided in a matrix within the Environmental Statement.

Stage 3 – Data Gathering

- 16.2.10. The focus of the desk-top study will be the collection of information from the appropriate source (likely to be the local planning authority, the Planning Inspectorate or directly from the application relating to the background of relevant projects. This data will consist of the design of the scheme, its location, the expected timelines and likely environmental impacts.

Stage 4 – Assessment

- 16.2.11. The assessment will consider those schemes outlined in the short-list, considered to have the potential to generate a cumulative effect together with the proposed Scheme. The following information will be documented for each of the schemes on the short-list:
- a brief description of the proposed Scheme;
 - an assessment of the cumulative effect with the proposed Scheme;
 - proposed mitigation applicable to the proposed Scheme; and

- the likely residual cumulative effect.
- 16.2.12. The criteria for determining the significance of residual cumulative effects will be based upon:
- the duration of effect, i.e. will it be temporary or permanent; b) the extent of effect, e.g. the geographical area of an effect; c) the type of effect, e.g. whether additive or synergistic;
 - the frequency of the effect;
 - the 'value' and resilience of the receptor affected; and
 - the likely success of mitigation.
- 16.2.13. The significance of residual cumulative effects will be determined taking into account the guidance set out in Section 5.3 of this report in line with DMRB Volume 11, Section 2, Part 5 (HA 205/08).

16.3. Assessment of Combined Effects

- 16.3.1. During the construction and operational phases of the proposed Scheme, those receptors most at risk from combined effects are those in close proximity to construction activities (e.g. within 100 m of the proposed Scheme). Receptors in these locations have the potential to be temporarily and sometimes permanently affected by changes in air quality, dust, noise, vibration or visual intrusion. Due to the location of the proposed Scheme those receptors most likely to be affected by combined effects during construction and operation are residential receptors at Dark Lane, Hilton Lane and Brookfield Farm.

16.4. Assessment of Cumulative Effects

- 16.4.1. The cumulative assessment reported in the EAR Addendum (2018) (Ref 16.3) considered that there would be no significant residual cumulative effects as a result of the proposed Scheme. This assessment will be reviewed and updated for inclusion in the Environmental Statement.

17. SUMMARY

17.1.1. Table 17.1 sets out the topics that have been scoped in to the Environmental Statement.

Table 17.1: Summary of topics scoped in to the Environmental Statement

Topics	Scoped in (Level of Assessment)
Air quality	<p>An air quality assessment, during construction and operation, has been scoped in. An assessment of the potential impacts of construction phase dust emissions will be undertaken in accordance with Design Manual for Roads and Bridges (DMRB) guidance and will consider receptors within 200m of construction activity. The assessment of Heavy Goods Vehicles (HGVs) emissions will be assessed when traffic data is available. If this shows that HGV movements are unlikely to be greater than 200 movements per day, this will be scoped out. Traffic management measures will also be considered to determine whether the DMRB thresholds are exceeded, and consequently triggering the need for limited, detailed dispersion modelling.</p> <p>Both a local and regional air quality assessment will be undertaken for the operational phase.</p> <p>The local air quality assessment will constitute a detailed assessment and will focus on emissions of the key pollutants NO₂ and PM₁₀. Information on current air quality in the vicinity of the proposed Scheme will be taken from available monitoring data. The results of the local air quality assessment will be utilised to undertake a compliance risk assessment for the proposed Scheme against the EU Directive (2008/50/EC) in accordance with DMRB Interim Advice Note (IAN) 175/13. The compliance risk assessment will be undertaken using Defra's Pollution Climate Mapping Model. A Transport Analysis Guidance (WebTAG) Plan Level Local Air Quality Assessment will also be carried out in accordance with the DMRB.</p> <p>The regional air quality assessment will report the findings of the WebTAG plan level appraisal focusing on changes in regional emissions including carbon dioxide, NO_x and PM₁₀ during operation. This assessment will be undertaken in accordance with DMRB HA207/07 using vehicle emission factors from the emission factor toolkit.</p>
Cultural heritage	<p>An assessment of cultural heritage (including archaeological assets), during construction and operation, has been scoped in.</p> <p>The methodology contained within DMRB Volume 11, Section 3, Part 2: Cultural Heritage (HA 208/07) will form the basis for a detailed assessment. A detailed assessment is required where there is potential to cause significant effects, and a detailed study is required to obtain sufficient information to allow for assessment of effects. The methodology outlined in Chapter 5 and annexes 5 (Sub-Topic Guidance: Archaeological Remains), 6 (Sub-Topic Guidance: Historic Buildings) and 7 (Sub-Topic Guidance: Historic Landscape) of DMRB will be used to assess the value, impact and significance of the effect on the known cultural heritage assets at both the construction and operational phases of the proposed Scheme.</p>
Landscape and visual	<p>An assessment of landscape and visual effects, during construction and operation, has been scoped in.</p> <p>A detailed Landscape and Visual Impact Assessment (LVIA) will be carried out in line with GLVIA3 and IAN 135/10 as there is the potential for significant landscape and visual effects arising from the proposed Scheme. The assessment will include desk and fieldwork in order to identify the character of the landscape, including its condition and value, and the nature and sensitivity of the visual receptors that may be affected by the project.</p>

Topics	Scoped in (Level of Assessment)
	<p>The landscape and visual effects of the proposed Scheme will be assessed during the construction period; at 1 year after the proposed Scheme opens; and at 15 years after the proposed Scheme has opened, and therefore allowing time for planting and other landscape mitigation to mature.</p>
Biodiversity	<p>An assessment of biodiversity, during both construction and operation, has been scoped in.</p> <p>The assessment would be undertaken in accordance with DMRB Volume 11, Section 3, Part 4; Interim Advice Note 130/10; DMRB Volume 11, Section 4, Part 4; and the Guidelines of Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management, Second Edition 2016). In addition, professional judgement will be used where appropriate.</p> <p>Through desk-based surveys and field surveys, the assessment would assess the impact of the proposed Scheme on habitats, flora; fauna and sites designated for their ecological value. A number of ecological assessment reports would be appended to the Environmental Statement and will support the information set out within the biodiversity chapter, these include:</p> <ul style="list-style-type: none"> • Phase 1 Habitat Survey; • Ancient Semi-Natural Woodland; • Badger; • Tree summer bat roost survey; • Tree hibernation bat survey; • Building bat survey; • Building bat emergence and re-entry surveys; • Bat transect surveys; • Barn owl; • Wintering bird; • Breeding bird; • Great crested newt • Invasive plant species; • Otter and water vole; • Reptile; • Terrestrial invertebrates • Aquatic Invertebrates; and • White-clawed crayfish. <p>Following the completion of the desk study and a number of protected species surveys further assessment of selected species and sites have been scoped out (see Table 17.2).</p>
Geology and soils	<p>An assessment of geology and soils, during both construction and operation, has been scoped in.</p> <p>The assessment would be undertaken in accordance with DMRB Volume 11, Section 3, Part 11 Geology and Soils. This guidance document defines the scope of the assessment but does not provide formal guidance on the assessment of impacts and effects. The effects assessment methodology applied will take into account technical guidance that has been produced in the UK for the assessment of ground conditions and water resources by the government (i.e. Defra and its predecessor and successor departments); agencies such as the Environment Agency and Contaminated land: Applications in Real Environments (CL:AIRE); and British Standards. With regard to impacts upon agricultural soils, the</p>

Topics	Scoped in (Level of Assessment)
	<p>assessment methodology will take into account the statutory consultation procedures in the Town and Country Planning (Development Management Procedure) Order 2010 in which Natural England has to consider proposals which individually or cumulatively involve the loss of more than 20 ha of best and most versatile land.</p> <p>The assessment would focus on receptors including human health (off-site receptors, future scheme users, and construction and maintenance workers), controlled waters (groundwater, surface waters, surrounding land uses (residential, agricultural land) and soil quality.</p>
Material assets and waste	<p>An assessment of material assets and waste, during construction, has been scoped in.</p> <p>A detailed assessment, as defined in IAN 153/11, will be undertaken to assess the impacts of the material resources and waste arisings from the proposed Scheme. As part of this detailed assessment, the following tasks will be carried out:</p> <p>relevant waste legislation, policies and guidance will be reviewed to identify material use and waste management objectives and targets;</p> <p>the likely types of material resources and waste arisings will be identified, and quantities estimated for the proposed Scheme;</p> <p>impacts will be evaluated against the national materials markets and relevant targets for recycling of material assets;</p> <p>opportunities to reduce, re-use, recover and/ or recycle material resources and waste arisings will be identified through a review of the proposed Scheme (including proposed building materials, construction methods and design, where available) and in accordance with industry best practices; and</p> <p>Coordinated and documented consideration and identification of circular economy opportunities during the proposed Scheme's early design stage.</p>
Noise and vibration	<p>An assessment of noise and vibration impacts, during construction and operation, has been scoped in.</p> <p>The assessment level proposed is a detailed assessment, as the proposed Scheme is considered to have the potential to result in potentially significant changes in traffic noise.</p> <p>A quantitative assessment of construction noise impacts is proposed based on estimates of reasonable worst-case construction noise levels for a selection of the closest identified potentially sensitive receptors to the works. Reasonable worst-case construction noise levels will be estimated in accordance with the methodology in BS 5228: 2009+A1: 2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'. Construction traffic noise impacts along existing roads will be estimated based on the Calculation of Road Traffic Noise (CRTN) methodology. Construction vibration impacts will be assessed for all construction activities, which are a potentially significant source of vibration, proposed within close proximity of any sensitive receptors. It should be noted that the scope of the construction noise and vibration assessment will be dependent on the level of detail available in relation to the construction works.</p> <p>An assessment of operational road traffic derived noise level will also be undertaken, in accordance with the requirements of CRTN, DMRB Volume 11, Section 3, Part 7 HD 213/11 and IAN 185/15. The assessment will consider both day-time and night-time impacts. DMRB also requires consideration of the likely annoyance to residents caused by traffic noise, in both the short and long term. A preliminary indication of any properties likely to qualify under the Noise Insulation Regulations will be provided in the Environmental Statement.</p> <p>Construction vibration impacts will be assessed for all construction activities which are a potentially significant source of vibration proposed in close proximity of any</p>

Topics	Scoped in (Level of Assessment)
	<p>identified potentially sensitive receptors such as works using vibratory rollers/compactors. Vibration levels will be estimated in accordance with the relevant methodologies in BS 5228. Impacts are considered for both damage to buildings and annoyance to occupiers.</p> <p>The potential for vibration impacts during operation is limited to the immediate vicinity of a road and the relationship between annoyance due to vibration and traffic noise level in DMRB is based on properties located within 40 m of a road. Therefore, at each property within 40 m of the proposed Scheme, the existing AA460/M54/M6 replaced by the proposed Scheme or other affected routes, and at which traffic noise levels are predicted to be 58 dB, L_{A10,18h} or more, the percentage of people likely to be bothered very much or quite a lot by vibration will be calculated.</p>
Population and health	<p>An assessment of the effect of the proposed Scheme on population and health, during construction and operation, has been scoped in.</p> <p>The assessment will consider the impact of the proposed Scheme on non-motorised users; motorised users; community and private assets, development land, community severance and human health. The assessment will utilise the following guidance documents:</p> <ul style="list-style-type: none"> • DMRB, Volume 11, Section 3, Part 6: Land Use; • DMRB, Volume 11, Section 3, Part 8: Pedestrians, Cyclists, Equestrians and Community Effects; • DMRB, Volume 11, Section 3, Part 9: Vehicle Travellers; • DMRB, Volume 11, Section 3, Part 1: Air Quality and IAN 185/15; IAN 175/13; IAN 174/13; IAN 170/12; • DMRB, Volume 11, Section 3, Part 7: Noise & Vibration (Ref 13.17) and IAN 185/15; • DMRB, Volume 11, Section 3, Part 10: Road Drainage & The Water Environment; and • Health in Environmental Impact Assessment; A Primer for a Proportionate Approach.
Road drainage and the water environment	<p>An assessment of the effects of the proposed Scheme on road drainage and the water environment, during construction and operation, has been scoped in.</p> <p>The assessment of road drainage and the water environment will be undertaken with regard to advice and methodologies set out in DMRB Volume 11, Section 3, Part 10: Road Drainage and the Water Environment (HD 45/09). The assessment will consider potential impacts on water quality, morphology, flood risk and groundwater (in terms of impacts from highway runoff only) during proposed Scheme construction and operation. A detailed level of assessment is considered to be appropriate due to the fact that numerous waterbodies are in immediate proximity to, or are to be directly crossed by, the proposed Scheme, which could lead to an array of potential adverse effects relating to water quality, morphology and flood risk if appropriate mitigation is not provided.</p> <p>This would include a qualitative assessment of the risk to the water environment during construction works (in accordance with best practice CIRIA guidelines). Mitigation measures to manage and control works during construction to avoid, prevent and minimise the risk of pollution will be provided. Liaison with the EA and LLFA will be undertaken to identify any water related licences / consents / permits that may be required for construction and operation of the new highway.</p> <p>A Preliminary Water Framework Directive (pWFD) Assessment will be produced based on a combination of desk study and a hydrogeomorphological walkover survey. The pWFD Assessment will consider relevant WFD parameters and</p>

Topics	Scoped in (Level of Assessment)
	<p>whether the proposed Scheme has the potential to prevent or compromise WFD objectives being met in the waterbodies described above. Depending on the outcome of the Preliminary WFD Assessment and consultation with the Environment Agency, further more detailed assessment may be required, and will be scoped at a later stage.</p> <p>A detailed Flood Risk Assessment will be undertaken in accordance with the requirements of the NPPF utilising detailed flood maps and modelled flood extents provided by the Environment Agency to assess the impact of the proposed Scheme on flood risk. It is envisaged that the FRA will also summarise the proposed surface water drainage strategy. The preparation of both of these items will include consultation with the LLFA (i.e. Staffordshire County Council), Environment Agency and Severn Trent Water. Results of the assessment will be presented in a standalone FRA with summary text included in the Environmental Statement.</p>
Climate	<p>An assessment of the effect of the proposed Scheme on the climate, during construction and operation, has been scoped in.</p> <p>Consideration of climate change adaptation within EIAs is an area of emerging practice. There is not a prescribed format for undertaking such assessments, therefore the approach taken will follow new and emerging guidelines and good practice from other similar studies including DMRB Volume 11, Section 3, Part 1, HA 207/07 and IEMA guidance documents Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation; and Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. The assessment will include:</p> <p>Greenhouse Gas Impact Assessment – The GHG emissions arising from the construction and operation of the proposed Scheme are within the scope of this assessment.</p> <p>Climate Resilience Assessment – An assessment of climate change resilience will be conducted for the proposed Scheme which identifies potential climate change impacts and considers their potential consequence and likelihood of occurrence. The assessment will include all infrastructure and assets associated with the proposed Scheme. It will assess resilience against both gradual climate change and the risks associated with an increased frequency of severe weather events as per the UKCP18 climate change projections. The assessment of potential impacts and the proposed Scheme's vulnerability will take into account the mitigation measures designed into the proposed Scheme. As there is a link between the climate change resilience assessment and the assessments reported within other chapters, cross-references will be included where appropriate.</p> <p>In-combination Climate Impacts Assessment – Projected changes to average climatic conditions, as a result of climate change, and an increased frequency and severity of extreme weather events have the potential to impact the ability of the surrounding natural environment to adapt to climate change. The key parameters of climate change are: changing temperature, changing rainfall quantities and frequency, changing frequency and magnitude of storm events, and changing wind strength. The in-combination climate impacts assessment will consider the ways in which projected climate change will influence the significance of the impacts of the proposed Scheme on identified receptors in the surrounding environment.</p>
Cumulative	<p>An assessment of cumulative effect, both combined and cumulative, has been scoped in.</p> <p>Combined effects – The results of the technical chapters within the Environmental Statement will be used to ascertain if there is likely to be, more than one environmental effect on an individual receptor as a result of the proposed</p>

Topics	Scoped in (Level of Assessment)
	<p>Scheme.</p> <p>Cumulative effects – Cumulative effects is the effect resulting from impacts of the proposed Scheme, acting together with an impact or impacts associated with other proposed development schemes on a single receptor. The assessment methodology will follow guidance set out by the Planning Inspectorate which requires a four-stage approach to the assessment.</p> <p>The significance of residual cumulative effects will take into account the guidance set out in Section 5.3 of this report, in line with DMRB Volume 11, Section 2, Part 5 (HA 205/08) and The Planning Inspectorate Advise Note 17: Cumulative Effects Assessment.</p>

17.1.2. Table 17.2 sets out the topics/ matters that have been scoped out of the Environmental Statement.

Table 17.2: Summary of topics/ matters scoped out of the Environmental Statement

Topic/Matter Scoped Out	Reason
Heat and Radiation.	Para. 5.1.14. Neither heat nor radiation are of relevance to the proposed Scheme. Therefore, an assessment of the effects of the proposed Scheme on emissions of heat and radiation has been scoped out.
Transboundary Effects.	Para 5.1.15. The proposed Scheme is not anticipated to generate any significant potential transboundary effects. A Transboundary effects screening matrix is provided in Appendix 5.1. Therefore, an assessment of transboundary effects, resulting from the construction and operation of the proposed Scheme, has been scoped out.
Demolition of the proposed Scheme.	Para 5.2.7. It is considered highly unlikely that the proposed Scheme would be demolished after its design life as the road is likely to have become an integral part of highway infrastructure in the area. Therefore, an assessment of the effects that may result from the demolition of the proposed Scheme has been scoped out.
Maintenance of the proposed Scheme.	Para 5.2.8. It is considered that the principal components that make up the proposed Scheme are appropriate for its design life. During operation should any components require replacement/ maintenance, such works would be undertaken by the Highways Managing Agent Contractor in accordance with their standard maintenance practices. Therefore, an assessment of the effects that may result from the maintenance of the proposed Scheme has been scoped out.
Air Quality: Pre-construction demolition and construction phase plant emissions.	Para 6.8.4. Demolition and construction plant emissions will not be explicitly modelled, as these are considered to be a small emission source relative to ambient local conditions in the vicinity of the proposed Scheme. These emissions will be managed through best practice mitigation measures and scoped out of any further assessment.
Biodiversity: Protected species.	<p>Table 9.6. A number of ecology surveys have been completed and their results reported in Appendix 9.1 to 9.5 and summarised in Chapter 9: Biodiversity. Based on the results of these surveys and desk based study The further assessment of the following protected species have been scoped out of the Environmental Statement:</p> <ul style="list-style-type: none"> • great crested newts; • otter; • water vole; • reptiles; and

Topic/Matter Scoped Out	Reason
	<ul style="list-style-type: none"> • barn owl.
<p>Biodiversity: Designated sites and areas of ancient woodland.</p>	<p>Table 9.6. Based on site surveys and desk based study it is considered that there are no pathways by which the integrity or nature conservation value of the following sites could be adversely affected by the proposed Scheme. Further assessment of these sites has therefore been scoped out of the Environmental Statement:</p> <ul style="list-style-type: none"> • Cannock Extension Canal SAC; • Wryley and Essington Canal LNR and LWS; • Burns Wood (east) - Ancient & Semi-Natural Woodland; • Burns Wood (west) - Ancient & Semi-Natural Woodland; • Essington Wood - Ancient & Semi-Natural Woodland; • Spring Coppice - Ancient & Semi-Natural Woodland; and • Beech Head - Ancient & Semi-Natural Woodland.
<p>Material Assets and Waste: Material use and waste generation during operation.</p>	<p>Para 11.5.4. Material use and waste generation is expected to be very small during operation of the proposed Scheme, these matters have therefore been scoped out of the Environmental Statement.</p>
<p>Material Assets and Waste: Effects on Mineral Safeguard sites.</p>	<p>Para 11.4.6. The Minerals Local Plan for Staffordshire (2015-2030) was adopted by Staffordshire County Council on the 16 February 2017. The proposed Scheme is located within a Mineral Safeguarding Area as illustrated in the Policies and Proposals Map included in the Minerals Local Plan. There are no active or allocated minerals extraction sites within the boundary of the proposed Scheme. This matter of the assessment has therefore been scoped out of the Environmental Statement.</p>
<p>Noise and Vibration: Disturbance or damage to properties from traffic induced ground borne vibration.</p>	<p>Para 12.8.39. It is a requirement of new highway constructions that the highway surface be smooth and free from any discontinuities. Paragraph A5.25 of DMRB highlights that in relation to ground borne vibration 'no evidence has been found to support the theory that traffic induced vibrations are a source of significant damage to buildings'. Paragraph A5.26 of DMRB also states: 'Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances'. Hence, no significant effects from traffic induced ground borne vibration due to the passage of vehicles over irregularities on the proposed Scheme, in terms of either disturbance or damage to buildings (or other structures) are anticipated and no further assessment will be required.</p>
<p>Population and Health: Effects on land used by the community.</p>	<p>Para 13.8.3. The assessment of effects on land used by the community has been scoped out of the assessment as there are no areas of land designated for use by the community within the study area such as village greens, community land or areas of public open space.</p>
<p>Climate: Greenhouse Gas Impact Assessment - End of life assessment.</p>	<p>Para 15.8.1. It is very unlikely that the proposed Scheme would be demolished after its design life as the road would have become an integral part of nationally important infrastructure. Subsequently, end of life assessment of the demolition phase is scoped out of the assessment.</p>

REFERENCES

- Ref 1.1 Planning Act 2008
- Ref 1.2 The Highway and Railway (Nationally Significant Infrastructure Project) Order 2013
- Ref 1.3 Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
- Ref 1.4 The Localism Act 2011
- Ref 1.5 Department for Transport (2014) *National Policy Statement for National Networks*. Available online at www.gov.uk/government/publications
- Ref 1.6 Secretary of State for Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*
- Ref 1.7 South Staffordshire Council (2012) *Core Strategy Development Plan Document* adopted December 2012 (Ref1.7);
- Ref 1.8 Staffordshire County Council (2015) Minerals Local Plan for Staffordshire (2015-2030) adopted February 2017 (Ref1.7); and
- Ref 1.9 Staffordshire and Stoke-on-Trent Waste Local Plan (2010 to 2026) adopted March 2013 (Ref1.8).
- Ref 2.1 West Midlands Area Multi Modal Study
- Ref 2.2 Department for Transport (2015) Road Investment Strategy 2015 to 2020
- Ref 2.3 The Planning Inspectorate (2018) Advice Note 9: Using the 'Rochdale Envelope'
- Ref 3.1 West Midlands Area Multi Modal Study
- Ref 3.2 Highways England (2009) M54-M6/M6 Toll Link Road, PCF Stage 1: Traffic Assessment Report (TAR)
- Ref 3.3 Highways England (2014) M54-M6/M6 Toll Link Road, PCF Stage 1: Traffic Assessment Report Addendum
- Ref 3.4 Highways England (2015) M54-M6/M6 Toll Link Road, PCF Stage 2: Environmental Assessment Report
- Ref 3.5 Highways England (2016) M54-M6/M6 Toll Link Road, PCF Stage 2: Supplement to Scheme Assessment Report
- Ref 3.6 Highways England (2018) M54-M6/M6 Toll Link Road, PCF Stage 2: Environmental Assessment Report Addendum
- Ref 4.1 The Planning Inspectorate (2012) EIA Consultation and Notification. Advice Note Three: The Planning Inspectorate and nationally significant infrastructure projects
- Ref 4.2 Planning Act 2008
- Ref 5.1 Highways England (2018) *M54-M6/M6 Toll Link Road, PCF Stage 2: Environmental Assessment Report Addendum*
- Ref 5.2 Highways England (2015) *Interim Advice Note (IAN) 125/15 Environmental Assessment Update*
- Ref 5.3 Cabinet Office (2017) UK National Risk Register of Civil Emergencies
- Ref 6.1 Department for Transport (2007) Design Manual for Roads and Bridges, Volume II, Section 3, Part 1: HA 207/07 Air Quality London: The Stationery Office
- Ref 6.2 Department for Transport (2014) National Policy Statement for National Networks
- Ref 6.3 Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework
- Ref 6.4 South Staffordshire Council (2012) Core Strategy Development Plan Document

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- Ref 6.5 Ministry of Housing, Communities and Local Government (2014) Planning Practices Guidance (PPG), Available at <<http://planningguidance.planningportal.gov.uk/>>
- Ref 6.6 H.M. Government (2010) The Conservation of Habitats and Species Regulations. Statutory Instrument No. 490. The Stationery Office
- Ref 6.7 Department for Environment, Food and Rural Affairs (2017) Improving air quality in the UK: tackling nitrogen dioxide in our towns and cities Draft UK Air Quality Plan for tackling nitrogen dioxide
- Ref 6.8 Department for Environment, Food and Rural Affairs (2018) Supplement to the UK Plan for tackling roadside nitrogen dioxide concentrations
- Ref 6.9 Highways England (n.d.) Interim Advice Note 170/12, Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'
- Ref 6.10 Highways England (n.d.) Interim Advice Note 174/13, Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07)
- Ref 6.11 Highways England (n.d.) Interim Advice Note 175/13, Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality'
- Ref 6.12 Highways England (2015) Interim Advice Note 185/15, Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise
- Ref 6.13 Department for Transport (2015) Transport Analysis Guidance (TAG) Environmental Impact Appraisal (UNIT A3), Section 3 Air Quality Impacts. Dated December 2015.
- Ref 6.14 Department for Environment, Farming and Rural Affairs (2018) Defra Air Quality Management Areas. Available online at < <http://uk-air.defra.gov.uk/aqma/maps>> Accessed 10/10/18
- Ref 6.15 South Staffordshire Council (2016) Air Quality Annual Status Report (ASR)
- Ref 6.16 City of Wolverhampton Council (2016) Air Quality Annual Status Report (ASR)
- Ref 6.17 Department of Environment, Food and Rural Affairs (2017) Defra PCM mapping. Available online at < <https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data> > Accessed 10/10/18
- Ref 6.18 Department of Environment, Food and Rural Affairs (2018) 2015-based background maps for NOx, NO2, and PM10. Available online at: < <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015> >Accessed 10/10/18
- Ref 6.19 Ordnance Survey Address Base Plus and Master Map datasets
- Ref 6.20 Natural England (2017) Available online at
< http://www.gis.naturalengland.org.uk/pubs/gis/GIS_register.asp > Accessed 10/10/18
- Ref 6.21 Highways England (2015) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report
- Ref 6.22 Highways England (2018) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report Addendum
- Ref 6.23 Department for Environment, Food and Rural Affairs (2016) Local Air Quality Management Technical Guidance (TG16)
- Ref 6.24 H.M. Government (1990) Environmental Protection Act. The Stationery Office

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- Ref. 6.25 Institute of Air Quality Management (2014) Guidance on the Assessment of Dust from Demolition and Construction.
- Ref 7.1 Department for Transport (2007) Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment Section 3, Part 2, Cultural Heritage (HA 208/07)
- Ref 7.2 The Stationery Office (1979) Ancient Monuments and Archaeological Areas Act (1979) (as amended)
- Ref 7.3 The Planning (Listed Buildings and Conservation Areas) Act 1990.
- Ref 7.4 Department for Transport (2014). National Policy Statement for National Networks.
- Ref 7.5 Department for Communities and Local Government (2018). National Planning Policy Framework.
- Ref 7.6 Department for Communities and Local Government Planning Practice Guidance <http://planningguidance.communities.gov.uk/> Accessed October 2018
- Ref 7.7 Highways Agency (2001) Design Manual for Roads and Bridges Volume 10, Section 6, Part 1: Trunk Roads and Archaeological Mitigation HA 75/01
- Ref 7.8 Historic England (2017) 'Historic Environment Good Practice Advice in Planning Note 3 – The Setting of Heritage Assets'. Second edition
- Ref 7.9 Chartered Institute for Archaeologists (2014) Code of Conduct [online] Available at <http://www.archaeologists.net/sites/default/files/node-files/CodesofConduct.pdf>
- Ref 7.10 Chartered Institute for Archaeologists (2017) Standard and Guidance for Historic Environment desk-based Assessment Reading: ClfA [online] Available at http://www.archaeologists.net/sites/default/files/node-files/ClfAS&GDBA_0.pdf
- Ref 7.11 Highways England (2018) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report Addendum
- Ref 7.12 Mills, A. D. (2003) A Dictionary of British Place Names Oxford, Oxford University Press.
- Ref 8.1 Highways England (2010) Interim Advice Note (IAN) 135/10. Available online at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian135.pdf>. Accessed 10/10/18
- Ref 8.2 Department for Transport (2014) National Policy Statement for National Networks. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf. Accessed 10/10/18
- Ref 8.3 Secretary of State for Ministry of Housing, Communities and Local Government. (2018) National Planning Policy Framework. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf. Accessed 10/10/18
- Ref 8.4 Highways England (1993) Design Manual for Roads and Bridges: Volume 11, Section 3, Part 5 - Landscape Effects. Available online at: <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/11s3p05.pdf>. Accessed 10/10/18
- Ref 8.5 Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment. Routledge; Abingdon.
- Ref 8.6 South Staffordshire Council (2012) Adopted Core Strategy. Available online at: <https://www.sstaffs.gov.uk/planning/the-adopted-core-strategy.cfm>. Accessed 10/10/18.
- Ref 8.7 Highways England (2015) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report
- Ref 8.8 Highways England (2018) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report Addendum

-
- Ref 8.9 Staffordshire County Council (2000) Planning for Landscape Change. Available online at: <https://www.staffordshire.gov.uk/environment/eLand/planners-developers/landscape/NaturalEnvironmentLandscapeCharacterTypes.aspx>. Accessed 09/10/18
- Ref 8.10 Black Country Archaeology Service (2009) The Black Country - A Historic Characterisation. Available online at: http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=arch-939-1/dissemination/pdf/BCHLC_FullRpt.pdf. Accessed 09/10/18
- Ref 9.1 Highways England (2015) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report
- Ref 9.2 Department for Transport (2014) National Policy Statement for National Networks. Available online at www.gov.uk/government/publications
- Ref 9.3 Secretary of State for Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework
- Ref 9.4 Department for Environment, Food and Rural Affairs (2011) Biodiversity 2020; A strategy for England's Wildlife and Ecosystem Services.
- Ref 9.5 Council of Europe (1979) Convention on the Conservation of European Wildlife and Natural Habitats. European Treaty Series – No. 144. Available online at: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=0900001680078aff>. Accessed 24/10/2018
- Ref 9.6 Wild Birds Directive 1979 European Directive 79/409/EEC on the conservation of wild birds. Available online at: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF> Accessed 24/10/2018
- Ref 9.7 The Wildlife and Countryside Act 1981 (as amended). Available online at: <https://www.legislation.gov.uk/ukpga/1981/69>. Accessed on 24/10/2018 Accessed 24/10/2018
- Ref 9.8 Countryside and Rights of Way Act 2000. Available online at: <http://www.legislation.gov.uk/ukpga/2000/37/contents> Accessed 24/10/2018
- Ref 9.9 The Hedgerow Regulations 1997. <http://www.legislation.gov.uk/uksi/1997/1160/contents/made> Accessed 24/10/2018
- Ref 9.10 The Natural Environment and Rural Communities (NERC) Act. Available online at: <https://www.legislation.gov.uk/ukpga/2006/16/contents>. Accessed 24/10/2018
- Ref 9.11 Protection of Badgers Act 1992. London. Available online at: <http://www.legislation.gov.uk/ukpga/1992/51/contents> Accessed 24/10/2018
- Ref 9.12 The Conservation of Habitats and Species Regulations 2017. London. Available online at: <http://www.legislation.gov.uk/uksi/2017/1012/contents/made>. Accessed on 24/10/2018
- Ref 9.13 Highways England (2015) M54–M6/M6 Toll Link Road Scheme, Protected Species Report – Great Crested Newt Surveys 2015
- Ref 9.14 Highways England (2015) M54-M6/M6 Toll Link Road Scheme, Protected Species Report – Otter and Water Vole.
- Ref 9.15 Highways England (1993) Design Manual for Roads and Bridges Volume 11, Section 3, Part 4: Ecology and Nature Conservation
- Ref 9.16 Highways Agency (2008) Design Manual for Roads and Bridges, Volume 11, Section 2, Part 1: General Principles and Guidance of Environmental Impact Assessment (HA 201/08)
- Ref 9.17 Highways Agency (2008) Design Manual for Roads and Bridges, Volume 11, Section 2, Part 2: Assessment and Management of Environmental Effects (HA 205/08)

-
- Ref 9.18 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 1: Nature Conservation and Biodiversity HA84/01
- Ref 9.18 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 2: Mitigation Against Effects on Badgers HA59/92
- Ref 9.18 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 3: Nature Conservation Advice in Relation to Bats HA80/99
- Ref 9.18 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 4: Nature Conservation Advice in Relation to Otters HA 81/99
- Ref 9.18 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 6: Nature Conservation Advice in Relation to Amphibians HA 98/01
- Ref 9.18 Highways Agency (2005) Design Manual for Roads and Bridges, Volume 10, Section 4, Part 7 Nature Conservation Advice in Relation to Reptiles and Roads HA116/05
- Ref 9.19 Highways Agency (2010) Interim Advice Note 130/10: Ecology and Nature Conservation: Criteria for Impact Assessment. Available online at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf> Accessed 24/10/2018
- Ref 9.20 Chartered Institute of Ecology and Environmental Management (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester
- Ref 9.21 Highways England (2015) Biodiversity Plan: Our Plan to protect and Increase Biodiversity. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441300/N150146_-_Highways_England_Biodiversity_Plan3lo.pdf Accessed 24/10/2018.
- Ref 9.22 Magic Map Application. 2018. Available online from: <http://magic.defra.gov.uk/MagicMap.aspx> Accessed 24/10/2018 Accessed 24/10/2018
- Ref 9.13 EcoRecord (Ecological database for Birmingham and the Black Country. Available online at: <http://www.ecorecord.org.uk/> Accessed 24/10/2018
- Ref 9.24 Highways England (2018) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report Addendum
- Ref 9.25 Highways England (2015) M54–M6/M6 Toll Link Road Scheme, European Protected Species Report – Bats.
- Ref 9.26 Joint Nature Conservation Committee (2010) Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit' available online at: http://jncc.defra.gov.uk/PDF/pub10_handbookforphase1habitatsurvey.pdf Accessed 24/10/2018
- Ref 9.27 Environment Agency (2013) The Knotweed Code of Practice: Managing Japanese Knotweed on development sites (Version 3). England: Bristol
- Ref 9.28 Harris S, Cresswell P and Jefferies D (1989). Surveying Badgers. Mammal Society.
- Ref 9.29 Bang, P. & Dahlstrom, P. (2006). Animal Tracks and Signs. Oxford University Press, Oxford.
- Ref 9.30 Neal, E. & Cheeseman, C. (1996). Badgers, T&AD Poyser Ltd, London.
- Ref 9.31 Harris, S., Jeffries, D., Cheeseman, C., & Booty, C. (1994). Problems with badgers? (3rd Ed), RSPCA Publications.
- Ref 9.32 Andrews, R. (2013). The Classification of badgers *Meles Meles* setts in the UK: A review and Guidance for Surveyors. In Practice, CIEEM: pp. 27 – 31.
- Ref 9.33 Delahay, R. J. et al., (2000). The use of marked bait in studies of the territorial organization of the European Badger (*Meles meles*). Mammal Review 30(2). pp. 73-87

-
- Ref 9.34 Collins, J (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- Ref 9.35 Bat Conservation Trust (2012) Bats and Buildings. Bats and the Built Environment series. Available online at: http://www.bats.org.uk/pages/accommodating_bats_in_buildings.html Accessed 24/10/2018
- Ref 9.36 British Standards Institute (2015) Surveying for Bats in Trees and Woodland
- Ref 9.37 Chartered Institute of Ecology and Environmental Management (2013) Competencies for Species Surveys: Bats. Technical Guidance Series. Available online at: https://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_BATS_April_2013.pdf Accessed 24/10/2018
- Ref 9.38 English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature, Peterborough
- Ref 9.39 Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10 (4), 143-155.
- Ref 9.40 Chanin P (2003). Ecology of the European Otter. *Conserving Natura 2000*
- Ref 9.41 Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London. Available online at: <https://www.fensforthefuture.org.uk/admin/resources/downloads/water-vole-mitigation-guidance-final-2016.pdf> Accessed 24/10/2018
- Ref 9.42 Peay S (2003). Monitoring the White-clawed Crayfish *Austropotamobius pallipes*. *Conserving Natura 2000 Rivers Monitoring Series No. 1*, English Nature, Peterborough.
- Ref 9.43 Peay S (2000) Guidance on works affecting white-clawed crayfish. Available online at: <http://www.devon.gov.uk/guidancewccrayfish.pdf> Accessed on 24/10/2018
- Ref 9.44 Chartered Institute of Ecology and Environmental Management (2013) Competencies for Species Surveys: White-clawed Crayfish. Technical Guidance Series. Available online at: https://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_WHITE-CLAWED_CRAYFISH_April_2013.pdf Accessed 24/10/2018
- Ref 9.45 Holdich D (2003). Ecology of the White-clawed Crayfish. *Conserving Natura 2000 Rivers Ecology Series No. 1*. English Nature, Peterborough.
- Ref 9.46 Natural England (2013) Natural England – Standing Advice Species: White-clawed crayfish Available online at: <http://witham-1st-idb.gov.uk/wp-content/uploads/2013/03/Crayfish-factsheet.pdf> Accessed on 24/10/2018
- Ref 9.47 Bibby, C. J. et al., (2000). *Bird Census Techniques* (2nd Ed). England, Academic Press
- Ref 9.48 RSPB (2015) *Birds of Conservation Concern 4 BoCC: The Red List for Birds* leaflet
- Ref 9.49 Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.
- Ref 9.50 Eaton, M.A. et al (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man*.
- Ref 9.51 Froglife (1999) *Reptile Survey: An introduction to planning, conducting and interpreting Surveys for snake and lizard conservation*. Available online at: http://www.devon.gov.uk/froglife_advice_sheet_10_-_reptile_surveys.pdf Accessed 24/10/2018
- Ref 9.52 Chartered Institute of Ecology and Environmental Management (2013) Competencies for Species Surveys: Reptiles. Technical Guidance Series. Available online at: https://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_REPTILES_April_2013.pdf Accessed 24/10/2018
- Ref 9.53 Natural England (2015) *Technical Information Note (TIN 102); Reptile Mitigation Guidelines*

-
- Ref 9.54 Gent, A.H., & Gibson, S.D. (2003) Herpetofauna workers' manual Available online at: <http://jncc.defra.gov.uk/page-3325> Accessed 24/10/2018
- Ref 9.55 Drake C.M, Lott D.A, Alexander K.N.A and Webb J. (2007). Natural England Research Report NERR005 Surveying terrestrial and freshwater invertebrates for conservation evaluation. Natural England, Peterborough.
- Ref 9.56 Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M.C., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018). Pantheon - database version 3.7.6 available online at: <http://www.brc.ac.uk/pantheon/> Accessed 03/10/2018
- Ref 9.57 Chalkley, A site analysis for freshwater invertebrate surveys (SAFIS) Available online at: <http://www.suffolkwildlifetrust.org/SAFIS> Accessed 24/10/2018
- Ref 10.1 Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework
- Ref 10.2 Department for Transport (2014) National Policy Statement for National Networks
- Ref 10.3 Highways Agency (1993) Design Manual for Roads and Bridges Volume 11 Section 3 Part 11, Geology and Soils.
- Ref 10.4 South Staffordshire Council (2012) South Staffordshire Local Plan
- Ref 10.5 British Geological Survey (2001) Wolverhampton England and Wales Sheet 153. Solid and Drift Geology. 1:50 000.
- Ref 10.6 British Geological Survey (2018) Online Geindex map. Available online at <http://mapapps2.bgs.ac.uk/geoindex/home.html> - accessed 05/10/18.
- Ref 10.7 Highways England (2017) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Preliminary Sources Study Report Addendum 2 HE514465-ACM-SGT-M54_SW_01_Z-RP-GE-001-P02 S3.
- Ref 10.8 The Coal Authority (2018) Online Interactive map. Available online at <http://mapapps2.bgs.ac.uk/coalauthority/home.html> - accessed 08/10/18.
- Ref 10.9 Natural England (2010) West Midlands Region 1:250 000 Series Agricultural Land Classification.
- Ref 10.10 Natural England (2015) Agricultural Land Classification (ALC) Grades – Post 1988 Survey. Available online at <https://magic.defra.gov.uk/MagicMap.aspx> - accessed 08/10/18.
- Ref 10.11 Natural England (2012) Technical Note Information (TIN 049). Agricultural Land Classification: protecting the best and most versatile agricultural land.
- Ref 10.12 Highways Agency (2001) Design Manual for Roads and Bridges Volume 11 Section 3 Part 6, Land Use
- Ref 10.13 BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice
- Ref 11.1 Highways Agency (2011) Interim Advice Note 153/11: Guidance on the environmental assessment of material resources
- Ref 11.2 European Commission (2008) Waste Framework Directive (2008/98/EC)
- Ref 11.3 Environment Agency (2018) Waste Management Information 2017
- Ref 11.4 Ministry of Housing, Communities and Local Government (2009) National and Regional Guidelines for Aggregates Provision in England 2005 to 2020
- Ref 11.5 Staffordshire County Council (2017) Minerals Local Plan for Staffordshire (2015-2030)
- Ref 11.6 Highways England (2018) M54-M6/M6 Toll Link Road, PCF Stage 2 Environmental Assessment Report Addendum
- Ref 12.1 Highways Agency (2011) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7, HD 213/11 Revision 1
- Ref 12.2 Department of Transport, Welsh Office (1988) Calculation of Road Traffic Noise (CRTN)

-
- Ref 12.3 Department for Transport (2014) National Policy Statement for National Networks.
- Ref 12.4 Secretary of State for Ministry of Housing, Communities and Local Government (2018) National Planning Policy Framework.
- Ref 12.5 Defra (2010) Noise Policy Statement for England (NPSE)
- Ref 12.6 Department for Communities and Local Government (2014) Planning Practice Guidance - Noise (PPG-N)
- Ref 12.7 Highways England (2015) Interim Advice Note 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3, Part 7 Noise
- Ref 12.8 Highways England (2015) M54-M6/M6 Toll Link Road Scheme PCF Stage 2 Environmental Assessment Report
- Ref 12.9 British Standards Institution (2013) BS 7445: 2003 Description and measurement of environmental noise
- Ref 12.10 British Standards Institution (2014) BS 5228:2009 + A1:2014 Code of Practice for noise and vibration control on construction and open sites
- Ref 12.11 British Standards Institution (1993) BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration
- Ref 12.12 ISO (2010) ISO 4866:2010 Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures
- Ref 12.13 Transport Research Laboratory (TRL) (2002) Converting the UK traffic noise index LA10,18h to EU noise indices for noise mapping
- Ref 12.14 World Health Organisation (1999) Guidelines for Community Noise
- Ref 12.15 World Health Organisation (2009) Night Noise Guidelines for Europe
- Ref 13.1 Department for Transport, (2014) National Networks National Policy Statement. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf [accessed 06/10/18]
- Ref 13.2 Department for Communities and Local Government, (2018). National Planning Policy Framework. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf > [accessed 06/10/18].
- Ref 13.3 Highways Agency (2001) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 6: Land Use
- Ref 13.4 Highways Agency (1993) Design Manual for Roads and Bridges, Volume 11, Section 3; Part 8: Pedestrians, Cyclists, Equestrians and Community Effects
- Ref 13.5 Highways Agency (1993) Design Manual for Roads and Bridges, Volume 11, Section 3; Part 9: Vehicle Travellers
- Ref 13.6 Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3; Part 1: Air Quality
- Ref 13.7 Highways England (2015) Interim Advice Note 185/15, Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 Air Quality and Volume 11, Section 3, Part 7: Noise.
- Ref 13.8 Highways England (2013) Interim Advice Note 175/13, Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1: Air Quality.

-
- Ref 13.9 Highways England (2013) Interim Advice Note 174/13, Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1: Air Quality (HA207/07).
- Ref 13.10 Highways England (2012) Interim Advice Note 170/12, Updated air quality advice on the assessment of future NOx and NO2 projections for users of DMRB Volume 11, Section 3, Part 1: Air Quality.
- Ref 13.11: Highways Agency (2007) Design Manual for Roads and Bridges: Volume 11, Section 3, Part 7: Noise and Vibration
- Ref 13.12: Highways Agency (2007) Design Manual for Roads and Bridges: Volume 11, Section 3, Part 10: Road Drainage and the Water Environment.
- Ref 13.13 South Staffordshire District Council (2018) South Staffordshire Local Plan, Site Allocations Document
- Ref 13.14 Labour Market profile south Staffordshire. Available online at: <https://www.nomisweb.co.uk/reports/lmp/la/1946157177/report.pdf> (accessed 12/10/18)
- Ref 13.15 Public Health England, Local Health. Available online at: <http://www.localhealth.org.uk>
- Ref 13.16 Natural England, MAGIC maps. Available online at: <https://magic.defra.gov.uk/MagicMap.aspx> (accessed 09/10/18)
- Ref 13.17 Sustrans, National Cycle Network. Available online at: <https://www.sustrans.org.uk/ncn/map> (accessed 09/10/18)
- Ref 13.18 Staffordshire County Council, Cycling Maps. Available online at: <https://www.staffordshire.gov.uk/transport/cycling/Cycle-maps/Cycling-in-South-Staffordshire-Issue-4.pdf> (accessed 09/10/18)
- Ref 13.19 Cave, B., Fothergill, J., Pyper, R., Gibson, G., and saubders, P., (2017) Health in Environmental Impact Assessment: A Primer for a Proportionate Approach. Ben Cave Associates Ltd, IEMA and the Faculty of Public Health. Lincoln, England. Available at www.iema.net
- Ref 14.1 The European Union (2000) Water Framework Directive, Directive 2000/60/EC.
- Ref 14.2 The European Union (2008) Priority Substances Directive, Directive 2008/105/EC.
- Ref 14.3 The European Union Directive (2006) Groundwater Daughter Directive, Directive 2006/118/EC.
- Ref 14.4 The European Union Directive (2007) The EU Floods Directive, Directive 2007/60/EC.
- Ref 14.5 The European Union (2004) The Environmental Liability Directive, Directive 2004/35/EC.
- Ref 14.6 The European Union (2006) Freshwater Fish Directive, Directive 2006/44/EC.
- Ref 14.7 Water Act 2014 London, Her Majesty's Stationery Office.
- Ref 14.8 The Floods and Water Management Act 2010 London, Her Majesty's Stationery Office.
- Ref 14.9 The Land Drainage Act 1991 London, Her Majesty's Stationery Office.
- Ref 14.10 The Water Resources Act 1991.
- Ref 14.11 The Salmon and Freshwater Fisheries Act 1975 as amended, London, Her Majesty's Stationery Office.
- Ref 14.12 The Reservoirs Act 1975 London, Her Majesty's Stationery Office.
- Ref 14.13 The Water Environment (Water Framework Directive) (England Wales) Regulations 2003 London, Her Majesty's Stationery Office.
- Ref 14.14 The Environmental Permitting (England and Wales) Regulations 2016 London, Her Majesty's Stationery Office.

-
- Ref 14.15 The Environmental Damage (Prevention and Remediation) Regulations (2015) London, Her Majesty's Stationery Office.
- Ref 14.16 The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 London, Her Majesty's Stationery Office.
- Ref 14.17 The Flood Risk Regulations 2009 London, Her Majesty's Stationery Office.
- Ref 14.18 The Eels (England and Wales) Regulation 2009 London, Her Majesty's Stationery Office.
- Ref 14.19 The Groundwater (England and Wales) Regulations (2009) London, Her Majesty's Stationery Office.
- Ref 14.20 The Control of Substances Hazardous to Health Regulations 2002 as amended, London, Her Majesty's Stationery Office.
- Ref 14.21 The Control of Pollution (Oil Storage) (England) Regulations 2001 London, Her Majesty's Stationery Office.
- Ref 14.22 Department for Communities and Local Government (2014) National Policy Statement for National Networks NPSNN, London, Her Majesty's Stationery Office;
- Ref 14.23 Department for Communities and Local Government (2012) National Planning Policy Framework, London, Her Majesty's Stationery Office;
- Ref 14.24 Department for Communities and Local Government (2012) National Planning Practice Guidance, London, Her Majesty's Stationery Office;
- Ref 14.25 DEFRA (2011) Future Water, the Government's water strategy for England, London, Her Majesty's Stationery Office
- Ref 14.26 DEFRA (2011) Non-statutory technical standards for SuDS;
- Ref 14.27 HM Government (2015), Building Regulations 2010, Drainage and Waste Disposal Approved Document H;
- Ref 14.28 South Staffordshire County Council (2012) South Staffordshire Core Strategy;
- Ref 14.29 Cannock Chase Council, Lichfield District Council, South Staffordshire Council, Stafford Borough Council (2014) South Staffordshire District Council Level 1 Strategic Flood Risk Assessment;
- Ref 14.30 CIRIA (2015) The SuDS Manual (C753);
- Ref 14.31 Highways Agency (2006), Design Manual for Roads and Bridges HD103/06, Vegetated Drainage Systems for Highway Runoff;
- Ref 14.32 Highways Agency (2006) Design Manual for Roads and Bridges HD 33/06 Surface and Subsurface Drainage Systems for Highways;
- Ref 14.33 Highways Agency, Design Manual for Roads and Bridges HD 45/09 Road Drainage and the Water Environment.
- Ref 14.34 Ordnance Survey online mapping, available online at www.bing.co.uk/maps, accessed October 2018;
- Ref 14.35 Multi-agency Geographical Information for the Countryside (MAGIC) website, available at <http://www.natureonthemap.naturalengland.org.uk/>; accessed October 2018;
- Ref 14.36 Highways Agency, Drainage Data Management System (HADDMS) website, available at <http://www.haddms.com/>, accessed October 2018;
- Ref 14.37 UK Government, Flood Map for Planning website, available at <https://flood-map-for-planning.service.gov.uk/>, accessed October 2018;
- Ref 14.38 UK Government, Long Term Flood Risk map, <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>, accessed on October 2018;
- Ref 14.39 Environment Agency, Areas Susceptible to Groundwater Flooding map;

-
- Ref 14.40 Highways England (2015) M54 to M6/ M6 Toll Link Road Scheme. PCF Stage 2 Environmental Assessment Report
- Ref 14.41 Highways England (2018) M54 to M6/ M6 Toll Link Road. PCF Stage 2 Environmental Assessment Report Addendum
- Ref. 15.1 Department for Transport (2014) National Policy Statement for National Networks
- Ref. 15.2 Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU
- Ref. 15.3 H.M Government (2008) UK Climate Change Act
- Ref. 15.4 H.M Government (2018) National Planning Policy Framework (NPPF)
- Ref. 15.5 Department for Environment, Food and Rural Affairs (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services
- Ref. 15.6 West Midlands Combined Authority (WMCA) (2016) The West Midlands Strategic Transport Plan
- Ref. 15.7 Staffordshire County Council (2011) Staffordshire Local Transport Plan 2011-2026
- Ref. 15.8 South Staffordshire Council (2012) A Local Plan for South Staffordshire
- Ref. 15.9 Institute of Environmental Management and Assessment (2017) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation
- Ref. 15.10 Institute of Environmental Management and Assessment (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance
- Ref. 15.11 Highways England (2007) Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA 207/07
- Ref. 15.12 The Met Office historic climate data.
Weblink: www.metoffice.gov.uk/public/weather/climate/gcqfp5e8q (Accessed 09/10/18).
- Ref. 15.13 The Intergovernmental Panel on Climate Change (IPCC) (2000) Special Report on Emissions Scenarios
- Ref. 15.14 BS EN 15804:2012+A1:2013 – Sustainability of construction works, BSI
- Ref. 15.15 British Standards Institution (2011) PAS 2050:2011 Specification for the assessment of the life cycle greenhouse gas emissions of goods and services
- Ref. 15.16 UK Climate Impacts programme (UKCIP) (2009) UK Climate Projections
- Ref. 15.17 Highways England's IAN 114/08 – Highways Agency Carbon Calculation and Reporting Requirements
- Ref. 15.18 Highways England (2015) Carbon Tool Guidance. Weblink:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/453177/Task_446_Guidance_Document.pdf (Accessed 09/10/18)
- Ref. 15.19 World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) (2015) Greenhouse Gas Protocol Corporate Accounting and Reporting Standard
- Ref 16.1 Highways Agency (2008) Design Manual for Roads and Bridges, Volume 11, Section 2, Part 5: Assessment and Management of Environmental Effects.
- Ref 16.2 The Planning Inspectorate (2015) Advise Note Seventeen: Cumulative Effects Assessment.
- Ref 16.3 Highways England (2018) M54-M6/ M6 Toll Link Road: PCF Stage 2 Environmental Assessment Report Addendum.

ABBREVIATIONS

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ADMS	Atmospheric Dispersion Modelling System
AQMA	Air Quality Management Area
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
ARN	Affected Road Network
ASNW	Ancient Semi-Natural Woodland
AWVP	Ancient Woodland Vascular Plant
BAP	Biodiversity Action Plan
BAS	Biodiversity Alert Site
BGS	British Geological Survey
BMV	Best and Most Versatile
BNL	Basic Noise Level
CDM	Construction Demolition Waste
CEMP	Construction Environmental Management Plan
CH ₄	Methane
CifA	Chartered Institute for Archaeologists
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated land: Applications in Real Environments
CO ₂	Carbon Dioxide
CoPA	Control of Pollution Action
CRTN	Calculation of Road Traffic Noise
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EAR	Environmental Assessment Report
EC	European Commission
EIA	Environmental Impact Assessment
END	Environmental Noise Directive
ENVIS	Environmental Information System

EU	European Union
FRA	Flood Risk Assessment
GCN	Great crested newt
GHG	Greenhouse Gas
GIS	Geographical Information System
GLVIA	Guidelines for Landscape and Visual Assessment
HADDMS	Highways Agency Drainage Data Management System
HAPMS	Highways Agency Pavement Management System
HAWRAT	Highways Agency Water Risk Assessment Tool
HDV	Heavy Duty Vehicle
HECZ	Historic Environment Character Zone
HER	Historic Environment Record
HFC	Hydrofluorocarbons
HGVs	Heavy Goods Vehicles
HLA	Historic Landscape Area
HRA	Habitat Regulations Assessment
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
IP	Inter Peak
IPCC	Intergovernmental Panel on Climate Change
LAQM	Local Air Quality Management
LAQM.TG	Local Air Quality Management Technical Guidance
LCT	Landscape Character Type
LGS	Local Geographical Sites
LLT	Long Term Trend
LNR	Local Nature Reserve
LOAEL	Lowest Observable Adverse Effect Level
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
N ₂ O	Nitrous Oxide
NCA	National Character Area
NERC	Natural Environment and Rural Communities Act
NMU	Non-Motorised User
NO _x	Nitrogen Oxides
NO ₂	Nitrogen Dioxide
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework

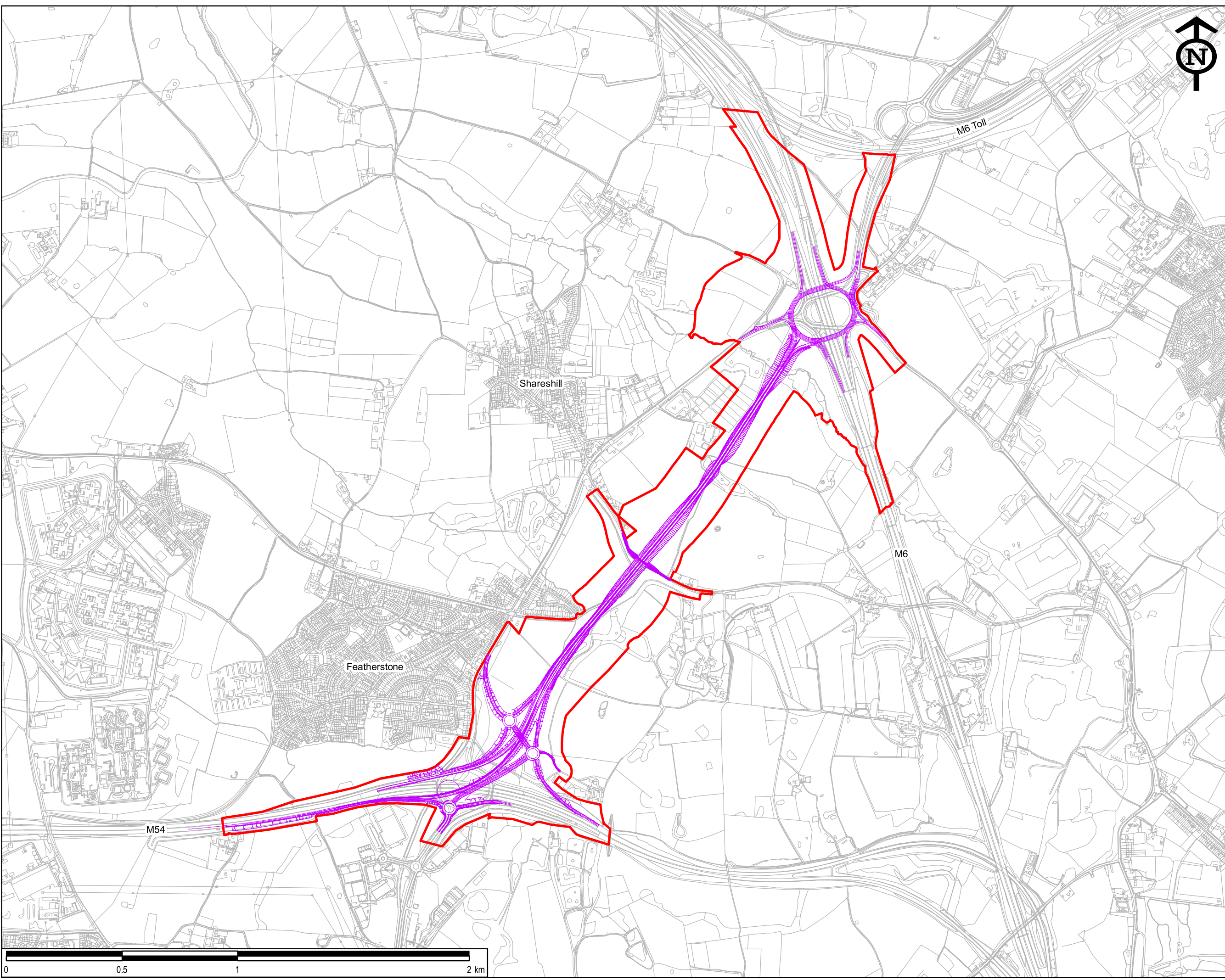
NPS	National Policy Statement
NPSNN	National Policy Statement for National Networks
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NVZ	Nitrogen Vulnerable Zone
OP	Off Peak
PA	Planning Act
PAS	Publically Available Specification
PAWS	Plantation on Ancient Woodland Site
PCF	Project Control Framework
PCM	Pollution Climate Mapping
PEIR	Preliminary Environmental Information Report
PFC	Perfluorocarbons
PM ₁₀	Particle Matter 10 micrometers or less in diameter
PPG	Planning Practice Guidance
PPG-N	Planning Practice Guidance on Noise
PRA	Preferred Route Announcement
PRoW	Public Right of Way
pWFD	Preliminary Water Framework Directive
RBMP	River Basin Management Plan
S41	Section 41 of the NERC Act 2006
SAC	Special Area of Conservation
SBI	Site of Biological Importance
SF ₆	Sulphur hexafluoride
SINC	Site of Importance for Nature Conservation
SNRHW	Selected Non-Reactive Hazardous Waste
SoCC	Statement of Community Consultation
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuD _s	Sustainable Drainage Systems
TAG	Transport Analysis Guidance
tCO ₂ e	tonnes of carbon dioxide equivalent
TRL	Transport Research Laboratory
UKCP09	UK Climate Projections published in 2009
UKCP18	UK Climate Projections published in 2018

UKCIP	UK Climate Impacts Programme
WebTAG	Web-based Transport Analysis Guidance
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility
$\mu\text{g}/\text{m}^3$	Microgram per cubic metre

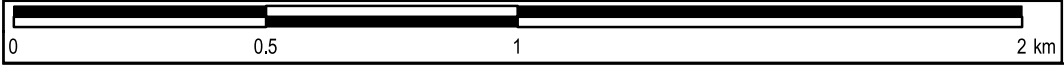
Figures

- Figure 1.1: Draft DCO Site Boundary
- Figure 7.1: Known Archaeology and Built Heritage Assets
- Figure 8.1: Zone of Theoretical Visibility
- Figure 8.2: Landscape Character
- Figure 8.3: Landscape Designations
- Figure 9.1: European Designated Sites
- Figure 9.2: Statutory, Non-Statutory and Ancient Woodland Sites
- Figure 9.3: Statutory Designated Sites within the Local Air Quality Area
- Figure 9.4: Phase 1 Habitat Survey
- Figure 9.5: Ancient Woodland
- Figure 12.1: Noise Location Plan
- Figure 14.1: Water Resources Constraints Plan

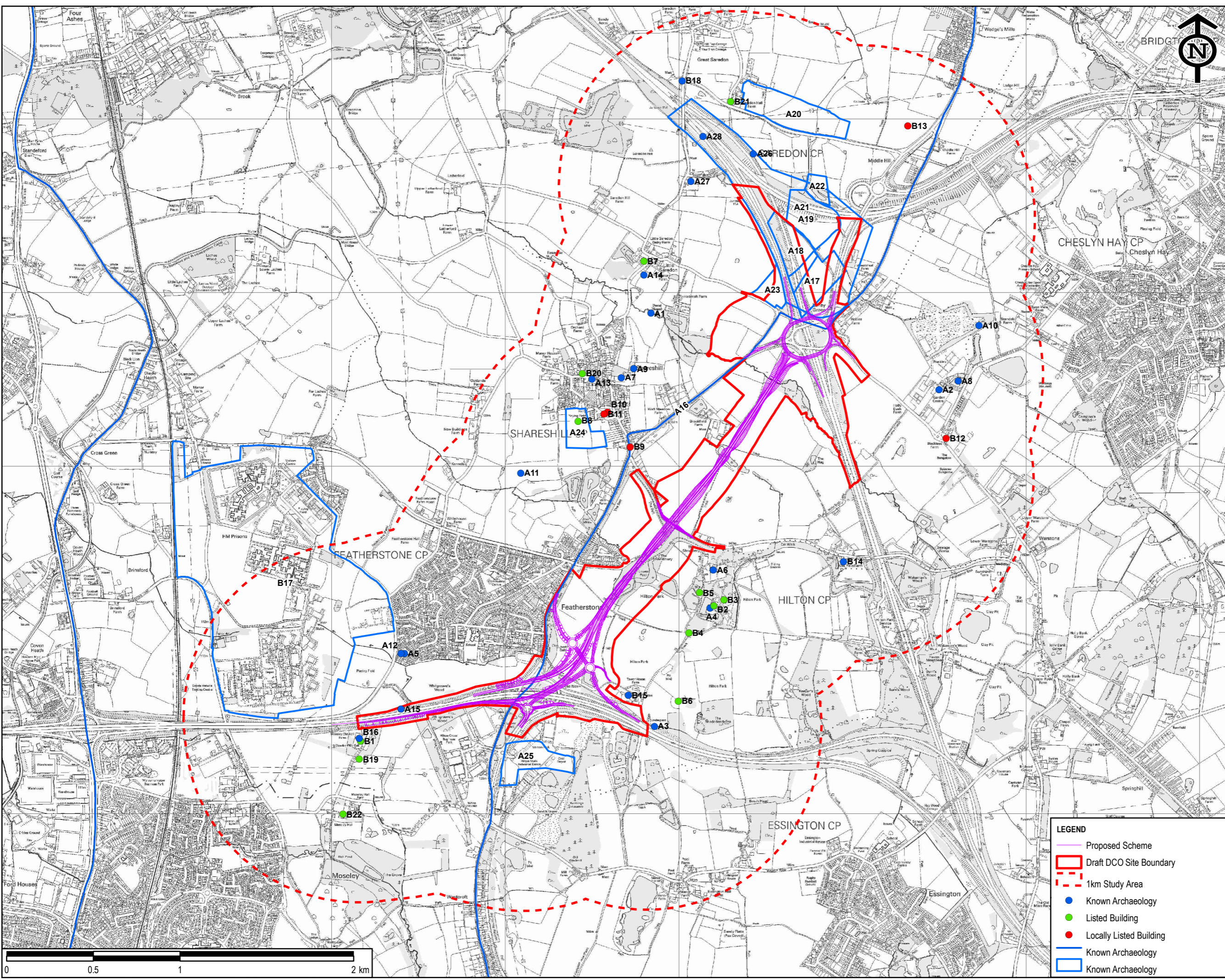
Plot Date: 05 December 2018 12:38:12
 File Name: \\ukis2pfs001\1\ie\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Figure 1.1 Proposed DCO application.mxd



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<div style="display: flex; justify-content: space-between; align-items: center;"> draft DCO site boundary </div>				
<div style="display: flex; justify-content: space-between; align-items: center;"> Proposed Scheme </div>				
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First Issue	EC	31/10/18	P01	
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Project Title				
M54 TO M6/M6 (TOLL) LINK ROAD				
Drawing Title				
FIGURE 1.1 DRAFT DCO SITE BOUNDARY AND GENERAL ARRANGEMENT				
Designed DM	Drawn EC	Checked AR	Approved TP	Date 05/12/2018
Internal Project No. 60529339		Suitability S2		
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Drawing Number Highways England PIN HE514465	Originator -ACM	Volume -EGN -	Issue -DR -LE -0001	Rev P01
Location M54_SW_RP_Z	Type	Role	Number	



Plot Date: 05 December 2018 16:35:57
 File Name: \\UKS2\psa001\uk\environment\practice\areas\archaeology\projects\M54-M6 Link 60529339\GIS\Workspaces\Fig 7.1 Known Archaeology.mxd



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Project Title
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Drawing Title
**FIGURE 7.1
 KNOWN HERITAGE ASSETS**

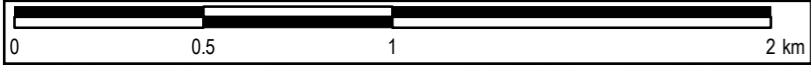
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Internal Project No.	Suitability			
60529339	S2			
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1:20,000	M54 to M6/M6 (Toll) Link Road			

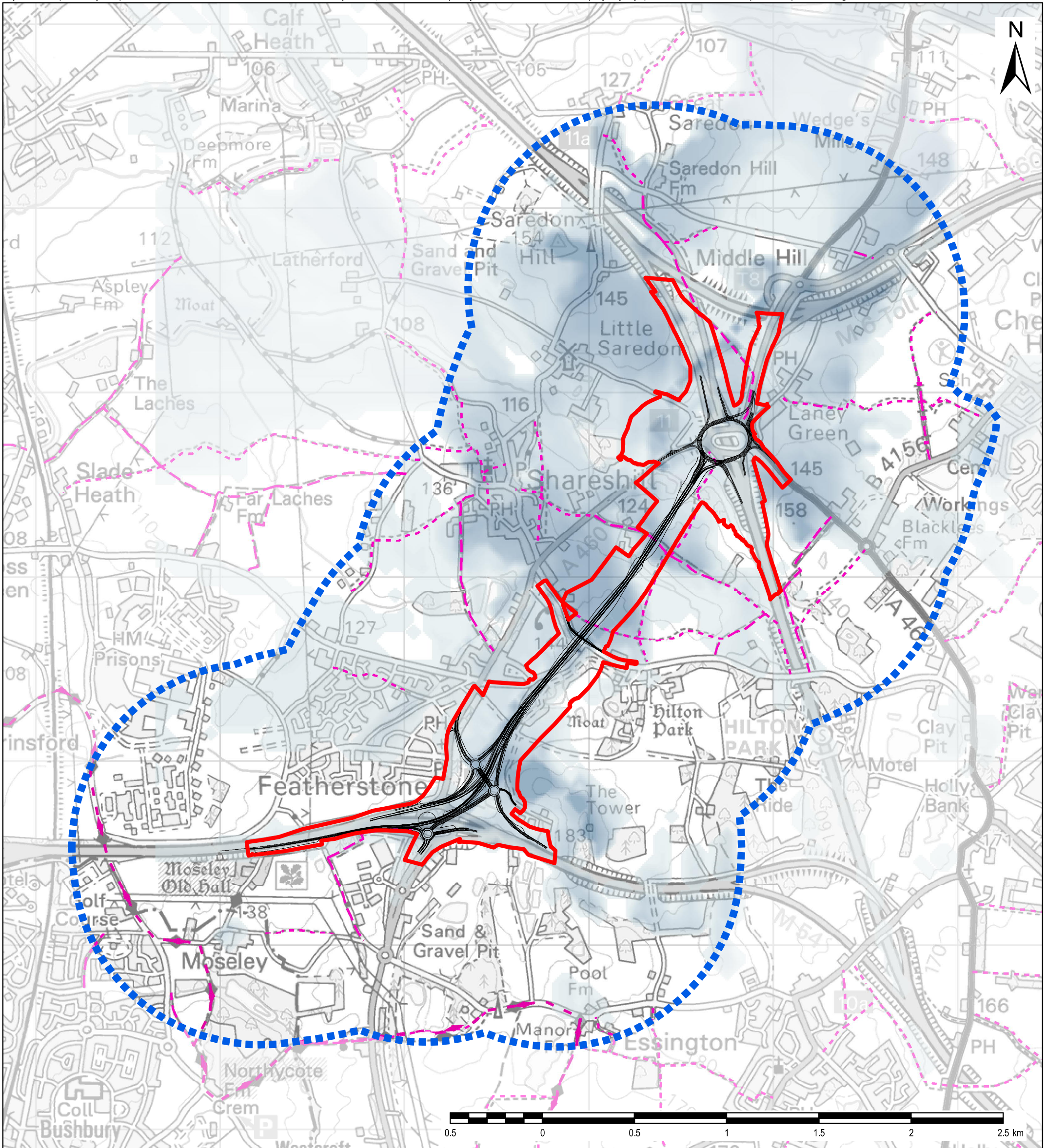
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LEGEND

- Proposed Scheme
- Draft DCO Site Boundary
- 1km Study Area
- Known Archaeology
- Listed Building
- Locally Listed Building
- Known Archaeology
- Known Archaeology





LEGEND

- Draft DCO Site Boundary
- Extent of Study Area
- Proposed Scheme
- Zone of Theoretical Visibility**
- Higher visibility
- Lower visibility
- Public Rights of Way**
- Footpath
- Bridleway
- Byway Open to All
- Monarch's Way long distance footpath

Project Number:	60529339		
Suitability:	S2		
Zone:	M54 TO M6 / M6 (TOLL) LINK ROAD		
Rev:	P02		
Drawn:	RW	Chk'd:	NW
App'd:	TP	Date:	06/12/2018
Scale at A3:	1:20,000		
Drawing No:	HE514465-ACM-ELS-M54_SW_PR_Z-DR-LV-0003		

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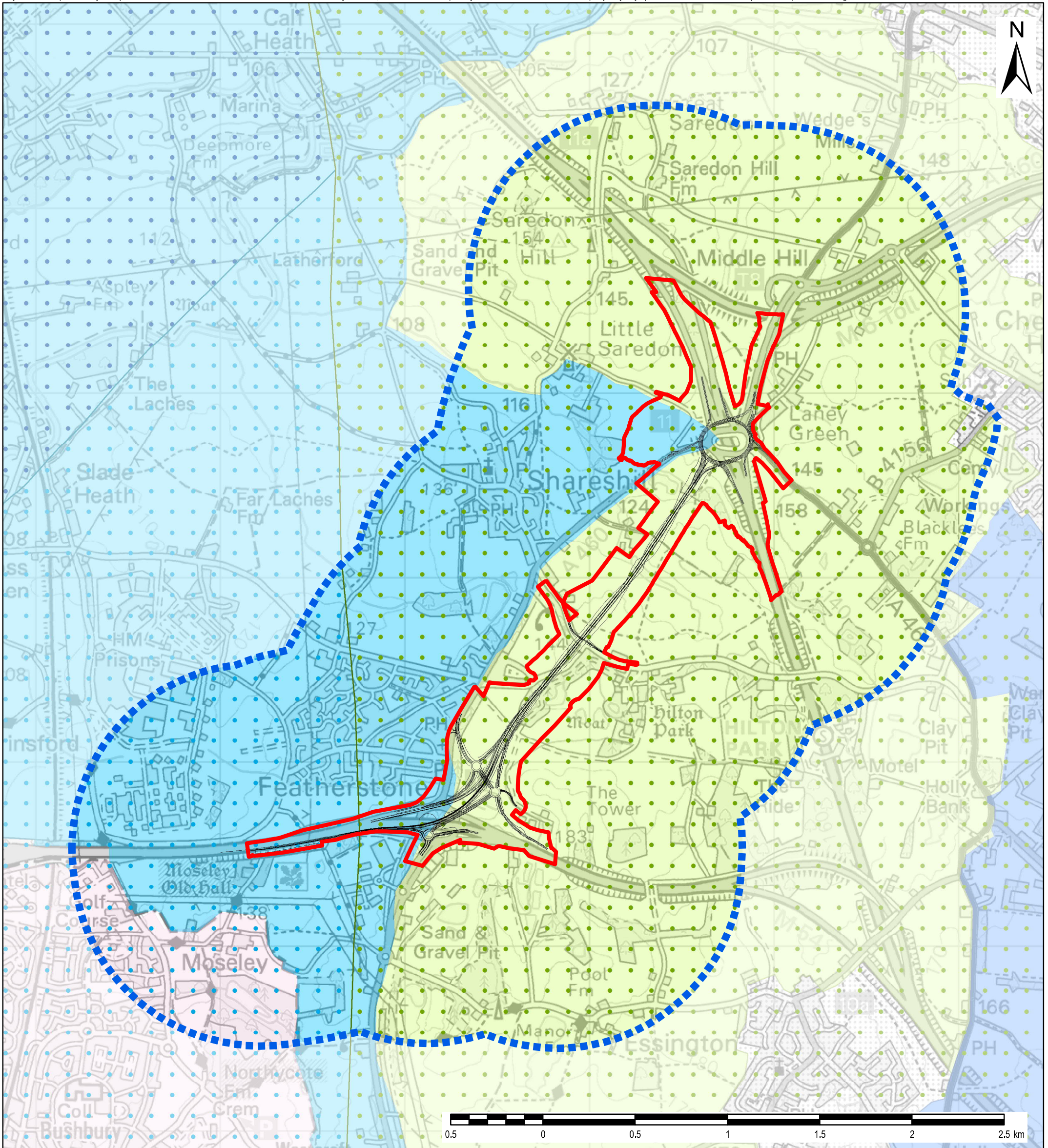
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**FIGURE 8.1 -
ZONE OF THEORETICAL VISIBILITY**

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LEGEND

- Draft DCO Site Boundary
- Proposed Scheme
- Extent of Study Area

National Character Area

- NCA 67: Cannock Chase and Cank Wood
- NCA 66: Mid Severn Sandstone Plateau
- NCA 61: Shropshire, Cheshire and Staffordshire Plain

Staffordshire Landscape Character

- Coalfield farmlands LCT
- Settled heathlands LCT
- Settled plateau farmland slopes LCT
- Urban

Black Country Historic Landscape Character Areas

- WV10 - Pendeford, Fordhouses & Bushbury LCA

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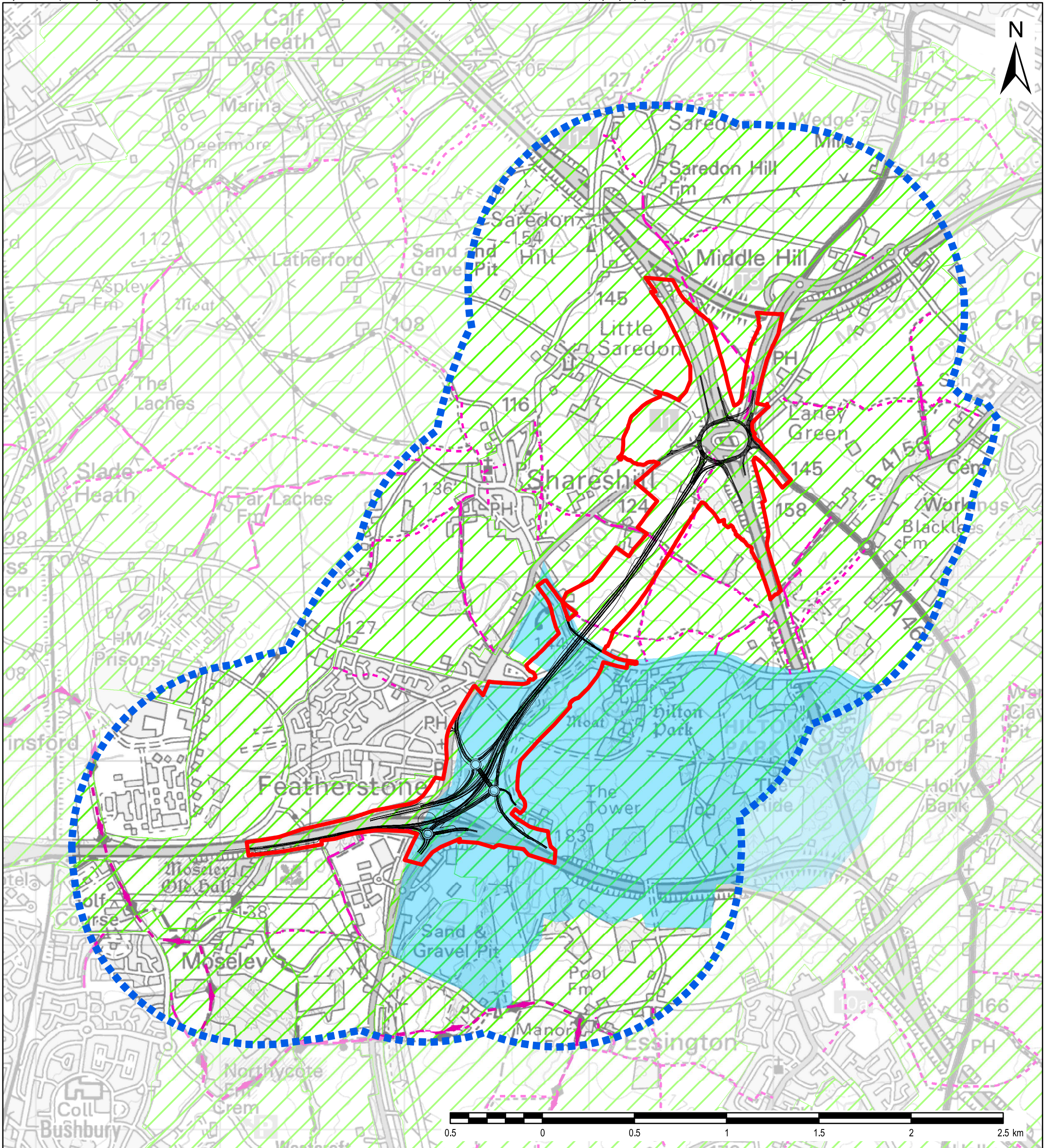
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**FIGURE 8.2 -
LANDSCAPE CHARACTER**

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LEGEND

- Draft DCO Site Boundary
- Proposed Scheme
- Extent of Study Area
- Historic Landscape Areas (South Staffordshire Council)
- Green Belt land
- Public Rights of Way
 - Footpath
 - Bridleway
 - Byway Open to All Traffic
 - Monarch's Way long distance footpath

Project Number:	60529339		
Suitability:	S2		
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**FIGURE 8.3 -
LANDSCAPE DESIGNATIONS**

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Plot Date: 05 December 2018 12:47:40
 File Name: \\ukhs2pfs001\ukhs2pfs001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 9.1 European Designated Sites.mxd



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- Proposed Scheme
- Draft DCO Site Boundary
- 10km Buffer of draft DCO site boundary
- Special Area of Conservation

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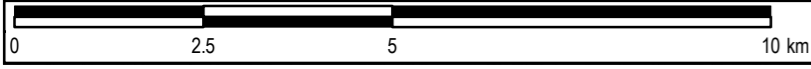
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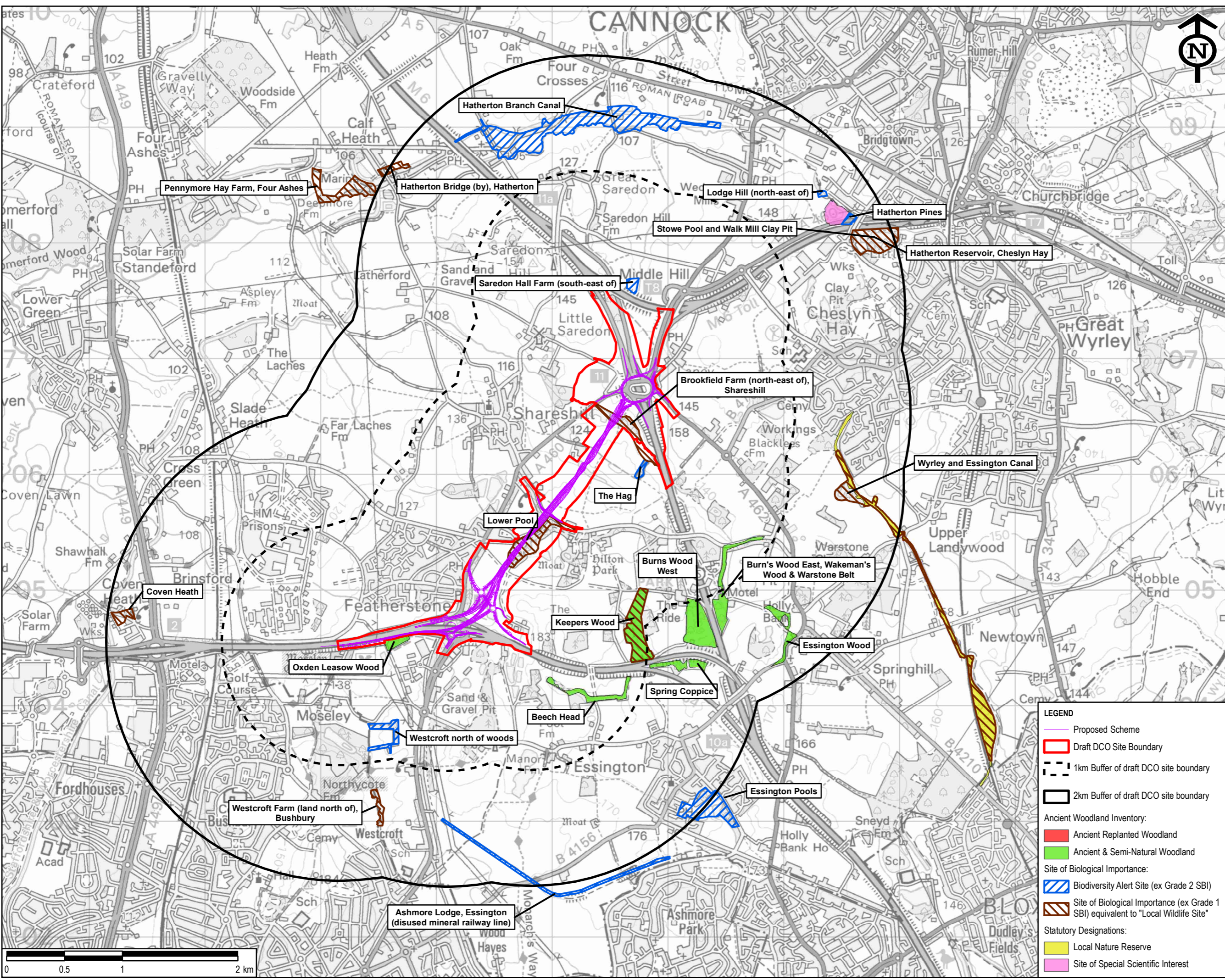
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**FIGURE 9.1
 EUROPEAN DESIGNATED SITES**

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highways england

Project Title
M54 TO M6/M6 (TOLL) LINK ROAD

Drawing Title
**FIGURE 9.2
STATUTORY, NON-STATUTORY
AND ANCIENT WOODLAND SITES**

Designed DM	Drawn DM	Checked LK	Approved LK	Date 05/12/2018
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Internal Project No.
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Suitability
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Zone
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LEGEND

- Proposed Scheme
- Draft DCO Site Boundary
- 1km Buffer of draft DCO site boundary
- 2km Buffer of draft DCO site boundary

Ancient Woodland Inventory:

- Ancient Replanted Woodland
- Ancient & Semi-Natural Woodland

Site of Biological Importance:

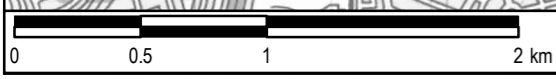
- Biodiversity Alert Site (ex Grade 2 SBI)
- Site of Biological Importance (ex Grade 1 SBI) equivalent to "Local Wildlife Site"

Statutory Designations:

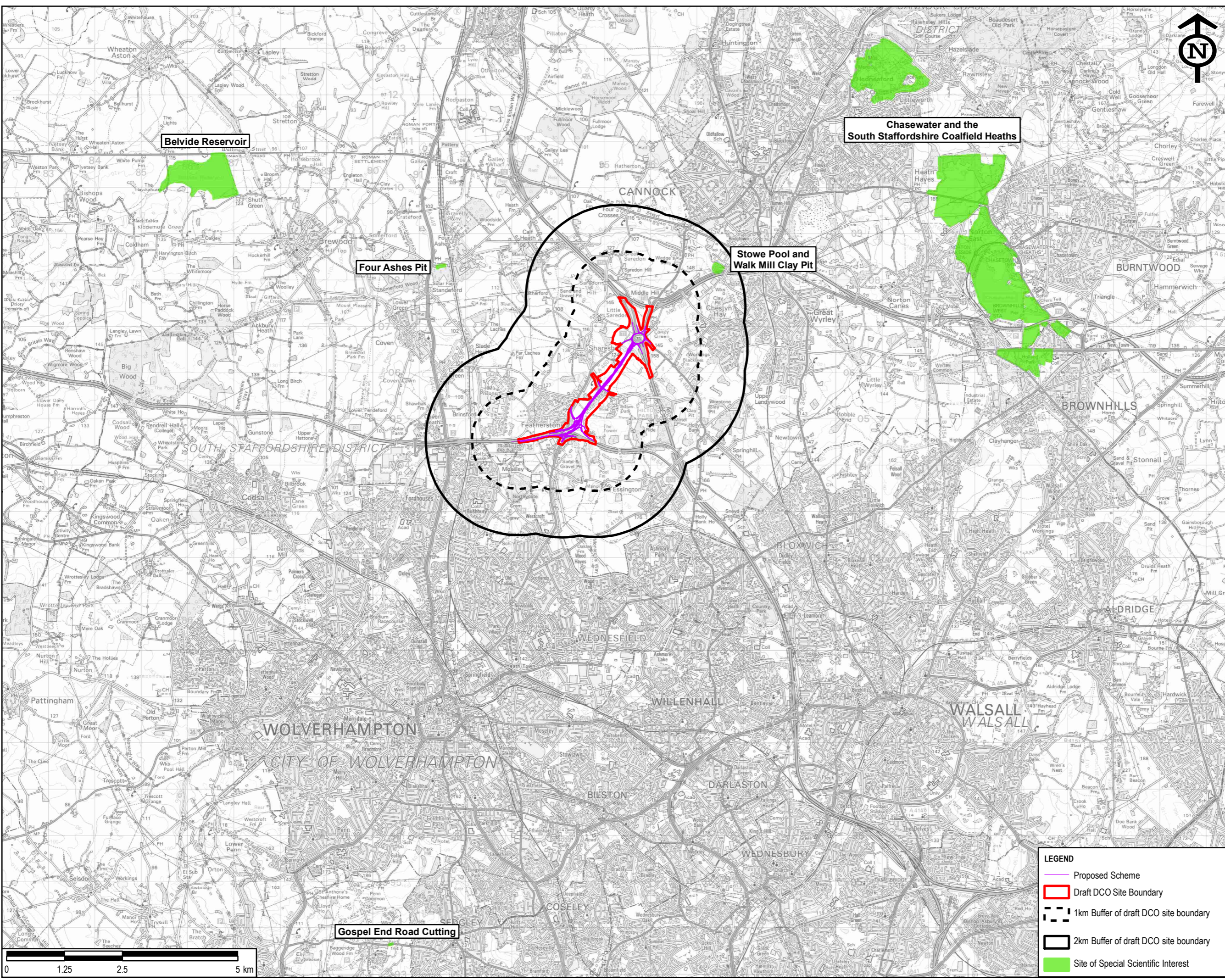
- Local Nature Reserve
- Site of Special Scientific Interest

Drawing Number HE514465 M54_SW_01_Z	Originator -ACM	Volume -HML	Rev P01
Location	-DR - CH - 0001	Type Role Number	

Plot Date: 05 December 2018 16:38:08
 File Name: \\ukcas\pfs\001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 9.2 Statutory, Non-Statutory and Ancient Woodland Sites.mxd



Plot Date: 05 December 2018 14:04:17
 File Name: \\ukrs2pfs001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54\M6 Link\Workspace\Fig 9.3 Statutory Designated Sites within the Local Air Quality Study Area.mxd



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Working on behalf of

Project Title
M54 TO M6/M6 (TOLL) LINK ROAD

Drawing Title
**FIGURE 9.3
 STATUTORY DESIGNATED SITES
 WITHIN THE LOCAL AIR QUALITY
 STUDY AREA**

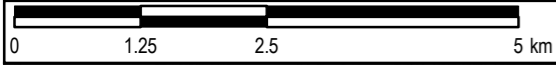
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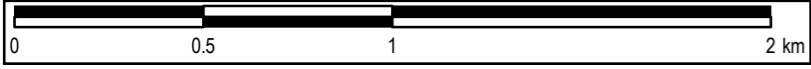
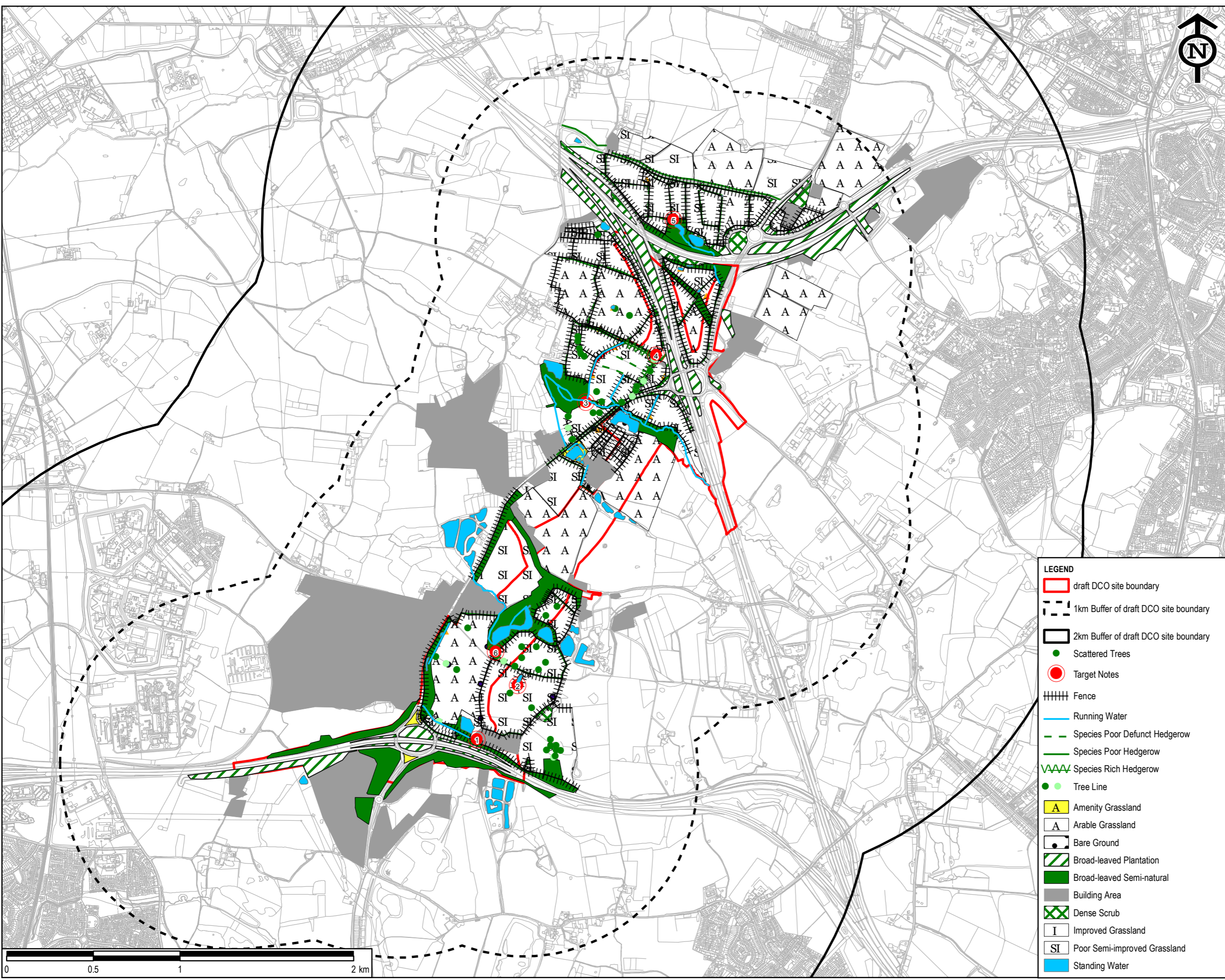
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Drawing Number HE514465 M54_SW_01_Z Location	Originator -ACM -DR - CH - 0001 Type Role Number	Volume -HML - Page	Rev P01

LEGEND

- Proposed Scheme
- Draft DCO Site Boundary
- 1km Buffer of draft DCO site boundary
- 2km Buffer of draft DCO site boundary
- Site of Special Scientific Interest



Plot Date: 11 December 2018 15:50:19
 File Name: \\UK\hsc\pfs\001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 9.4 Phase 1 Habitat Survey.mxd

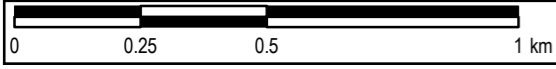
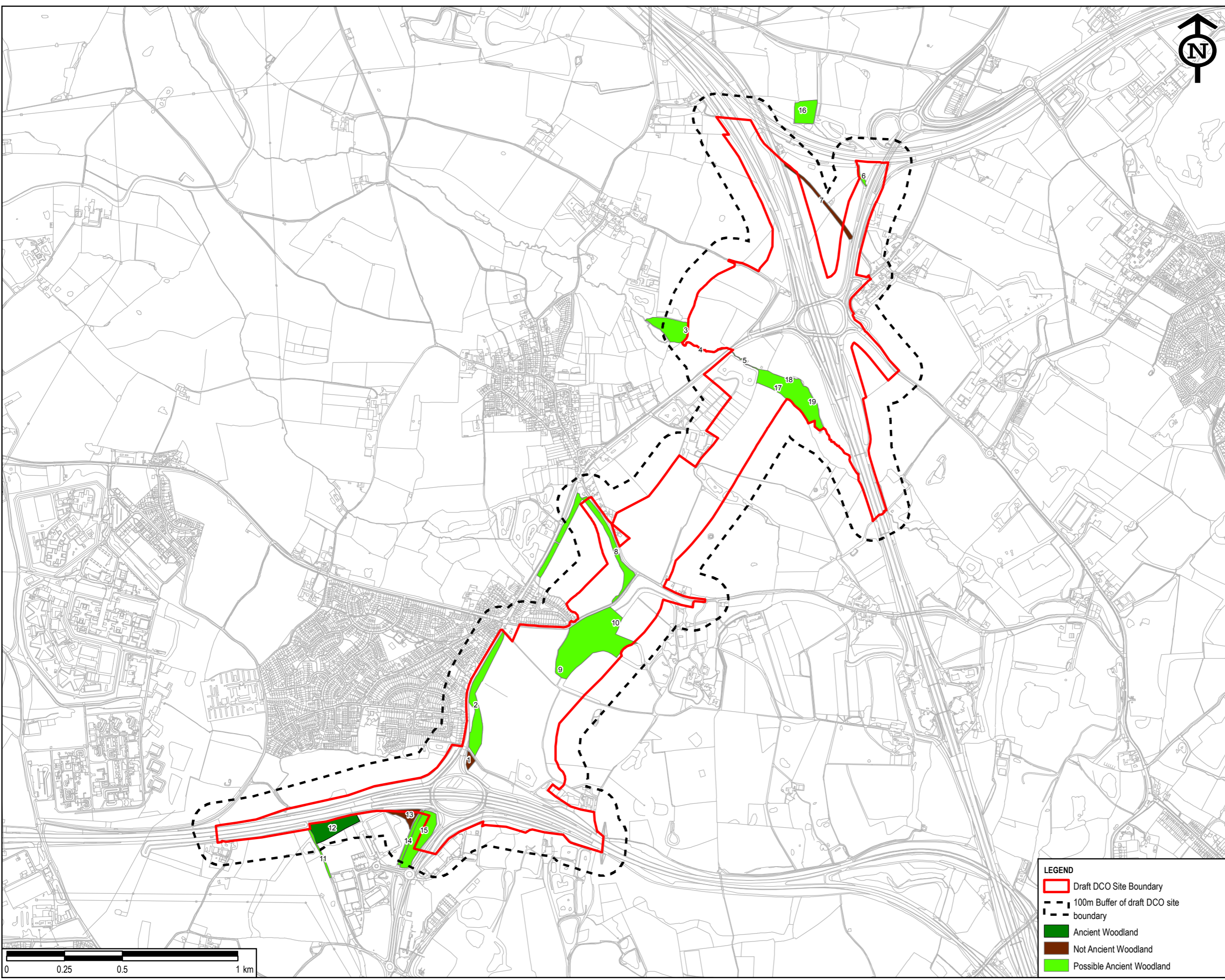


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First Issue	EC	04/12/18	P01
Revision Details	By	Date	Suffix
	AR		
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LEGEND			
	draft DCO site boundary		1km Buffer of draft DCO site boundary
	2km Buffer of draft DCO site boundary		Scattered Trees
	Target Notes		Fence
	Running Water		Species Poor Defunct Hedgerow
	Species Rich Hedgerow		Species Poor Hedgerow
	Tree Line		Broad-leaved Plantation
	Amenity Grassland		Broad-leaved Semi-natural
	Arable Grassland		Building Area
	Bare Ground		Dense Scrub
	Improved Grassland		Poor Semi-improved Grassland
	Standing Water		

FOR INFORMATION			
Client	Working on behalf of		
Highways England			
The Cube	199 Wharfside Street		
Birmingham	B1 1RN		
Project Title	M54 TO M6/M6 (TOLL) LINK ROAD		
Drawing Title	FIGURE 9.4 PHASE 1 HABITAT SURVEY		
Designed EC	Drawn EC	Checked AR	Approved TP
			11/12/2018
Internal Project No.	Suitability		
60529339	S2		
Scale @ A3	Zone		
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M54_SW_RP_Z		-DR - CH - 0001	
Location	Type	Role	Number

Plot Date: 20 December 2018 09:09:09
 File Name: \\UKS2\pfs\001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 9.5 Ancient Woodland.mxd



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First Issue	DM LK	24/04/18	P01
Revision Details	EC AR	29/12/18	Suffx
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Project Title			
M54 TO M6/M6 (TOLL) LINK ROAD			
Drawing Title			
FIGURE 9.5 ANCIENT WOODLAND			
Designed DM	Drawn DM	Checked LK	Approved LK
Date 20/12/2018			
Internal Project No. 60529339		Suitability S2	
Scale @ A3		Zone M54 to M6/M6 (Toll) Link Road	
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Drawing Number Highways England PIN M54_SW_RP_Z	Originator -ACM	Volume -HML - -DR - CH - 0001	Rev P01

LEGEND

- Draft DCO Site Boundary
- 100m Buffer of draft DCO site boundary
- Ancient Woodland
- Possible Ancient Woodland
- Not Ancient Woodland



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Revision Details	By	Check	Date	Suffix

Purpose of Issue
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Working on behalf of
highways england

Project Title
M54 TO M6/M6 (TOLL) LINK ROAD

Drawing Title
FIGURE 12.1 NOISE LOCATION PLAN

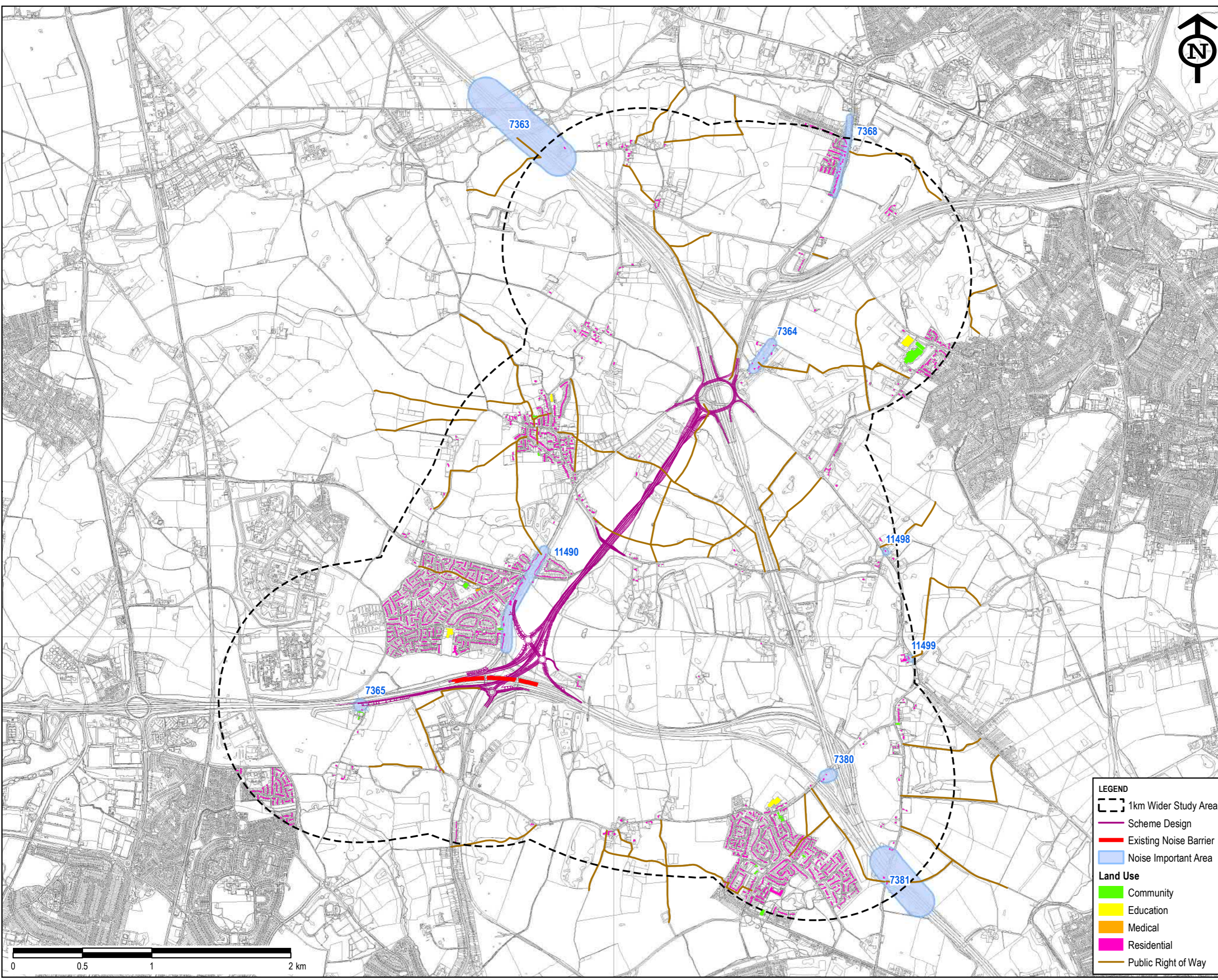
Designed	Drawn	Checked	Approved	Date
CN	JW	SS	SS	11/10/2018
Internal Project No.	Suitability			
60536736	S3			
Scale @ A3	Zone			
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HE514462	-ACM	-ENV -	P01
M54_SW_01_Z	-DR - LN -	00121	
Location	Type	Role	Number



LEGEND

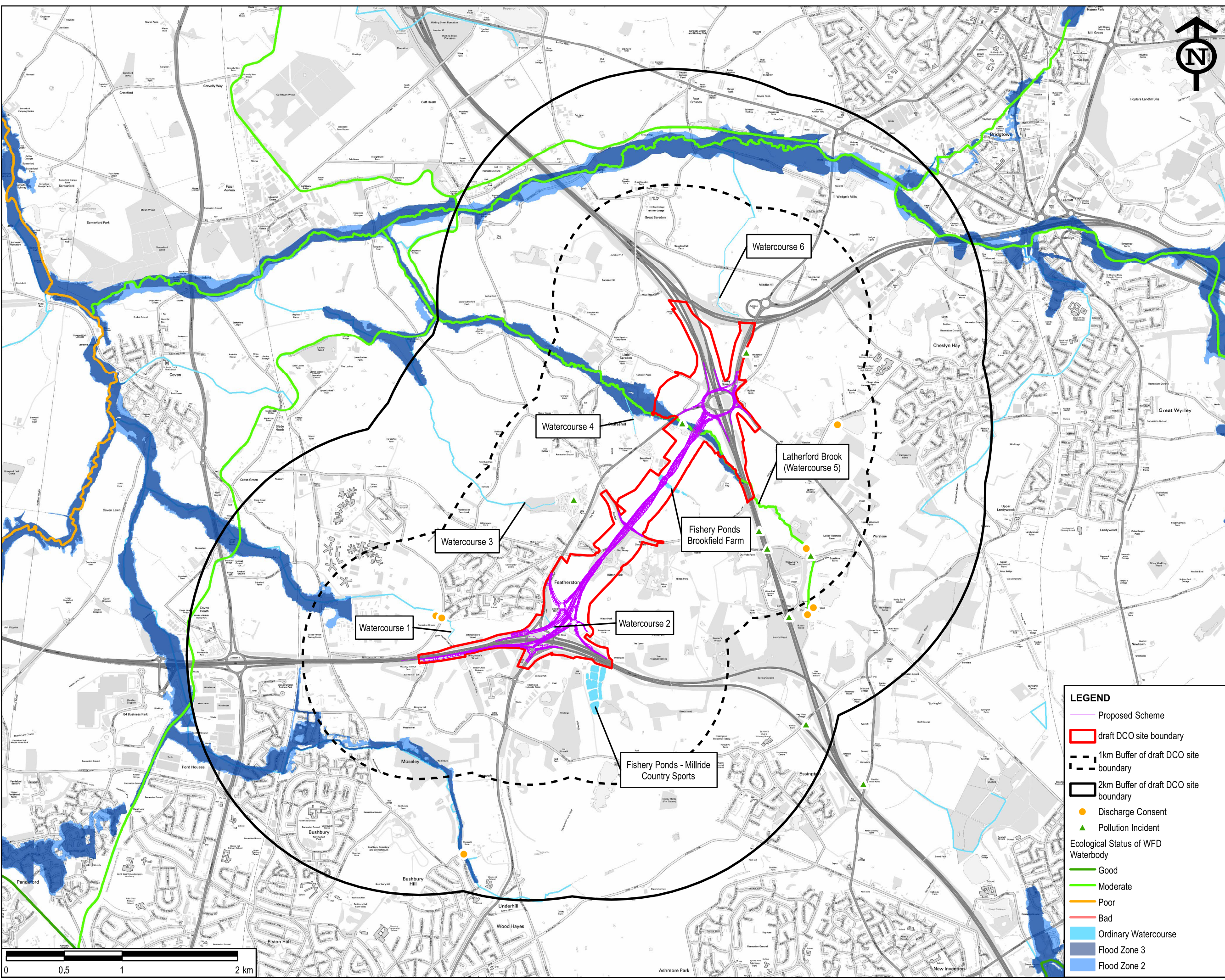
- 1km Wider Study Area (dashed black line)
- Scheme Design (purple line)
- Existing Noise Barrier (red line)
- Noise Important Area (light blue fill)

Land Use

- Community (green fill)
- Education (yellow fill)
- Medical (orange fill)
- Residential (pink fill)
- Public Right of Way (orange line)

Plot Date: 11 October 2018 11:16:18
File Name: I:\5004 - Information Systems\60536736_M54_M6_Link02_Maps\Figure 12-1- Noise Location Plan.mxd

Plot Date: 05 December 2018 13:54:24
 File Name: \\ukis2pfs001\ukis2pfs001\1\ie\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Figure 14.1 Water Resources and Flood Risk.mxd



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	Check		

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Working on behalf of

Project Title
M54 TO M6/M6 (TOLL) LINK ROAD

Drawing Title
FIGURE 14.1 WATER RESOURCES AND FLOOD RISK

Designed	Drawn	Checked	Approved	Date
DM	EC	AR	TP	05/12/2018
Internal Project No.	Suitability			
60529339	S2			
Scale @ A3	Zone			
1:30,000	M54 to M6/M6 (Toll) Link Road			

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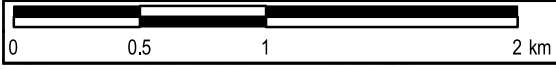
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Drawing Number	Originator	Volume	Rev
HE514465	-EGN	-EGN	P01
M54_SW_RP_Z	-DR-LE-001	-DR-LE-001	
Location	Type	Role	Number

LEGEND

- Proposed Scheme
- draft DCO site boundary
- 1km Buffer of draft DCO site boundary
- 2km Buffer of draft DCO site boundary
- Discharge Consent
- Pollution Incident
- Ecological Status of WFD Waterbody
 - Good
 - Moderate
 - Poor
 - Bad
- Ordinary Watercourse
- Flood Zone 3
- Flood Zone 2



Appendices

Appendix 5.1: Transboundary Effects Screening Matrix

Regulation 32 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the consideration of any likely significant effects on the environment of another European Economic Association (EEA) State.

Guidance upon the consideration of transboundary effects is provided in the Inspectorate's Advice Note 12: Transboundary impacts (Planning Inspectorate, 2015). The following screening matrix provides the consideration of transboundary effects for the proposed Scheme, taking guidance from Advice Note 12 (Annex).

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
<p>Characteristics of the development:</p> <ul style="list-style-type: none"> • Size of the development • Use of natural resources • Production of waste • Pollution and nuisance • Risk of accidents • Use of technologies 	<p>The proposed Scheme includes the construction of a new highway on agricultural land between the M54, M6 and A460 and the remodelling of junction 1 of the M54 and junction 11 of the M6. The proposed Scheme would be approximately 2.8 km in length.</p> <p>Some of the resources required for the construction of the proposed Scheme are likely to be obtained from the global market e.g. steel, but it is envisaged that materials would be obtained locally wherever possible.</p> <p>No waste, nuisances or pollution are likely to be produced that would extend beyond the border of the UK.</p> <p>There are always inherent risks associated with the construction and operation of highways schemes, however, with appropriate working methods and traffic management the risk of accidents occurring is very low.</p> <p>No novel technologies are proposed that have potential for transboundary effects.</p>
<p>Geographical Area</p> <ul style="list-style-type: none"> • What is the extent of the area of a likely impact under the jurisdiction of another EEA state? 	<p>It is extremely unlikely that the impacts of proposed Scheme will extend beyond the jurisdiction of the UK, with the exception of potential release of greenhouse gas emissions which would be minimal within a global context.</p>
<p>Location of Development</p> <ul style="list-style-type: none"> • What is the existing use? • What is the distance to another EEA state? (Name EEA state) 	<p>The majority of the site is currently agricultural land, however, both the southern and northern extends of the proposed Scheme would include existing highways.</p> <p>The proposed Scheme is approximately 270 km to the west of Ireland and is 320 km to the east of France.</p>
<p>Cumulative Impacts</p> <ul style="list-style-type: none"> • Are other major developments close by? 	<p>Other developments that have the potential to have cumulative effects in combination with the proposed Scheme have not been identified at this stage, and will be identified as part of the Environmental Statement. Notwithstanding this, the construction and operation of the proposed Scheme in combination with other schemes for development are very unlikely to lead to transboundary effects.</p>
<p>Carrier</p> <ul style="list-style-type: none"> • By what means could impacts be spread (i.e. what pathways)? 	<p>The impact of greenhouse gas emissions would be spread by atmospheric processes.</p>
<p>Environmental Importance</p>	<p>There are a number of locally designated ecological sites located</p>

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
<ul style="list-style-type: none"> • Are particular environmental values (e.g. protected areas – name them) likely to be affected? • Capacity of the natural environment • Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance 	<p>within 1 km of the proposed Scheme, including Lower Pool SBI (LWS) and Brookfield Farm, Shareshill SBI (LWS), which are immediately adjacent to, and will be directly affected by, the proposed Scheme. There are no sites designated for ecological value at a national scale within 1 km of the proposed Scheme. The nearest is the Wyrley & Essington Canal Local Nature Reserve, which is located approximately 1.5km to the north-east. There are a number of European protected sites located within 30km of the proposed Scheme, however, only one of these is designated for bats – Cannock Chase Special Area of Conservation (SAC) is located approximately 7.4 km to the north-east. A screening exercise at PCF Stage 2 (Options selection) determined that there would be no significant effects as a result of the proposed Scheme on European sites and therefore no European sites are required to be considered and taken forward to Appropriate Assessment. This screening exercise will be updated during PCF Stage 3 (preliminary design) but is considered that the results of this screening are unlikely to have changed.</p> <p>There are a number of listed buildings within 1 km of the proposed Scheme, including the Grade I Listed Hilton Hall and the associated Grade I Listed conservatory. There are no other cultural heritage designations within the Study Area. The historic landscapes comprise two non-designated historic parks and two Historic Environment Character Zones (HECZ).</p> <p>The landscape within the study area is not covered by any statutory landscape designations and the sensitivity of the landscape is generally considered to be low.</p> <p>The proposed Scheme is located within close proximity to populated areas and has the potential to generate a range of air quality, noise and visual effects, although air quality effects are not anticipated to be significant.</p>
<p>Extent</p> <ul style="list-style-type: none"> • What is the likely extent of the impact (geographical area and size of the affected population)? 	<p>The only potential transboundary environmental impact which is considered likely is from greenhouse gas emissions, which are known to contribute to changes on climate on a global scale.</p>
<p>Magnitude</p> <ul style="list-style-type: none"> • What will the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable? 	<p>Total UK greenhouse gas emissions were estimated to be 495.7 million tonnes of carbon dioxide equivalent (MtCO₂e) in 2015, whilst greenhouse gas emissions from UK transport were estimated to be approximately 120 MtCO₂e (Department for Business, Energy & Industrial Strategy (7 February 2017²). The proposed Scheme would make a negligible contribution to UK greenhouse gas emission. It is proposed to calculate the likely greenhouse gas emissions as part of the proposed EIA scope.</p>
<p>Probability</p> <ul style="list-style-type: none"> • What is the degree of probability of the impact? • Is the impact likely to occur 	<p>The probability of the proposed Scheme contributing to greenhouse gas emissions is likely and would occur as a consequence of the construction and normal operating conditions.</p>

² <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015>

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
<p>as a consequence of normal conditions or exceptional situations, such as accidents?</p>	
<p>Duration</p> <ul style="list-style-type: none"> • Is the impact likely to be temporary, short-term or long-term? • Is the impact likely to relate to the construction, operation or decommissioning phase of the activity? 	<p>The impact is likely to be long-term, relating to both construction and operation.</p>
<p>Frequency</p> <p>What is likely to be the temporal pattern of the impact?</p>	<p>The temporal pattern is likely to be relatively constant.</p>
<p>Reversibility</p> <ul style="list-style-type: none"> • Is the impact likely to be reversible or irreversible? 	<p>The impact is considered irreversible within human lifetimes.</p>

Appendix 7.1: Gazetteer of Heritage Assets

Archaeology Assets

Reference	Grid Reference	Period	Description	Ref Figure 7.1
01075, 76955	SJ 9484 0688	Prehistoric?	The remains of a probable Bronze Age burnt mound. The mound has been eroded by the adjacent stream.	A1
01083, 76944, EST1814	SJ 9650 0644	Medieval	Site of a medieval moat which dated from at least the 14 th century, based on documentary evidence. A second, possibly earlier moat may have existed to the north. Its location is marked on the OS first edition. It has been built over by a car park for a garden centre.	A2
1674	SJ 9486 0450	Post-Medieval	Possible boundary marker in the form of a low earthwork bank. A former road or trackway followed the line of the bank in the 19 th century.	A3
1690	SJ 9518 0518	Medieval	The site of a moated site at Hilton Park. The 18 th century house is now built over it. A possible deserted medieval village may have been located nearby.	A4
1915	SJ 9342 0492	Neolithic	Find spot of a Neolithic polished axe.	A5
03784, 76917	SJ 952 054	Early Medieval	Hilton/Haltone deserted settlement. The site of a settlement first recorded in 994/6AD and in the Domesday Book. The date of the desertion is unknown.	A6
03546, 76950	SJ 9467 0651	Medieval	One of four possible moated sites at Shareshill. Some remains survived as water filled features into the 1960s.	A7
50665	SJ 9661 0649	Post-Medieval	Possible marl pit, north of Backlees Farm. No remains survive.	A8
52261, EST1874	SJ 9474 0656	Post-Medieval to Modern	The find spot of unstratified finds of late post-medieval or modern date recovered during an archaeological watching brief. Finds included pottery and a handmade brick.	A9
54186	SJ 9673 0681	Post-Medieval/Modern	Site of brickworks which may have been known as the Holly Bush Works. It has its origins in the 19 th century and was also producing tile by c.1900. It was disused by 1920.	A10
55321	SJ 9409 0596	Medieval & Later	Ridge and furrow identified on 1960s aerial photography. The earthworks appear to have been ploughed out.	A11

Reference	Grid Reference	Period	Description	Ref Figure 7.1
58439	SJ 9340 0492	Post-Medieval	Site of Brook House Farm. It was shown on Yates' map of 1775 but was demolished in the late 20 th century in advance of construction of a housing estate.	A12
76960	SJ 945 065	Bronze Age	Find spot of a Bronze Age palstave.	A13
499351	SJ 948 071	Medieval or later	Site of a windmill of unknown date.	A14
1521694	SJ 934 046	Modern	Possible site of a World War II searchlight battery.	A15
58520	SO 9300 9752	Post-Medieval	Streetway and Wordsley Green Turnpike Road. A mid-18 th century turnpike road. The route had nine main gates and four side gates, and was first recorded in 1761.	A16
4534	SJ 9579 0704	Unknown	A number of field boundaries recorded as cropmarks.	A17
4535	SJ 9565 0723	Unknown	Cropmark of a group of ditched enclosures of unknown date.	A18
04536, 1411041, EST2448	SJ 9546 0770	Medieval/Post-Medieval	Cropmarks of features related to a medieval field system and/or post-medieval trackways and field boundaries. The features were excavated in advance of the construction of the M6 Toll.	A19
5416	SJ 9567 0805	Medieval	The remains of earthwork ridge and furrow.	A20
5423	SJ 9577 0741	Unknown	Cropmark complex of unknown date. Features include ditches, pits and other cut features which may represent a settlement complex.	A21
5424	SJ 9579 0759	Unknown	A curvilinear bank and a second, straighter bank, recorded from aerial photographs.	A22
5425	SJ 9551 0703	Unknown	A cropmark complex containing pits and other negative features.	A23
20391	SJ 9446 0621	Medieval	Earthwork remains of ridge and furrow recorded from aerial photographs from the 1960s.	A24
20491	SJ 9418 0428	Modern	Hilton Main Colliery. Established in the early 20 th century.	A25

Built Heritage

Reference	Grid Reference	Period	Description	Ref Figure 7.1
09126, 77058, 77081DST3803	SJ 93168 04414	Post-Medieval	Moseley Old Hall. A late 16 th century timber framed house, later encased in brown brick with blue brick dressings in around 1870. Charles II took refuge here after the Battle of Worcester in 1651. Now owned by the National Trust Grade II* listed building.	B1
09119, 76936, DST3795	SJ 95202 05194	Post-Medieval	Hilton Hall. A country house built for Henry Vernon c.1720-30. Built of red brick and with three storeys. It is tentatively attributed to Richard Trubshaw. Grade I listed building.	B2
09120, DST3796	SJ 95260 05229	Post-Medieval	Coach house and stable block at Hilton Park. Dated to around 1830, built of red brick with a slate roof. It has four ranges surrounding a quadrangular courtyard. Grade II listed building.	B3
09122, DST3797	SJ 95058 05039	Post-Medieval	A pair of early 18 th century gate piers at Hilton Park. Grade II listed building.	B4
09121, DST3798	SJ 9512 0527	Post-Medieval	An early 19 th century conservatory at Hilton Park. Circular in plan and of a half cast-iron frame and half wooden frame construction, with a hemispherical dome. It was heated by a furnace in the cellar below. It is derelict and on the Heritage at Risk Register. Grade I listed building.	B5
09123, DST3808	SJ 94998 04646	Post-Medieval	The Portobello Tower, Hilton Park. A tower built for Henry Vernon between 1739 and 1765 to commemorate the taking of Portobello by Admiral Edward Vernon during the 'War of Jenkin's Ear' in 1739. It may have been by Richard Trubshaw. The tower is in poor condition. Grade II listed building.	B6
617134	SJ 9480 0718	Post-Medieval	Little Saredon Manor. A 16 th century house with an earlier moat. A timber framed core with brick walls and plain tile roofs in a H-plan. Built of stone, brick and timber. Two sides of a rectangular moat and part of a third are still in existence. Grade II listed building.	B7
1354557, 1443968,	SJ 9442 06258	Post-Medieval	Church of St Mary and St Luke. A parish church built c.1742 with a 15 th to 16 th century west tower. Built of red brick with ashlar tower and dressings and a plain tile roof.	B8

Reference	Grid Reference	Period	Description	Ref Figure 7.1
1485899, 1488562, 1578726			Archaeological investigation revealed post-medieval burial vaults, graves and a boundary wall. Grade II* listed building.	
56454, DST7925	SJ 9472 0611	Modern	An ex-Wolverhampton Corporation small timber bus shelter with a tiled roof on the junction of Cannock Road and Church Lane in Shareshill. It was probably built in the mid-20 th century. List of Buildings of Special Local Interest, Grade C.	B9
58767, DST8288	SJ 9459 0631	Post-Medieval	The Elms Public House. A mid-19 th century house converted for use as a public house in 1956. List of Buildings of Special Local Interest, Grade A.	B10
58768, DST8289	SJ 9457 0630	Post-Medieval	The Old Barn. A former barn, now a residential building, built around 1800. List of Buildings of Special Local Interest.	B11
58769, DST8290	SJ 9654 0616	Post-Medieval	A three storey farmhouse at Blacklees Farm. List of Buildings of Special Local Interest, Grade B.	B12
58770, 1412701, DST8292	SJ 9632 0796	Modern	Remains of an anti-aircraft gun site. The remains include four octagonal gun pits with an associated oblong command post. List of Buildings of Special Local Interest, Grade C.	B13
57396	SJ 9595 0545	Post-Medieval	Old Yells Farm/White Farm. An early 19 th century farmstead laid out around a regular courtyard with a main U-plan range and additional detached outbuildings.	B14
58258	SJ 9471 0468	Post-Medieval	Tower House Farm/Home Farm, Hilton. A 19 th century farm that may have been established to serve Hilton Park.	B15
58440	SJ 9316 0443	Post-Medieval	Mosely Old Hall Farm. An isolated farmstead associated with Mosely Old Hall. It may have been established as early as the late 16 th century and is laid out around a loose, three-sided yard.	B16
50418	SJ 9272 0534	Modern	Royal Ordnance Factory, Cat and Kittens Lane, Featherstone. A shell filling factory from World War II. It was built between 1940 and 1942. It included barracks, air raid shelters, pillboxes (see separate entries) workshops and a railway siding, as well as the factory buildings. It is thought that the factory was used to fill heavy bombs, along with the production of anti-tank shells and .303 cartridges for Lee Enfield rifles and Bren guns. The site was chosen as it was relatively flat and was close to a railway line. Later uses	B17

Reference	Grid Reference	Period	Description	Ref Figure 7.1
			included a teacher training college and a prison. It has since been redeveloped.	

Appendix 9.1: Extended Phase 1 Habitat Report



M54-M6/M6 Toll Link Road

Extended Phase 1 Habitat Report

**Report Number: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0001-P01 S2
November 2018**

M54-M6/M6 Toll Link Road

Extended Phase 1 Habitat Report

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November 2018

Issue No	Current Status	Date	Prepared By	Reviewed By	Approved By
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Appendices

- Annex A: Wildlife Legislation and Policy
- Annex B: Phase 1 Habitat Maps
- Annex C: Target Notes
- Annex D: Waterbodies and Watercourse

1. INTRODUCTION

1.1. Background

- 1.1.1. The A460 currently provides a link between the M54 Junction 1, M6 Junction 11 and M6 Toll Junction T18 via Featherstone, Staffordshire. The A460 is a single carriageway road which experience significant congestion for vehicles travelling between the M6 north, M54 and M6 Toll. To alleviate congestion Highways England are proposing a new two lane dual carriageway link road, approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, herein referred to as the 'proposed Scheme'. This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.
- 1.1.2. A suit of ecological surveys will be undertaken to the support the Environmental Statement including an Extended Phase 1 survey within the proposed Scheme boundary.

1.2. Study Area and Location

- 1.2.1. The study area for the proposed Scheme is located north of Wolverhampton, within the County of Staffordshire. The study area for the Extended Phase 1 Habitat survey is defined as the draft DCO site boundary and a 250 m buffer as shown in Figures 1 and 2, Annex B.
- 1.2.2. The surrounding area consists predominantly of arable farmland interspersed with areas of grassland, woodland, several waterbodies and small watercourses. There are several major roadways which intersect the local landscape including the M6, M6 Toll, M54, and A460. Residential areas within the surrounding landscape include the small villages of Featherstone, Shareshill and Hilton which are directly adjacent to the A460, the civil parish of Great Saredon adjacent to the M6 Toll, as well as scattered small holdings and various farmhouses.

1.3. Survey Aims and Objectives

- 1.3.1. All habitats within the study area have been mapped and described to provide an overview of the proposed Scheme boundary. This included the recording of specific features indicating the presence, or likely presence, of protected species such as bats, birds, great crested newts (GCN) (*Triturus cristatus*), badger (*Meles meles*), water vole (*Arvicola amphibious*), and other species of conservation significance. This also included the mapping of any invasive flora identified.
- 1.3.2. This report is intended to identify the presence, or likelihood of presence from the evaluation of habitats and features, of protected species and other species of conservation significance against National and European Legislation (see Annex A), and recommend, where necessary, any further surveys or mitigation needed.

1.4. Limitations

- 1.4.1. This report highlights habitats and the potential for protected species evident on the day of the survey visit. It does not record any ecological features that may only appear at other times of the year and therefore were not evident at the time of the visit.

-
- 1.4.2. Access to certain land plots was not permitted and therefore they were surveyed from adjacent land where possible. It is possible that features of interest were missed; however, sufficient information could be gained to inform the requirement for further surveys so this is not considered a significant limitation.
 - 1.4.3. One area, within a land plot, was not fully assessed due to the density of vegetation present at the time of survey. The location of this area was E 395694, N 307626. This area was assessed from adjoining land where access was granted.
 - 1.4.4. Areas of private residential dwellings and their associated curtilages were not surveyed due to land access not being permitted.
 - 1.4.5. There were numerous mature trees assessed within the survey area for bat potential. Many of the trees assessed showed significant ivy (*Hedera helix*) cover up the trunk and occasionally along major limbs. Whilst ivy should be considered for bat roost potential, it prevents identifying other features such as holes and cracks in the tree. This is not considered a limitation as further survey work, utilising a different methodology, is proposed where tree climbing surveys undertaken in August 2018 could not be undertaken safely.
 - 1.4.6. Despite the limitations detailed above, it is considered that there was sufficient information gathered during the survey to inform the PCF Stage 3 (preliminary design) (development of the preferred route) surveys.

2. METHODOLOGY

2.1. Desktop Study

- 2.1.1. A desktop study of statutory and non-statutory designated sites and protected species was completed in 2015 along the route of the proposed Scheme. This search included the proposed Scheme and a 2 km buffer and was obtained from Natural England, the Environment Agency, Staffordshire Ecological Record Centre (SER), and the Ecological records centre for Birmingham and the Black Country (EcoRecord). The data search was repeated in 2017, for information held by SER.
- 2.1.2. In April 2018, a data search utilising freely available information from Magic Map and NBN Atlas was undertaken for statutory and non-statutory designated sites and protected species records. OS maps were further accessed to identify the presence of standing and running water within the study area. This search included the proposed Scheme and a 2 km buffer.

2.2. Field Survey

- 2.2.1. This survey included all accessible land plots within 250 m of the proposed Scheme boundary to identify evidence of protected species, suitable habitats or ecological features that could result in a constraint to the proposed works.
- 2.2.2. The survey was conducted by suitably qualified Ecologists; Stuart Graham MSc, CEcol, CEnv, MCIEEM and Dean Cordelle BSc (Hons), Grad CIEEM on the 18th, 23rd, 25th of April and 15th, 16th May 2018. Environmental conditions experienced during the surveys were as follows:

April

- 18th – 16°C, cloud with sunny intervals, no precipitation and a light breeze
- 23rd – 11°C, cloudy, no precipitation, light breeze
- 25th – 9°C, cloudy, no precipitation, light breeze

May

- 15th - 20°C, light cloud, no precipitation, light breeze
- 16th - 14°C, light cloud, no precipitation, light breeze

- 2.2.3. The survey involved a systematic walkover of the accessible section of the proposed Scheme boundary, including a 250 m buffer. This comprised of an Extended Phase 1 assessment identifying habitats of ecological importance and features which indicate the potential presence of reptiles, amphibians including GCN, badgers, water vole, and other species of conservation significance. The Assessment was carried out in accordance with the Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology (JNCC, 2010), which was extended to record information regarding likelihood of protected species presence with reference to the Chartered Institute of Ecology and Environmental Management (CIEEM) Technical Guidance Series Guidelines for Preliminary Ecological Appraisal (CIEEM, 2013). No detailed surveys for protected species were undertaken as a part of these surveys.
- 2.2.4. The walkover involved searching for badger field signs such as setts, footprints, dung pits, guard hairs and runs (Bang and Dahlstrom, 2001); field signs were recorded based on classifications described in CIEEM (2013), Neal and Cheeseman (1996) and within Harris et al., (1994), and Andrews (2013).

-
- 2.2.5. Trees present along the route were assessed for potential roosting features (PRFs) in accordance with good practice guidelines from the Bat Conservation Trust (Collins, 2016). Trees were assessed for features such as woodpecker holes, rot holes, hazard beams, knot holes and other recognised PRFs from ground level.
- 2.2.6. All watercourses were assessed to determine their suitability for water vole (*Arvicola amphibious*), otter (*Lutra lutra*) and white-clawed crayfish (*Austropotamobius pallipes*). To assess suitability for water vole, vegetation composition on the banks was assessed, water levels and any obvious water vole field signs such as mown grass and/or burrows were identified (Dean et al., 2016). To assess the watercourse's suitability for otters, features such as overhanging tree roots (used for den sites), and large rocks (used for spraint marking) were recorded (Chanin, 2003). To assess the watercourse's suitability for white-clawed crayfish, features such as cobbles / rocks, submerged logs and roots of wooded vegetation were recorded (Holdich, 2003).
- 2.2.7. Hedgerows within and directly adjacent to the proposed Scheme were surveyed to determine their ecological importance; whether they were species-rich as defined by the UK Biodiversity Action Plan (BAP), and whether they were protected according to the Hedgerow Regulations (1997). The hedgerows were systematically walked and species composition was recorded as well as evidence of protected species or species of conservation concern. The following characteristics of each hedgerow were assessed: length, location, and 'ecological importance'.

3. RESULTS AND DISCUSSIONS

3.1. Desktop Study

3.1.1. The desktop study identified sites of biological importance within 2 km of the draft DCO site boundary. Table 1 lists the statutory and non-statutory sites along with ancient woodland (listed on the Ancient Woodland Inventory (AWI)) identified by SER.

Table 1: Statutory, non-statutory, and ancient / semi-natural woodland sites.

Designation	Distance from the draft DCO site boundary	Reason for Designation	Relationship to the proposed Scheme
Statutory designated Sites			
Stowe Pool and Walk Mill Clay Pit Site of Special Scientific Interest (SSSI) (only Walk Mill Clay Pit is within the study area)	1.5 km north-east	The only section of this SSSI that is within the Scheme's catchment is Walk Mill Clay Pit. This site has historically supported a large and significant population of white-clawed crayfish.	Located to the north of the M6 Toll and east of the M6, therefore there are significant major barriers between the site and the proposed Scheme.
Non-statutory designated sites			
Lower Pool SBI & LWS	Within the draft DCO site boundary	A large ornamental pool with both emergent and floating vegetation.	The proposed Scheme would have a direct impact on this LWS.
Brookfield Farm, Shareshill, SBI & LWS	Within the draft DCO site boundary	An area of wet woodland comprising alder and willow carr that is drying out in some areas of the site. Sycamore is common in the drier parts of the wood.	The proposed Scheme crosses the western end of the SBI.
Saredon Hall Farm retained BAS (south-east of)	268 m north	An area of oak woodland with a small pond. Much of the wood is impenetrable with bramble (<i>Rubus</i> sp.) and nettle (<i>Urtica dioica</i>). Additionally, there is a small pond to the south of the wood, fringed by glaucous sedge (<i>Carex flacca</i>), reedmace (<i>Typha</i> sp.) and broad-leaved pondweed (<i>Potamogeton natans</i>) in the water.	The site is adjacent to the northern end of the proposed Scheme. The M6 Toll acts as a significant major barrier between the site and the route of the proposed Scheme.

Designation	Distance from the draft DCO site boundary	Reason for Designation	Relationship to the proposed Scheme
The Hag retained BAS	404 m east	Woodland dominated by sycamore, with some oak and much hawthorn around the edges. Within the wood is a very steep-sided pond without emergent vegetation. In the report from Staffordshire	There is arable land, hedgerows and woodland connecting the BAS to the proposed Scheme. There are no hydrological links between the site and the proposed Scheme.
Westcroft retained BAS (woods north of)	683 m south-	A mixed wood containing mainly pedunculate oak (<i>Quercus robur</i>), sycamore and Scots pine (<i>Pinus sylvestris</i>). The understorey is dominated by elder and hawthorn (<i>Crataegus monogyna</i>).	The site is to the south-west of the southern section of the proposed Scheme. There are significant major barriers between the site and the proposed Scheme, including the M54 and a large industrial park.
Keeper's Wood, Hilton Park SBI & LWS	712 m east	Mature mixed deciduous/conifer plantation.	The site is linked to the proposed Scheme through arable farmland and hedgerows.
Westcroft Farm (land north of), Bushbury, SBI & LWS	1.2 km south-west	A linear strip of alder (<i>Alnus glutinosa</i>)/crack willow (<i>Salix fragilis</i>) woodland along the stream with sycamore (<i>Acer pseudoplatanus</i>) abundant in the canopy away from the stream. Hazel (<i>Corylus avellana</i>) frequents the understorey throughout the woodland, with scattered elder (<i>Sambucus nigra</i>) and holly (<i>Ilex aquifolium</i>).	The site is to the south-west of the southern section of the proposed Scheme. There are significant major barriers between the site and the proposed Scheme, including the M54 and a large industrial park.
Hatherton Branch Canal retained BAS	1.5 km north	The section of canal between the M6 and Oak Lane is largely choked by reed sweet-grass (<i>Glyceria maxima</i>). No trace of the original towpath can be seen. Ruderal vegetation grades between the sweet-	Located approximately 1km north of the northern section of the Scheme. Arable fields, hedgerows and drainage ditches may provide limited connectivity to the

Designation	Distance from the draft DCO site boundary	Reason for Designation	Relationship to the proposed Scheme
		grass swamp and the hedge on the south side.	northern section of the proposed Scheme.
Ashmore Lodge, Essington (disused mineral railway line), Retained BAS	1.5 km south-east	An old dismantled mineral line now covered by neutral grassland with some wooded areas.	Located to the south of the M54 and Bognop Road. These are considered to provide a major barrier between the site and the proposed Scheme.
Coven Heath SBI & LWS	1.6 km west	An area of wet heath, which is now drying, part of which has been ploughed.	Located to the southern end of the proposed Scheme. Separated from the proposed Scheme by Stafford Road.
Wryley and Essington Canal Local Nature Reserve (LNR), also designated as a LWS	1.4 km	This site has been restored and converted into a LNR over several years. Bat and GCN records are located within this nature reserve.	Located to the east of Warstone Road and the M6, therefore there are major barriers between the site and the proposed Scheme.
Hatherton Reservoir, Cheslyn Hay SBI & LWS	1.6 km north-east	Reservoir with high quality water and diverse emergent and submerged vegetation.	Located north-east of the proposed Scheme, a large industrial estate, quarry and the M6 act as major barriers. It appears that there is a hydrological connection through Wyrley Brook and Saredon Brook to a pond that is adjacent to the northern end of the proposed Scheme.
Hatherton Pines retained BAS	1.6 km north-east	An area of plantation coniferous woodland, situated between the two Hatherton Pools. The area of most importance is the grassland between the plantations which has a rich	Located to the north of the M6 Toll, and east of the M6 and the A4601, therefore there are significant major barriers between the site and the proposed

Designation	Distance from the draft DCO site boundary	Reason for Designation	Relationship to the proposed Scheme
		flora due to poor soil conditions, including kidney vetch (<i>Anthyllis vulneraria</i>) and bilberry (<i>Vaccinium myrtillus</i>).	Scheme. No hydrological links.
Lodge Hill (north-east of) BAS	1.6 km north-east	A small damp depression at the edge of an arable field.	Located to the north of the M6 Toll, and, east of the M6 and the A4601, therefore there are significant major barriers between the site and the Scheme. No hydrological links
Essington Pools retained Biodiversity Alert Site (BAS)	1.9 km south-east	As well as the open water, there are two areas of woodland, an area of tall planting and amenity grassland. The amenity grassland is regularly mown.	Located to the south of the M54 and proposed Scheme, the site is on the opposite side of the village of Essington, which is considered a major barrier, there are no hydrological links.
Pennymore Hay Farm, Four Ashes SBI Local Wildlife Site (LWS)	2 km west	A remnant of species rich marsh which has been damaged by tipping.	The site is to the west of the northern section of the proposed Scheme. Separated from the proposed Scheme by Great Saredon Road.
Hatherton Bridge (by) Hatherton Site of Biological Importance (SBI)	2 km north-west	Rough semi-improved field with many ruderal species.	The site is to the west of the northern section of the proposed Scheme. Separated from the proposed Scheme by Great Saredon Road.
Ancient Woodland			
Essington Wood	1.6 km south-east	Ancient & Semi-Natural Woodland	Located to the east of the M6, therefore major barriers between the site and the proposed Scheme.
Burns Wood (east)	1.2 km east	Ancient & Semi-Natural Woodland	Located to the east of the M6, and south of

Designation	Distance from the draft DCO site boundary	Reason for Designation	Relationship to the proposed Scheme
			the A462 therefore major barriers between the site and the proposed Scheme.
Burns Wood (west)	1 km east	Ancient & Semi-Natural Woodland	No pathways to the receptor.
Spring Coppice	1 km east	Ancient & Semi-Natural Woodland	Located to the east of the M6, and south of the A462 therefore major barriers between the site and the proposed Scheme.
Beech Head	340 m east	Ancient & Semi-Natural Woodland	Located to the south of the M54, which is a major barrier between the site and the proposed Scheme. No pathways to the receptor.
Oxden Leasow	Within the draft DCO site boundary	Ancient & Semi-Natural Woodland	Adjacent to the northern boundary of the woodland.

3.1.2. The majority of the designated areas are located outside of the proposed Scheme boundary. These are considered to be unaffected by the proposed Scheme due to little or no connectivity and being designated for species which are not mobile.

3.1.3. The sites of biological importance north of Brookfield's farm and at lower pool are directly within the proposed Scheme extent and may be negatively impacted upon by the proposed Scheme; dependent on final design. The ancient & semi-natural woodland site 'Oxden Leasow' is within the draft DCO site boundary and may additionally be negatively impacted; dependent on final design.

3.2. Habitats

3.2.1. The following broad habitat descriptions are based on field survey results at the time of the survey. A map depicting the proposed Scheme, habitats noted and potential areas of protected species interest is provided in Annex B; codes for each habitat are provided within the text below.

3.2.2. The broad habitats recorded within the study area include the following:

- A1 Woodland
- A2 Scrub
- B4 Improved grassland
- B6 Poor semi-improved grassland
- G1 Standing water

- G2 Running water
- J1.1 Arable
- J1.2 Amenity Grassland
- J2 Hedgerows
- J2.4 Fence
- J3 Built up areas
- J3.6 Buildings
- J4 Bare ground

A1 Woodland

3.2.3. Across the proposed Scheme there were several areas of woodland as detailed in Table 2 and shown on the Phase 1 Habitat Map (Annex B).

Table 2: Description of woodland found within the study area.

Label Ref (Annex B, Figure 2)	Designated Site or Ancient woodland	Access	Type of woodland	Canopy and shrub layer species	Ground story species present	Microhabitats present
W1	No	No	-	-	-	-
W2	Yes – ASNW Oxden Leasow Wood	Yes	Broad-leaved plantation	Oak, lime sp. (<i>Tilia</i> sp.), sycamore, elm (<i>Ulmus procera</i>), rowan (<i>Sorbus aucuparia</i>), ash (<i>Fraxinus excelsior</i>), hazel (<i>Corylus avellana</i>), hawthorn, holly, horse-chestnut (<i>Aesculus hippocastanum</i>).	Bluebells (<i>Hyacinthoides non-scripta</i>), dog's mercury (<i>Mercurialis perennis</i>), bramble scrub and grass species	-
W3	No	Yes	Broad-leaved semi-natural	Oak, ash, hazel, holly	Ancient woodland indicator species including bluebells and dog's mercury	Bank along west edge and mounds and banks within. Deadwood
W4	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn	Bramble scrub and grass species	-
W5	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn	Bramble scrub and grass species	-
W6	No	Yes	Broad-leaved semi-natural	Oak, ash, hawthorn	Bramble scrub and grass species	Deadwood
W7	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn	Bramble scrub and grass species	-
W8	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn	Bramble scrub and grass species	-
W9	No	Yes	Broad-leaved	Oak, ash, hawthorn	Bramble scrub and grass species	-

Label Ref (Annex B, Figure 2)	Designated Site or Ancient woodland	Access	Type of woodland	Canopy and shrub layer species	Ground story species present	Microhabitats present
W10	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn, Lime sp	Bluebell, dogs mercury, Ferns, Bramble scrub and grass species	-
W11	No	Yes	Broad-leaved plantation	Oak, ash, hawthorn	Bramble scrub and grass species	-
W12	No	Yes	Broad-leaved semi-natural	Oak, ash, beech, hawthorn	Bramble scrub and grass species	Deadwood and dry ditch present
W13	No	Yes	Broad-leaved semi-natural	Oak, scots pine	Bluebell	PRF
W14	No	Yes	Broad-leaved semi-natural	Oak, ash, beech	Bramble and ruderal vegetation	Watercourse present
W15	No	Yes	Broad-leaved semi-natural	Beech, sycamore, Lime sp.	Ancient woodland indicator species including bluebells	Two bodies of standing water, one watercourse, standing deadwood, deadwood, and several PRF trees.
W16	Lower Pool SBI	Yes	Broad-leaved semi-natural	Oak, ash, beech, rowan (<i>Sorbus aucuparia</i>), rhododendron (<i>Rhododendron</i> sp.)	Bramble and ruderal vegetation	Two bodies of standing water, one watercourse, standing deadwood, deadwood, and several PRF trees.
W17	No	Yes	Broad-leaved semi-natural	Sycamore and oak, holly and hawthorn understory	Bluebell, herb-Robert (<i>Geranium robertianum</i>), garlic mustard (<i>Alliaria</i>)	Standing deadwood, deadwood, and several PRF trees

Label Ref (Annex B, Figure 2)	Designated Site or Ancient woodland	Access	Type of woodland	Canopy and shrub layer species	Ground story species present	Microhabitats present
W18	No	No	Broad-leaved semi-natural	Willow sp.	Himalayan balsam (<i>Impatiens glandulifera</i>)	-
W19	Brookfield Farm (northeast of SBI)	Yes	Broad-leaved semi-natural	Oak, ash, willow	Ground flora of ramsons (<i>Allium ursinum</i>), wood avens (<i>Geranium urbanum</i>), marsh marigold (<i>Caltha palustris</i>), meadowsweet (<i>Filipendula ulmaria</i>), bluebell.	One watercourse, standing deadwood, deadwood, and several PRF trees.
W20	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W21	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W22	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W23	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W24	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W25	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W26	No	Yes	Broad-leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-

Label Ref (Annex B, Figure 2)	Designated Site or Ancient woodland	Access	Type of woodland	Canopy and shrub layer species	Ground story species present	Microhabitats present
			leaved plantation		grassland	
W27	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W28	No	No	Broad- leaved plantation	-	-	-
W29	No	No	Broad- leaved plantation	-	-	-
W30	No	Yes	Broad- leaved semi- natural	Ash, oak, beech	Bramble	-
W31	No	Yes	Broad- leaved plantation	Ash, hawthorn, beech	Bramble, Semi-improved grassland	-
W32	No	Yes	Broad- leaved semi- natural	Ash, hawthorn, beech	Bramble, Semi-improved grassland	-
W33	No	Yes	Broad- leaved plantation	Ash, hawthorn, beech	Bramble, Semi-improved grassland	-
W34	No	Yes	Broad- leaved plantation	Ash, hawthorn, beech	Bramble, Semi-improved grassland	-
W35	No	Yes	Broad- leaved plantation	Ash, hawthorn, beech	Bramble, Semi-improved grassland	-
W36	Yes – BAS – South east of	Yes	Broad- leaved	Oak, alder, hazel, holly, elder, dogwood (<i>Cornus</i>)	Red campion, Dog's mercury	-

Label Ref (Annex B, Figure 2)	Designated Site or Ancient woodland	Access	Type of woodland	Canopy and shrub layer species	Ground story species present	Microhabitats present
	Saredon Hall Farm		semi- natural	<i>sanguinea</i>)	Bramble, Japanese knotweed present	
W37	No	Yes	Broad- leaved semi- natural	Ash, oak, beech, blackthorn	Bramble, Semi-improved grassland	-
W38	No	Yes	Broad- leaved plantation	Blackthorn (<i>Prunus spinose</i>), ash	-	-
W39	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W40	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W41	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W42	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-
W43	No	Yes	Broad- leaved plantation	Ash, oak, beech	Bramble, Semi-improved grassland	-

A2 Scrub

- 3.2.4. Throughout the study area there were patches of both dense (A2.1) and areas of scattered scrub (A2.2), usually dominated by bramble, except for one area of scrub being predominantly dominated by gorse (*Ulex europaeus*).

B4 Improved grassland

- 3.2.5. Fields present within the extent of the study area were predominantly improved grassland currently in use for pastoral farming. Improved grassland is identified as grassland habitat which has been heavily affected by farming methods such as grazing, herbicide application, etc. resulting in a uniform species diversity. Grasses indicative of such habitat including perennial ryegrass (*Lolium perenne*). In addition, there were patches of common nettles (*Urtica dioica*) and thistles (*Cirsium sp.*) indicative of nutrient enrichment from cattle and / or fertilisers.

B6 Poor semi-improved grassland

- 3.2.6. Several fields within the study area were classified as poor semi-improved grassland habitat, most of which were used for occasional recreational purposes (predominantly car boot sales) and for agricultural purposes; cattle-grazing. Poor semi-improved grassland is identified as grassland habitat which has been affected by farming methods such as grazing, herbicide application, etc. and thus is less than diverse than unimproved grassland habitat. Grasses indicative of such habitat including perennial ryegrass; however, in addition to such grasses, broad-leaved herbs were present. Furthermore, there were patches of localised common nettles and thistles indicative of nutrient enrichment from cattle and fertilisers.

G1 Standing water

- 3.2.7. Forty-eight bodies of standing water were identified within the study area (see Phase 1 habitat map for individual locations). Each waterbody is detailed within Table D1, Annex D. The ponds present within the study area were mainly restricted to ones stocked for fishing and therefore offered low value for protected species such as GCN, although ponds within woodlands offered more value as potential breeding habitat for GCN.

G2 Running water

- 3.2.8. Several streams were noted within the study area (see Phase 1 habitat map for individual locations). Many of the streams connected fishing lakes or were run off from fishing lakes. These have the potential to act as corridors for protected species through less suitable habitat such as arable fields. In addition, these watercourses were found to offer varying levels of potential to support otter and water vole; although, no signs were noted during the survey. See Table D2, Annex D for watercourse characteristics.

J1.1 Arable

- 3.2.9. Several fields throughout the study area were managed for crop production with many being recently seeded prior to the survey.

J2.1 Hedgerows

- 3.2.10. Several hedgerows and lines of trees bordered fields and roadways across the study area. There was a total of 43 hedgerows identified; of which, 24 were species-poor intact, 17 were species-poor defunct, one was species-rich defunct, and one was species-rich intact. The species found within these features included hawthorn, ash, elder (*Sambucus nigra*), and blackthorn. A detailed description of each hedgerow is provided in Table D3, Annex D.

Fences

- 3.2.11. Many of the fields were bordered by a variety of fences, including wooden and electric. The screening woodland present adjacent to the motorways was further bordered by highways standard 'three rail' wooden fences.

Built up areas

- 3.2.12. Areas of private residential dwellings were present within the study area; however, these were not surveyed due to access issues.

Buildings

- 3.2.13. There were several buildings present within the study area where the surveyors were granted external access. These ranged from residential dwellings to warehouses. All the buildings were considered to offer low-high bat roosting potential and therefore bat roosting surveys were conducted. Survey findings are reported separately in an annex report.

Bare ground

- 3.2.14. Areas of bare ground were found within the study area. These were predominantly areas of gravel in use for parking vehicles or access tracks to buildings.

Notable habitats

- 3.2.15. The hedgerows and woodlands present could offer sheltering and breeding habitat to various species, particularly birds, listed under Section 41 of the NERC Act. In addition, the standing water present could offer opportunities to such species including GCN.

- 3.2.16. The following habitats, found, are listed on Staffordshire's Local Biodiversity Action Plan, or could possibly be listed on the plan following further surveys to confirm:

- hedgerows;
- native woodland;
- wood-pasture & parkland;
- eutrophic standing water; and
- ponds.

3.3. Protected Species

Badgers

- 3.3.1. Badger field signs, including active setts, were recorded during the survey. Several of the habitats found across the survey area offered foraging opportunities for the species. The woodlands present offered opportunities for shelter, commuting and foraging. It was considered that the proposed Scheme would have an impact upon badgers; therefore, targeted badger surveys were undertaken. Survey findings are reported separately within a confidential annex report.

Bats

- 3.3.2. Numerous trees and buildings offered roosting opportunities for a number of species of bats, in addition to hedgerows and tree lines offering suitable flight lines to feeding habitats present within the study area and wider environment. It was considered that the proposed Scheme would have an impact upon bats; therefore, targeted bat surveys were undertaken. Survey findings are reported separately in an annex report.

Breeding Birds

- 3.3.3. Several habitats present within the study area offered opportunities for nesting birds, including ground nesting species within the large agricultural fields. Woodlands, hedgerows and denser areas of scrub further offered nesting opportunities for certain bird species. Yellowhammers (*Emberiza citronella*) for example are known to nest within gorse scrub. It was considered that the proposed Scheme would have an impact upon breeding birds; therefore, targeted breeding bird surveys were undertaken. Survey findings are reported separately in an annex report.

GCN

- 3.3.4. Several ponds and adjacent habitats within the study area offered limited opportunities for GCN. Woodlands adjacent to these ponds offered further opportunities for shelter (including hibernacula), commuting and foraging for GCN. It was considered that the proposed Scheme would have an impact upon GCN if found present within the study area; therefore, targeted GCN surveys were undertaken. Survey findings are reported separately in an annex report.

Hare

- 3.3.5. No signs of European hare (*Lepus europaeus*) were identified during the survey; several fields offered opportunities, albeit limited, for the species with wide expanses of long grass present. With several similar field structures present in the wider landscape and the site being confined geographically by the existing road network, it is not anticipated that this species will be impacted by the proposed Scheme.

Invasive flora

- 3.3.6. Japanese knotweed (*Fallopia japonica*), Himalayan balsam and rhododendron were identified during the survey. The locations of these areas are shown on the phase one habitat map (Figure 1, Annex B) as target notes 1, 2, 3 and 5 (Annex C). An appropriate control and / or eradication program is recommended to be undertaken prior to the commencement of the proposed Scheme. Details of the control and / or eradication program should further be detailed within the Construction Environmental Management Plan.

Terrestrial Invertebrates

- 3.3.7. Several habitats within the study area offered opportunities for the terrestrial invertebrates. It was considered that the proposed Scheme would have an impact upon terrestrial invertebrates, dependent upon the final scheme design. Targeted invertebrate habitat suitability surveys were undertaken. Survey findings will be reported with the Environmental Statement.

Aquatic Invertebrates

- 3.3.8. The standing and running water present within the study area offered varied opportunities for aquatic invertebrates, including white-clawed crayfish. It is considered that the proposed Scheme would have an impact upon aquatic invertebrates, dependent upon the final scheme design; therefore, it is recommended that further targeted surveys for the species are undertaken.

Otters and water vole

- 3.3.9. Several waterbodies and watercourses within the study area offered opportunities for aquatic mammals. It was considered that the proposed Scheme would have an impact upon otters and water voles if found present within the study area; therefore, targeted otter and water vole surveys were undertaken. Survey findings are reported separately in an annex report.

Reptiles

- 3.3.10. Habitats present within the study area offered limited opportunities for reptiles. It was considered that the proposed Scheme would have an impact upon reptiles if found to be present within the study area; therefore, targeted reptile surveys were undertaken. Survey findings are reported separately in an annex report.

4. CONCLUSION AND RECOMMENDATIONS

- 4.1.1. Potential exists for protected species to be impacted upon by the proposed Scheme. Several areas of high value for protected species are present within the study area, including areas of semi-natural woodland with ancient woodland indicators species and waterbodies.
- 4.1.2. As such, it is recommended that further protected species surveys are conducted along the route of the proposed Scheme. These include:
- National Vegetation Classification survey (to identify any Ancient Woodland present).
 - Bat hibernation surveys.
 - Targeted terrestrial invertebrate surveys.
 - Targeted aquatic invertebrate surveys (inclusive of white-clawed crayfish).
- 4.1.3. The following surveys are recommended for the areas within the study area which were not surveyed due to land access:
- Extended Phase 1 Habitat survey (inclusive GCN Habitat Suitability Surveys).
 - Bat Roosting Potential surveys of trees and any structures present.
 - Badger survey.
 - Terrestrial and aquatic invertebrate surveys (inclusive of white-clawed crayfish).
- 4.1.4. The further targeted surveys will inform any amendments to scheme design (if required) and inform mitigation and biodiversity enhancement opportunities.

REFERENCES

All UK (and individual UK countries) legislation can be viewed at: <http://www.legislation.gov.uk/browse>

Andrews, R. (2013) *The Classification of Badger Setts in the UK: A Review and Guidance for Surveyors: 'In Practice'*

Bang, P. & Dahlstrom, P. (2001) *Animal Tracks and Signs*, Oxford University Press.

Chanin P (2003) *Ecology of the European Otter. Conserving Natura 2000*

CIEEM (2013) *Competencies for Species Surveys: Badger. Technical Guidance Series*

Collins, J (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.*

Designated Sites View, Natural England. Available at:

<https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1007257&SiteName=Highclere&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=>

Harris, S., Jeffries, D., Cheeseman, C., & Booty, C. (1994) *Problems with badgers?* (3rd Ed), RSPCA Publications.

Holdich D (2003) *Ecology of the White-clawed Crayfish. Conserving Natura 2000 Rivers Ecology Series No. 1.* English Nature, Peterborough.

Neal, E. & Cheeseman, C. (1996) *Badgers*, T&AD Poyser Ltd, London.

Oldham R.S, Keeble J., Swan M.J.S & Jeffcote M. (2000) *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155

Rivers Ecology Series No. 10. English Nature, Peterborough

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155.

Annex A Wildlife Legislation and Policy

The Wildlife & Countryside Act 1981 (as amended)

Provides for designation and protection of Sites of Special Scientific Interest (SSSI), which are areas that represent the most valuable habitats in the UK for nature conservation.

The Act creates the following offences:

- To intentionally kill, injure, or take any wild bird or their eggs or nests (with exception to species listed in Schedule 2). Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young.
- To intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- Certain methods of killing, injuring, or taking wild animals listed in Schedule 6.
- To pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.
- The release of certain non-native animals and planting of plants listed in Schedule 9.

It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

Conservation of Habitats and Species Regulations 2017

The principal means by which the European Habitats Directive is transposed in England and Wales.

Provide for the designation and protection of a network of 'European Sites' (also termed Natura 2000), including Special Areas of Conservation (SAC) and Special Protection Areas (SPA).

Regulation 41 creates the following offences relating to European Protected Species (EPS):

- deliberately capture, injure or kill any wild animal of a European Protected Species;
- deliberately disturb animals of any such species in such a way as to be likely to:
 - impair their ability to survive, breed, rear or nurture their young, hibernate or migrate, or
 - significantly affect the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

The Regulations also make it an offence (subject to exceptions) to deliberately pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5.

The actions listed above can be made lawful through the granting of licences (European Protected Species Licence) by the appropriate authorities (Natural England in England). Licences may be granted for a number of purposes, but only after the appropriate authority has determined that the following regulations are satisfied:

- The works under the licence are being carried out for the purposes of '*preserving public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment*'.
- There is 'no satisfactory alternative'.
- The action 'will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range'.

To apply for a licence, the following information is required:

- The species concerned.
- The relative size of the population at the site (note this may require a survey to be carried out at a particular time of the year).
- The impact(s) (if any) that the development is likely to have upon the populations.
- What measures will be conducted to mitigate for the impact(s).

Natural Environment & Rural Communities (NERC) Act 2006

Section 40 of NERC carries an extension of the earlier CRoW Act biodiversity duty to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. Section 41 requires the Secretary of State, as respects England, to publish a list of species and habitats which are of 'principal importance for the purpose of conserving biodiversity'. These lists generally reflect the species and habitats previously listed under the UK Biodiversity Action Plan.

National Planning Policy Framework

This framework replaces Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS 9) (ODPM 2005) and sets out the view of central Government on how planners should balance nature conservation with development. One of the key principles of the NPPF is:

The NPPF states that development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas, including biodiversity. It also states that the aim of planning decisions should be to prevent harm to biodiversity conservation interests and to 'promote the preservation, restoration and re-creation of priority habitats, ecological networks and the recovery of priority species.

Where determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principals; *'if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'*; and, *'planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss'*.

This means that full ecological surveys should be carried out and suitable mitigation measures proposed prior to any planning application being submitted.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services

This biodiversity strategy for England builds on the Natural Environment White Paper and the earlier UK Biodiversity Action Plan. It provides a comprehensive picture of how Government is implementing our international and EU commitments and sets out the strategic direction for biodiversity policy up to 2020. Its mission is to:

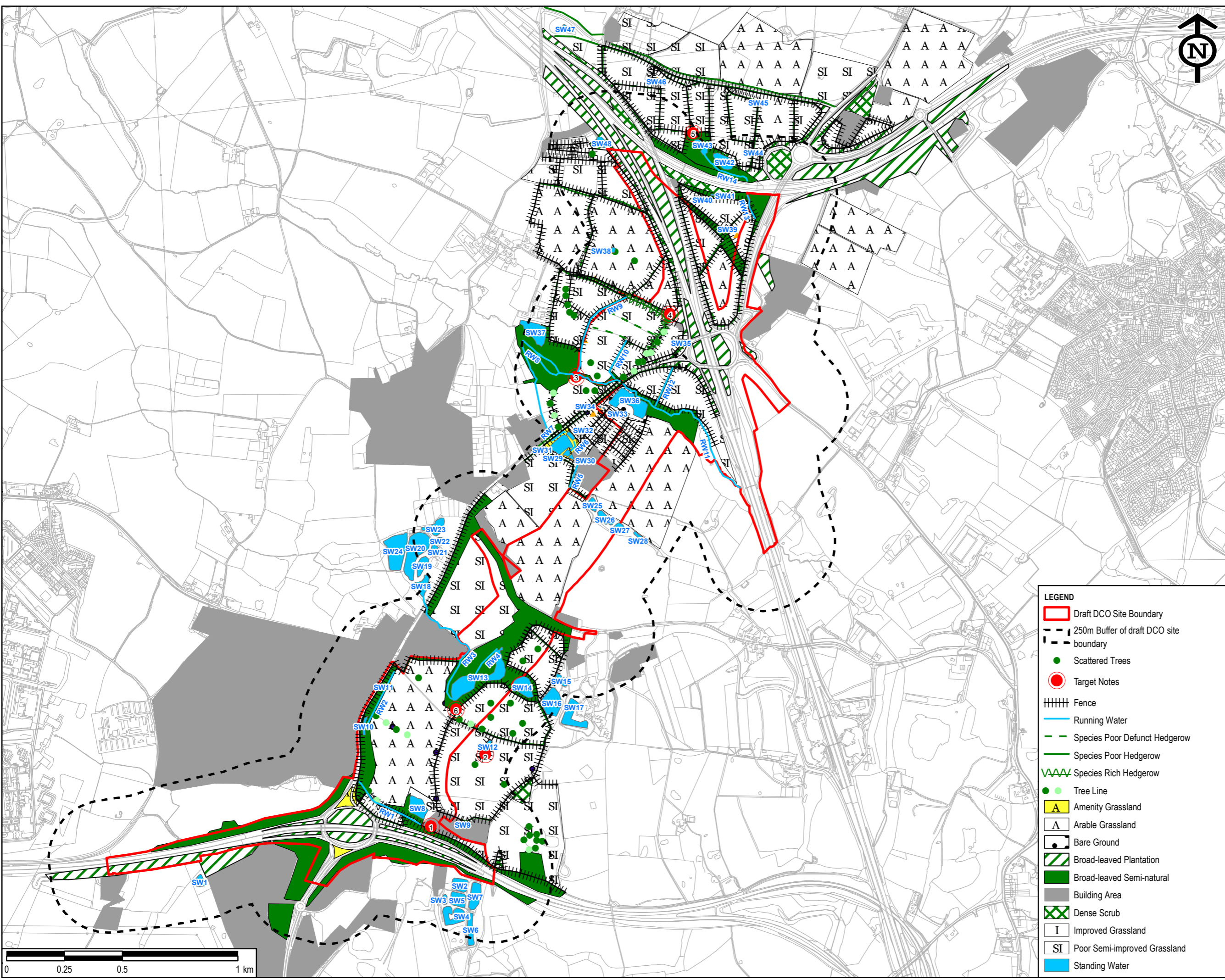
"halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people."

In relation to planning and development its priority is to:

"take a strategic approach to planning for nature within and across local areas. This approach will guide development to the best locations, encourage greener design and enable development to enhance natural networks. We will retain the protection and improvement of the natural environment as core objectives of the planning system."

Annex B Phase 1 Habitat Maps

Plot Date: 20 December 2018 09:58:33
 File Name: \\ukhs2pfs001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 1 Phase 1 Habitat Survey.mxd



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FOR INFORMATION

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The Cube
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Birmingham
B1 1RN

Working on behalf of
highways england

Project Title
M54 TO M6/M6 (TOLL) LINK ROAD

Drawing Title
**FIGURE 1
PHASE 1 HABITAT SURVEY**

Designed EC	Drawn EC	Checked AR	Approved TP	Date 20/12/2018
Internal Project No. 60529339	Suitability S2	Zone M54 to M6/M6 (Toll) Link Road		
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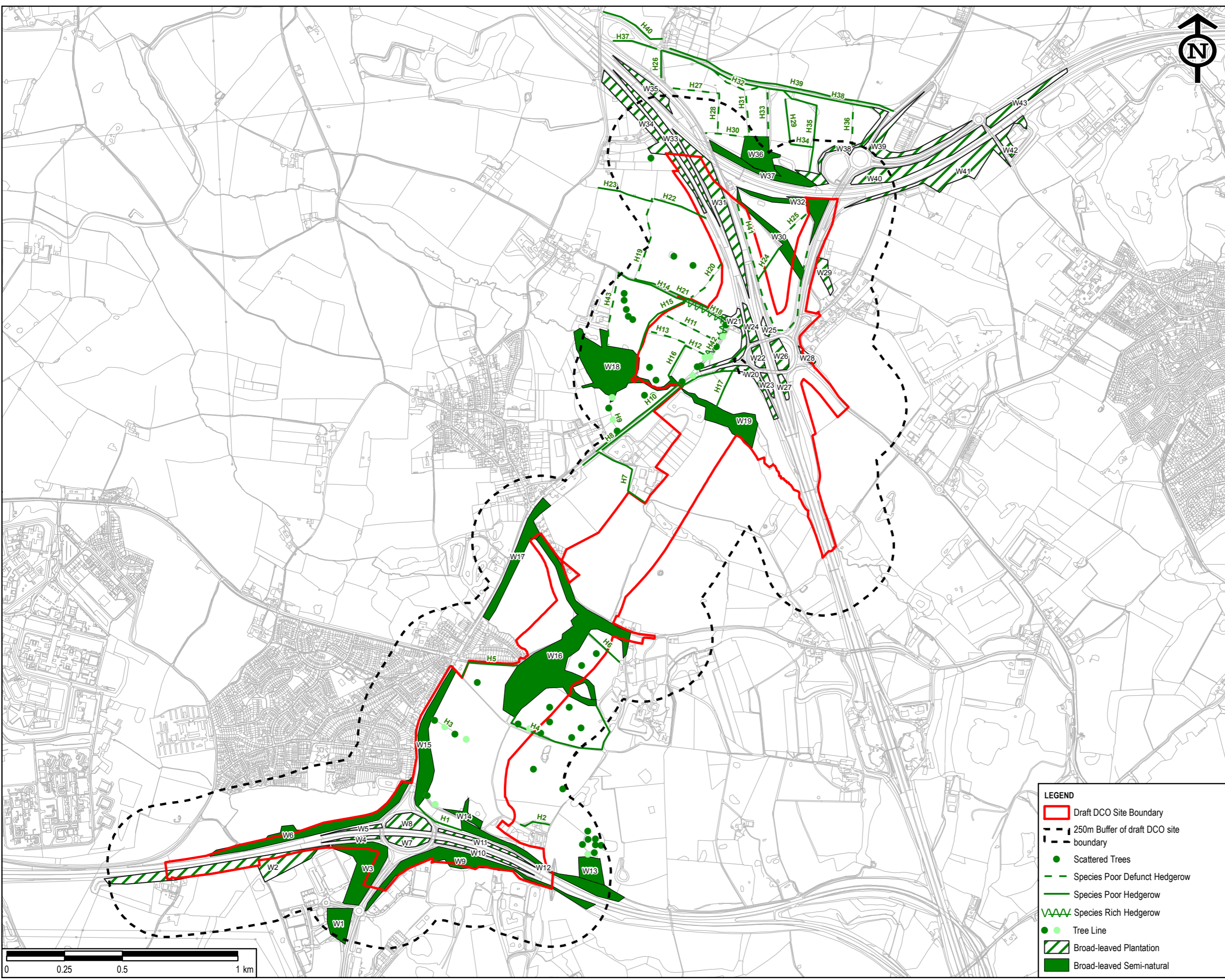
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LEGEND

- Draft DCO Site Boundary
- 250m Buffer of draft DCO site
- boundary
- Scattered Trees
- Target Notes
- Fence
- Running Water
- Species Poor Defunct Hedgerow
- Species Poor Hedgerow
- Species Rich Hedgerow
- Tree Line
- A Amenity Grassland
- A Arable Grassland
- Bare Ground
- Broad-leaved Plantation
- Broad-leaved Semi-natural
- Building Area
- Dense Scrub
- I Improved Grassland
- SI Poor Semi-improved Grassland
- Standing Water

Plot Date: 02 January 2019 15:36:02
 File Name: \\ukss2pfs001\1\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Figure 2 Woodland and Hedgerow Habitats.mxd



LEGEND

- Draft DCO Site Boundary
- 250m Buffer of draft DCO site boundary
- Scattered Trees
- Species Poor Defunct Hedgerow
- Species Poor Hedgerow
- Species Rich Hedgerow
- Tree Line
- Broad-leaved Plantation
- Broad-leaved Semi-natural

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FIGURE 2 WOODLAND AND HEDGEROW HABITATS			
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Annex C Target Notes

Target Note	Feature
1	Japanese Knotweed identified
2	Japanese Knotweed identified
3	Himalayan Balsam identified
4	Asbestos identified
5	Japanese Knotweed identified
6	Rhododendron identified

Annex D Waterbodies and Watercourse

Table D1: Description of waterbodies found across the study area.

Label Ref (Figure 1, Annex B)	Access	Size (m ²)	Description
SW1	No	1596	-
SW2	No	3664	-
SW3	No	905	-
SW4	No	5760	-
SW5	No	3570	-
SW6	No	3552	-
SW7	No	4832	-
SW8	Yes	5995	Large fishing lake heavily stocked with carp <i>Cyprinus sp.</i> , major presence of waterfowl, aquatic vegetation present – reed beds.
SW9	Yes	1	Small ditch, appeared to have poor water quality, filled with rubbish. No vegetation present.
SW10	Yes	1000	Poor water quality, fish likely absent, no waterfowl present, little aquatic vegetation or terrestrial vegetation present.
SW11	Yes	500	Appeared to have poor water quality, fish likely absent, no water fowl present, little aquatic vegetation or terrestrial vegetation present.
SW12	Yes	909	Appeared to have good water quality, reed beds present, minor presence of water fowl, fish likely absent.
SW13	Yes	15000	Appeared to have good water quality, reed beds present, minor presence of water fowl, fish present, several aquatic invertebrates noted.
SW14	Yes	5994	Appeared to have good water quality, reed beds present, minor presence of water fowl, fish present.
SW15	No	3000	-
SW22	No	1216	-
SW23	No	3304	-
SW25	No	2066	-
SW26	No	2763	-
SW27	No	2066	-
SW28	No	500	-
SW29	Yes	570	Fishing lake, appeared to have poor water quality, no aquatic vegetation present, little vegetation present on banks, minor presence of water fowl
SW30	Yes	150	Fishing lake, appeared to have poor water quality, no aquatic vegetation present, little vegetation present on banks, minor presence of water fowl

Label Ref (Figure 1, Annex B)	Access	Size (m ²)	Description
SW31	Yes	5468	Fishing lake, appeared to have poor water quality, no aquatic vegetation present, little vegetation present on banks, minor presence of water fowl
SW32	Yes	729	Fishing lake, appeared to have poor water quality, no aquatic vegetation present, little vegetation present on banks, minor presence of water fowl
SW33	Yes	5	Small ditch likely produced from scrapes of machinery. No aquatic vegetation present, appeared to have bad water quality. No presence of water fowl.
SW34	Yes	5	Small ditch likely produced from scrapes of machinery. No aquatic vegetation present. Appeared to have bad water quality. No presence of water fowl.
SW35	Yes	10	Appeared to have poor water quality, no aquatic vegetation present. No signs of waterfowl presence. Fish likely absent.
SW36	Yes	11167	Fishing lake, appeared to have poor water quality, no aquatic vegetation present, little vegetation present on banks. Waterfowl present.
SW38	Yes	507	Appeared to have poor water quality, no aquatic vegetation present, major presence of waterfowl, fish presence possible, close proximity to a watercourse.
SW39	Yes	400	Appeared to have poor water quality, no aquatic vegetation present, minor presence of waterfowl, fish presence possible.
SW40	Yes	549	Appeared to have poor water quality, no aquatic vegetation present, major presence of waterfowl, fish presence possible.
SW41	Yes	300	Appeared to have poor water quality, no aquatic vegetation present, minor presence of waterfowl, fish presence possible.
SW42	Yes	4403	Appeared to have poor water quality, aquatic vegetation present, major presence of waterfowl, fish presence likely.
SW43	Yes	2500	Appeared to have poor water quality, no aquatic vegetation present, major presence of waterfowl, fish presence likely.
SW44	Yes	10	Appeared to have poor water quality, no aquatic vegetation present, minor presence of waterfowl, fish presence likely absent.
SW45	Yes	15	Appeared to have poor water quality, no aquatic vegetation present, minor presence of waterfowl, fish presence likely absent.
SW46	No	10	Appeared to have poor water quality, no aquatic vegetation present, major presence of waterfowl, fish presence likely absent.
SW47	No	2750	-
SW48	No	3500	-

Table D2: Description of watercourses found across the study area.

Label Ref (Figure 1, Annex B)	Width (m)	Depth (m)	Description
RW1	1	1	Slow flowing, stony/silty sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have poor water quality
RW2	1.5	1	Drainage ditch - sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have poor water quality
RW3	1.5	<0.5m	Slow flowing, sediment and stone bottom, ruderal vegetation present on both banks for most of its length, appeared to have poor water quality
RW4	1	1	Slow flowing, sediment bottom, ruderal vegetation present on both banks, appeared to have good water quality
RW5	1.5	1.5	Slow flowing, sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have good water quality
RW6	1	1	Slow flowing – run off from one waterbody into the next, appeared to have bad water quality
RW7	1.5	<0.5	Appeared to have poor water quality, culverts beneath A460, sediment bottom
RW8	1.5	1	Slow flowing, sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have good water quality
RW9	1	1	Drainage ditch flows into watercourse – appeared to have poor water quality, sediment bottom, aquatic vegetation present, vegetation on both banks
RW10	1	<0.5	Drainage ditch flows into watercourse – appeared to have poor water quality, sediment bottom, vegetation on both banks
RW11	2	>1	Slow flowing, banks vegetated with Himalayan Balsam and common nettle, appeared to have good water quality
RW12	1	<0.5	Drainage ditch - appeared to have bad water quality, adjacent to line of trees
RW13	1.5	0.5	Appeared to have good water quality, adjacent to line of trees, sediment and stone bottom
RW14	1.5	0.5	Appeared to have good water quality, adjacent to line of trees, sediment and stone bottom

Table D3: Description of hedgerows found across the study area

Label Ref (Figure 2)	Width (m)	Height (m)	Length (m)	Defunct (D) or intact (I)?	Sp rich (R) or poor (P)?	Species compositi on (T = tree)	Ground flora	Managed? ¹
H1	1.5	1.5	220	I	P	Hawthorn	Common nettles, Perennial Rye.	Yes
H2	2	3	130	I	P	Cypress leylandii	None noted	Yes
H3	4	5	210	D	P	Oak, ash	Perennial Rye, false oat grass (<i>Arrhenatherum elatius</i>), Common couch (<i>Elymus repens</i>).	No
H4	2	1.5-2	450	I	P	Hawthorn, Cypress leylandii (T)	Common grass species including: Common couch Perennial Rye	Yes
H5	2	2	65	I	P	Hawthorn, Cypress leylandii, oak (T)	Perennial Rye	Yes
H6	1.5	1.5	180	I	P	Hawthorn	Perennial Rye, common couch, timothy sp. (<i>Phleum pratense</i>)	Yes
H7	1.5	1.5	380	I	P	Hawthorn	None noted	Yes
H8	1.5	1.5	430	I	P	Hawthorn	Common grass species including: Common couch Perennial Rye Common nettles, creeping thistle (<i>Cirsium arvense</i>)	Yes
H9	2.5	4	170	D	P	Alder (<i>Alnus glutinosa</i>), elder, hawthorn, oak	Common grass species including: Common couch Perennial Rye Common nettles, white dead nettle (<i>Lamium album</i>)	Partially
H10	1.5	1.5	450	I	P	Hawthorn	Common grass species including: Common couch	Yes

¹ Managed hedgerows were classified as hedgerows which had been subject to management methods so that the trees no longer took their natural shape. Partially managed hedgerows were hedgerows where signs of management methods were identified; however, the management was not regular, resulting in the species present regaining their natural shape. Unmanaged hedgerows were hedgerows where no signs of management methods were identified, and the shape of the species present was considered natural.

Label Ref (Figure 2)	Width (m)	Height (m)	Length (m)	Defunct (D) or intact (I)?	Sp rich (R) or poor (P)?	Species compositi on (T = tree)	Ground flora	Managed? 1
							Perennial Rye	
H11	2	2.5	230	D	P	Alder, elder, hawthorn, oak	Common grass species including: Common couch Perennial Rye Common nettle	Partially
H12	2.5	2.5	260	D	P	Holly, oak (T), hawthorn	Common grass species including: Common couch Perennial Rye Common nettle	Partially
H13	2.5	2.5	151	D	R	Hawthorn, holly, oak, alder, elder	Common grass species including: Common couch Perennial Rye Common nettle	Partially
H14	1.5	2	320	D	P	Hawthorn, hazel, blackthorn, oak	Common grass species including: Common couch Perennial Rye Common nettle	Yes
H15	2	2.5	315	I	P	Alder, elder, hawthorn, oak (T), holly	Common grass species including: Common couch Perennial Rye Common nettle	Partially
H16	2	4	190	I	P	Hawthorn, ash, holly, oak	Common nettles, white dead nettle	Partially
H17	2	2	255	I	P	Oak, ash, alder	Common grass species including: Common couch Perennial Rye Common nettle	No
H18	2	2	360	I	R	Hawthorn, blackthorn, holly, elm, dog rose Rosa canina	Common grass species including: Common couch Perennial Rye	Yes
H19	1.5	1	366	D	P	Oak, hawthorn	Common grass species including: Common couch Perennial Rye	No
H20	1.5	1.5	231	D	P	Oak, hawthorn	Common grass species including:	No

Label Ref (Figure 2)	Width (m)	Height (m)	Length (m)	Defunct (D) or intact (I)?	Sp rich (R) or poor (P)?	Species compositi on (T = tree)	Ground flora	Managed? 1
							Common couch Perennial Rye	
H21	2	3	414	I	P	Holly, oak, birch (<i>Betula</i> <i>sp.</i>), alder	Common grass species including: Common couch Perennial Rye	Yes
H22	2	2	260	I	P	Holly, blackthorn, oak, alder, elder	Common grass species including: Common couch Perennial Rye	Yes
H23	2	2	239	I	P	Holly, oak, blackthorn, hawthorn	Common grass species including: Common couch Perennial Rye	Yes
H24	2	2	161	I	P	Hazel, blackthorn, hawthorn, oak	Common grass species including: Common couch Perennial Rye	Yes
H25	2	2.5	180	D	P	Hawthorn, blackthorn, sycamore <i>Acer</i> <i>pseudoplatanu</i> <i>s</i> , holly, beech	Common couch & Perennial Rye	No
H26	1.5	2	114	I	P	Hawthorn	Common couch & Perennial Rye	Yes
H27	1.5	2.5	200	D	P	Hawthorn, ash, holly	Common couch & Perennial Rye	No
H28	2	2	170	D	P	Hawthorn, blackthorn, oak, hazel	Common couch & Perennial Rye	No
H29	2	4	190	I	P	Elm, ash, alder, oak	Common grass species including: Common couch Perennial Rye	Partially
H30	2	3	180	D	P	Hawthorn, blackthorn, oak, hazel	Common grass species including: Common couch Perennial Rye	No
H31	2	4	203	D	P	Elm, hawthorn, ash, alder, oak	Common grass species including: Common couch Perennial Rye	Partially
H32	2	4	222	D	P	Elm, ash, alder, oak	Common grass species including: Common couch	Yes

Label Ref (Figure 2)	Width (m)	Height (m)	Length (m)	Defunct (D) or intact (I)?	Sp rich (R) or poor (P)?	Species compositi on (T = tree)	Ground flora	Managed? 1
							Perennial Rye	
H33	2	4	205	D	P	Hawthorn, ash, alder, oak	Common grass species including: Common couch Perennial Rye	No
H34	2	4	90	I	P	Hawthorn, ash, alder, oak	Common grass species including: Common couch Perennial Rye	Partially
H35	2	4	406	I	P	Hawthorn, ash, alder, oak	Common grass species including: Common couch Perennial Rye Common nettle	Partially
H36	2.5	3	172	D	P	Hazel, hawthorn, blackthorn	Common grass species including: Common couch Perennial Rye	No
H37	2	2	162	I	p	Hawthorn	None noted.	Partially
H38	2-2.5	2	711	I	P	Hawthorn, alder (T), oak (T), ash (T)	Common grass species including: Common couch Perennial Rye	Yes
H39	2	2	1005	I	P	Hawthorn, blackthorn	Common grass species including: Common couch Perennial Rye	Yes
H40	2	2	285	I	P	Hawthorn	Common grass species including: Common couch Perennial Rye	Yes
H41	1	1	1008	D	P	Hawthorn	Common grass species including: Common couch Perennial Rye	No
H42	2.5	3	230	I	P	Oak, ash, hawthorn, alder	Common grass species including: Common couch Perennial Rye	No
H43	1.5	1	250	D	P	Hawthorn, alder	Common grass species including: Common couch Perennial Rye	No

Appendix 9.2: Great Crested Newt Report

M54-M6/M6 Toll Link Road

Great Crested Newt Survey Report

**Report Number: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0003 P01 S2
December 2018**

M54-M6/M6 Toll Link Road

Great Crested Newt Survey Report

Report No: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0003 -P01 S2

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Annexes

- Annex A Wildlife Legislation and Policy
- Annex B Survey Data
- Annex C Figure 1: Ponds Surveyed for GCN

1. INTRODUCTION

1.1. Background

1.1.1 The A460 currently provides a link between the M6 Junction 11, M54 Junction 1, and M6 Toll Junction T8 via Featherstone, Staffordshire. The A460 is a single carriageway road which experiences significant congestion from vehicles travelling between the M6 north, M54 and M6 Toll. To alleviate congestion Highways England are proposing a new two lane dual carriageway link road, approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, herein referred to as the 'proposed Scheme'. This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.

1.1.2 A suit of ecological surveys will be undertaken to support the Environmental Statement including Great Crested Newt (GCN) (*Triturus cristatus*) surveys.

1.1.3 Previous GCN surveys (Highways England, 2015) were completed in 2015 which included presence / likely absence surveys. These surveys revealed an absence of GCN from the draft DCO site boundary during the survey.

1.2. Study Area and Location

1.2.1 The study area for the proposed Scheme is located north of Wolverhampton, within the County of Staffordshire. The study area for the GCN surveys is defined as the proposed Scheme and a 500 m buffer as shown on Figure 1, Annex C.

1.2.2 The surrounding area consists predominantly of arable farmland interspersed with areas of grassland, woodland, several waterbodies and small watercourses. There are several major roadways which intersect the local landscape including the M6, M6 Toll, M54, and A460. Residential areas within the surrounding landscape include the small villages of Featherstone and Shareshill which are directly adjacent to the A460, the civil parish of Great Saredon adjacent to the M6 Toll, as well as scattered small holdings and various farmhouses.

1.3. Survey Aims and Objectives

1.3.1 The aims and objectives of the survey work and subsequent report presented here in were to:

- to determine presence or likely absence of GCN within 500 m of the proposed Scheme;
- undertake a desk based study including review of existing ecological data to identify any records for GCN within the study area;
- provide baseline information to inform design development and environmental assessment, and
- identify the risk of encountering GCN whilst undertaking works for the proposed Scheme.

1.3.2 The likelihood of presence was calculated from an evaluation of waterbodies and adjacent habitats; this information informed presence / likely absence survey locations and recommend, where necessary, further surveys or mitigation requirements.

1.4. Legislation

- 1.4.1 GCN are legally protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended), which makes it an offence to:
- I. intentionally or recklessly kill, injure, or take (handle) a GCN;
 - II. intentionally or recklessly damage, destroy or obstruct access to any structure or place that GCN uses for shelter or protection;
 - III. intentionally or recklessly disturb a GCN while it is occupying a structure or place that it uses for shelter or protection; or
 - IV. possess, sell or transport live or dead GCN, or any part of a GCN.
- 1.4.2 GCN receives further protection as it is a European Protected Species under the Conservation of Habitats and Species Regulations 2017. This makes it an offence to:
- I. deliberately capture, injure or kill any GCN;
 - II. deliberately disturb a GCN, especially if the disturbance will likely impair their ability to survive, breed, or reproduce;
 - III. deliberately take or destroy eggs of such an animal;
 - IV. deliberately disturb a GCN which will impair their ability to hibernate or migrate.
 - V. to significantly affect the local distribution or abundance of GCN; or
 - VI. damage or destroy a breeding site or resting place of a GCN.
- 1.4.3 Please refer to Annex A for full details on legislation.

1.5. Limitations

- 1.5.1 This report utilises Habitat Suitability Index (HSI) (Oldham *et al.*, 2000) calculations of waterbodies and adjacent habitats obtained on the day of the initial survey visit. It does not record any changes in ecological features that may only appear at other times of the year and therefore were not evident at the time of the initial visit.
- 1.5.2 Access to certain land plots was not permitted. It is possible that suitable features for GCN were missed; however, sufficient information could be gained to inform the requirement for further surveys so this is not considered a significant limitation.
- 1.5.3 One area, within a land plot, was not fully assessed due to the density of vegetation present at the time of survey. The location of this area was E 395694, N 307626. This area was assessed from adjoining land where access had been obtained. From OS maps it can be identified that there is a waterbody present within this area.
- 1.5.4 Areas of private residential dwellings and their associated curtilages were not surveyed due to land access not having been obtained; however, this is not considered a significant limitation as no waterbodies were identified within these areas from the desk top study.
- 1.5.5 A full presence / likely absence suit of surveys was not completed on Pond 12 due to health and safety issues in gaining access to the pond.
- 1.5.6 The recommendations in this report are based upon available knowledge of both the ecological constraints and the engineering works at the time of writing.
- 1.5.7 Despite the limitations detailed above it is considered that there was sufficient information gathered during the survey to inform the PCF Stage 3 Scoping Report Biodiversity Chapter and further PCF Stage 3 (preliminary design) surveys if needed.

2. METHODOLOGY

2.1. Desktop Study

2.1.1 A desktop study of statutory and non-statutory designated sites and protected species was completed in 2015 along the route of the proposed Scheme. This search area included the PCF Stage 2 (options selection) Scheme options and a 2 km buffer. Data was obtained from Natural England, the Environment Agency, Staffordshire Ecological Record Centre (SER), and the Ecological records centre for Birmingham and the Black Country (EcoRecord). An updated desk study and data search was completed in 2017 with data obtained from SER.

2.1.2 In 2018, an additional data search was undertaken utilising freely available sources including the NBN Atlas to identify GCN records and Magic Map Application to identify any licence applications for GCN within 2 km of the proposed Scheme. In addition, SER and EcoRecord were approached again in 2018 to identify records for the species within 4 km of the draft DCO site boundary.

2.2. Habitat Suitability Index

2.2.1 A total of 48 waterbodies and five wet ditches were identified within the proposed Scheme. These can be seen in Figure 1, in Annex C. These were assessed both in-situ and ex-situ for connectivity to the proposed Scheme. 'Connectivity' was considered corridors or patches of suitable GCN habitat linking a waterbody to the proposed Scheme footprint. The draft DCO site boundary was considered likely isolated from the wider environment by the presence of the four major roadways.

2.2.2 Ponds considered connected to the proposed Scheme by suitable habitat and within 500m of the works were then assessed for their suitability for GCN breeding habitat where possible. The Habitat Suitability Index developed by Oldham *et al.*, (2000) includes analysis of location (S1), size (S2), pond drying (S3), water quality (S4), shade (S5), fowl (S6), fish (S7), ponds (S8), terrestrial habitat (S9), macrophytes (S10). These ten categories are given a numerical value between 0-1 per the index, then an overall value is calculated using:

$$HSI = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

2.2.3 This will give an HSI value between 0-1 which corresponds to a pond suitability value. See Table 1 below for the categories of suitability.

Table 1: Suitability categories for HSI scores.

HSI	Pond Suitability
<0.5	Poor
0.5 - 0.59	Below average
0.6 – 0.69	average
0.7 – 0.79	Good
> 0.8	Excellent

2.2.4 The system is not sufficiently precise enough to conclude that any particular waterbody with a high score will support GCN or that a waterbody with a low score will not support GCN. Oldham *et al* (2000) reported that the lowest scoring pond support GCN in their study was 0.43.

- 2.2.5 The habitat suitability index assessments were conducted by suitably qualified Ecologists; Stuart Graham BSc (Hons), MSc, CEcol, CEnv, MCIEEM and Dean Cordelle BSc (Hons), Grad CIEEM on the 18, 23 and 25 April and 15 and 16 May 2018.
- 2.2.6 The surveys were all carried out in accordance with the time of year during suitable weather conditions as recommended in the GCN Conservation Handbook (Langton, 2001) and the Great Crested Newt Mitigation Guidelines (2001). Environmental conditions experienced during the surveys were as follows:
- April*
- 18th – 16°C, cloud with sunny intervals, no precipitation, and a light breeze
 - 23rd – 11°C, cloudy, no precipitation, light breeze
 - 25th – 9°C, cloudy, no precipitation, light breeze
- May*
- 15th - 20°C, light cloud, no precipitation, light breeze
 - 16th - 14°C, light cloud, no precipitation, light breeze
- 2.2.7 Presence, Likely Absence Surveys of waterbodies which were calculated to have a HSI Score of average or above were subject to further surveys, as the higher the HSI Score, the greater the likelihood of encountering GCN and therefore confirming presence within the Scheme.
- 2.2.8 All waterbodies which were calculated to have a HSI of 'average' or above were subject to further surveying using three of the following methods adapted from the GCN Conservation Handbook (Langton, 2001) and Great Crested Newt Mitigation Guidelines (2001):
- torch surveys;
 - bottle trapping;
 - netting; and
 - egg searching.
- 2.2.9 Each survey visit constituted one evening visit where bottle traps were set in the pond and torching was undertaken; the following morning the bottle traps were checked and at least one additional method was undertaken.
- 2.2.10 The surveys were conducted by the following suitably qualified Ecologists:
- Keely Bigland BSc (Hons) (GCN Class 1 Licence holder);
 - Stephanie Nieto BSc (Hons), MSc;
 - Henry James BSc (Hons);
 - Mark Nelson MSc GradCIEEM (GCN Class 1 licence holder).
- 2.2.11 Each survey visit was led by a GCN licence holder.
- 2.2.12 Environmental conditions experienced during the surveys are shown in Table 2.

Table 2: Environmental conditions recorded during the surveys.

Date	Trapping session	Air temperature (°C)	Precipitation (0-3)	Wind disturbance (Y/N)	Bright moonlight (Y/N)
24th April	Evening	10	2	N	N
	Morning	7	-	-	-
26th April	Evening	12	1	N	Y
	Morning	6	-	-	-
16th May	Evening	13	0	N	N
	Morning	9	-	-	-
22nd May	Evening	20	0	N	N
	Morning	15	-	-	-

Precipitation was scored between 0 and 3, where 0 represented none, 1 = yesterday, 2 = immediately prior, 3 = during the survey.

3. RESULTS AND DISCUSSION

3.1. Desktop Study

- 3.1.1 Records from SER and EcoRecord (updated in 2018) show several records for GCN within the wider area, particularly concentrated to the east of the M6. All of these records were outside of the proposed Scheme extent, and beyond the four major roadways.
- 3.1.2 The Magic Map Application revealed no licence applications for GCN within 2 km of the proposed Scheme extent. The nearest licence application was approximately 2.1 km to the east, past the M6. The NBN atlas also revealed a large number of records for GCN within the wider area, although many of these records were not recorded accurately, with a grid reference of only 2 digits.
- 3.1.3 No signs of GCN were recorded during the surveys in 2015 (Highways England, 2015).

3.2. Habitat Suitability Index

- 3.2.1 The terrestrial habitat present within the scheme was considered to offer commuting, foraging, and hibernation potential for GCN, with corridors identified which connected waterbodies. Of the 48 waterbodies identified, 34 were considered to be connected to the proposed Scheme by suitable habitat, with all five of the wet ditches considered connected also. Access to every waterbody was not gained, therefore HSI surveys were undertaken on 22 ponds and 5 ditches. The HSI Scores are shown in Table 3.
- 3.2.2 The HSI surveys identified three waterbodies considered to have average or above suitability for breeding habitat for GCN. These were waterbodies 10, 11, and 12, with 11 having average suitability, whilst 10 and 12 were considered to have excellent suitability. The terrestrial habitat present adjacent to waterbodies 10 and 11 was considered to offer high suitability for GCN, including potential hibernacula areas. Waterbody 12 had immediately adjacent suitable habitat for GCN; but overall was very isolated within the wider environment, being surrounded by heavily grazed grassland. Many of the remaining ponds were deemed unsuitable due to factors including high fish presence, high waterfowl impact, and poor water quality.

3.3. Presence, Likely Absence Surveys

- 3.3.1 Waterbodies 10, 11 and 12 were subject to presence / likely absence surveys. These surveys revealed no presence of GCN. They did identify presence of smooth newt (*Lissotriton vulgaris*) and common frog (*Rana temporaria*). The raw data of these surveys can be found in Annex B.

Table 3: HSI scores for the remaining waterbodies and wet ditches

Reference (Figure 1, Annex B) (SW= Standing Water, WD=wet ditch)	HSI Score
SW 8	0.31 = poor
SW 9	0.36 = poor
SW 10	0.80 = excellent
SW 11	0.69 = average
SW 12	0.85 = excellent

Reference (Figure 1, Annex B) (SW= Standing Water, WD=wet ditch)	HSI Score
SW 13	0.35 = poor
SW 14	0.45 = poor
SW 29	0.43 = poor
SW 30	0.18 = poor
SW 31	0.42 = poor
SW 32	0.28 = poor
SW 33	0.37 = poor
SW 34	0.37 = poor
SW 35	0.53 = below average
SW 36	0.18 = poor
SW 38	0.45 = poor
SW 39	0.59 = below average
SW 40	0.30 = poor
SW 41	0.45 = poor
SW 43	0.46 = poor
SW 44	Dry
SW 45	Dry
WD 2	0.47 = poor
WD 4	0.46 = poor
WD 9	0.47 = poor
WD 10	0.57 = below average
WD 12	0.46 = poor

4. CONCLUSION AND RECOMMENDATIONS

- 4.1.1 The terrestrial habitat present immediately within the study area offered potential, albeit limited, habitat for GCN (patches and corridors consisting predominantly of woodland,); however, of the 48 waterbodies present, only three were considered to have average or above suitability for breeding habitat for GCN. These waterbodies were then found to be absent of any GCN.
- 4.1.2 The data search indicates GCN are present within the wider environment, however, these records were all recorded beyond the major roadways present. It was considered likely that the isolated nature of the scheme, in combination with the low number of suitable ponds, has resulted in these populations having restricted migration access to the area, and being unable to establish viable populations within the proposed Scheme extent.
- 4.1.3 It is considered that GCN are likely absent from the draft DCO site boundary, meaning that the proposed Scheme is unlikely to impact upon this species.

REFERENCES

All UK (and individual UK countries) legislation can be viewed at:
<http://www.legislation.gov.uk/browse>

COE (1979) Convention on the Conservation of European Wildlife and Natural Habitats. European Treaty Series – No. 144. Available online at:
<https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=090001680078aff>. Accessed 24/10/2018

EcoRecord (Ecological database for Birmingham and the Black Country. Available online at:
<http://www.ecorecord.org.uk/> Accessed 24/10/2018

English Nature (2001) Great Crested Newt Mitigation Guidelines. Available online at:
<https://www.merthyr.gov.uk/media/1241/great-crested-newts-mitigation-guidelines.pdf> Accessed 28/11/2018

H.M.S.O (1981) The Wildlife and Countryside Act 1981 (as amended). London. Available online at: <https://www.legislation.gov.uk/ukpga/1981/69>. Accessed on 24/10/2018 Accessed 24/10/2018 Accessed 24/10/2018

H.M.S.O. (2017) The Conservation of Habitats and Species Regulations 2017. London. Available online at: <http://www.legislation.gov.uk/uksi/2017/1012/contents/made>. Accessed on 24/10/2018

H.M.S.O. (2006) The Natural Environment and Rural Communities (NERC) Act. Available online at: <https://www.legislation.gov.uk/ukpga/2006/16/contents>. Accessed 24/10/2018

H.M.S.O (2018) The National Planning Policy Framework (NPPF). Available online at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf Accessed 24/10/2018

H.M.S.O. (2000) Countryside and Rights of Way Act. Available online at:
<http://www.legislation.gov.uk/ukpga/2000/37/contents> Accessed 24/10/2018

Magic Map Application. 2018. Available online from: <http://magic.defra.gov.uk/MagicMap.aspx> Accessed 24/10/2018 Accessed 24/10/2018

Highways England (2015) M54-M6/M6 Toll Link Road Scheme, Protected Species Report - Great Crested Newt Surveys.

Highways England (2015a) M54-M6/M6 Toll Link Link Road Scheme, PCF Stage 2 Environmental Assessment Report

Highways England (2018) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report Addendum

Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth

Oldham R.S, Keeble J., Swan M.J.S & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155

Staffordshire Ecological Record (SER). 2018 Available online from:
<http://www.sbap.org.uk/biologicalrecords/index.php?page=LRC> Accessed 24/10/2018

Annex A Wildlife Legislation and Policy

The Wildlife & Countryside Act 1981 (as amended)

Provides for designation and protection of Sites of Special Scientific Interest (SSSI), which are areas that represent the most valuable habitats in the UK for nature conservation.

The Act creates the following offences:

- To intentionally kill, injure, or take any wild bird or their eggs or nests (with exception to species listed in Schedule 2). Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young.
- To intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- Certain methods of killing, injuring, or taking wild animals listed in Schedule 6.
- To pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.
- The release of certain non-native animals and planting of plants listed in Schedule 9.

It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

Conservation of Habitats and Species Regulations 2017

The principal means by which the European Habitats Directive is transposed in England and Wales.

Provide for the designation and protection of a network of 'European Sites' (also termed Natura 2000), including Special Areas of Conservation (SAC) and Special Protection Areas (SPA).

Regulation 41 creates the following offences relating to European Protected Species (EPS):

- deliberately capture, injure or kill any wild animal of a European Protected Species;
- deliberately disturb animals of any such species in such a way as to be likely to:
 - impair their ability to survive, breed, rear or nurture their young, hibernate or migrate; or
 - significantly affect the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

The Regulations also make it an offence (subject to exceptions) to deliberately pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5.

However, the actions listed above can be made lawful through the granting of licences (European Protected Species Licence) by the appropriate authorities (Natural England in England). Licences may be granted for a number of purposes, but only after the appropriate authority has determined that the following regulations are satisfied:

- the works under the licence are being carried out for the purposes of 'preserving public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment'.
- there is 'no satisfactory alternative'.

- the action 'will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range'.

To apply for a licence, the following information is required:

- The species concerned.
- The relative size of the population at the site (note this may require a survey to be carried out at a particular time of the year).
- The impact(s) (if any) that the development is likely to have upon the populations.
- What measures will be conducted to mitigate for the impact(s).

Natural Environment & Rural Communities (NERC) Act 2006

Section 40 of NERC carries an extension of the earlier CRoW Act biodiversity duty to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. Section 41 requires the Secretary of State, as respects England, to publish a list of species and habitats which are of 'principal importance for the purpose of conserving biodiversity'. These lists generally reflect the species and habitats previously listed under the UK Biodiversity Action Plan.

National Planning Policy Framework

This framework replaces Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS 9) (ODPM 2005) and sets out the view of central Government on how planners should balance nature conservation with development. One of the key principles of the NPPF is:

The NPPF states that development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas, including biodiversity. It also states that the aim of planning decisions should be to prevent harm to biodiversity conservation interests and to 'promote the preservation, restoration and re-creation of priority habitats, ecological networks and the recovery of priority species'.

Where determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principals; 'if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'; and, 'planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss'.

This means that full ecological surveys should be carried out and suitable mitigation measures proposed prior to any planning application being submitted.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services

This biodiversity strategy for England builds on the Natural Environment White Paper and the earlier UK Biodiversity Action Plan. It provides a comprehensive picture of how Government is implementing our international and EU commitments and sets out the strategic direction for biodiversity policy up to 2020. Its mission is to:

"halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people."

In relation to planning and development its priority is to:

"take a strategic approach to planning for nature within and across local areas. This approach will guide development to the best locations, encourage greener design and enable development to enhance natural networks. We will retain the protection and improvement of the natural environment as core objectives of the planning system."

Annex B Survey Data

AMPHIBIAN BOTTLE TRAPPING SURVEY RECORDING FORM



Project		MSU/mb		Surveyors		KB + SN	
Pond Number		43a	43b				
Survey visit		1	1				
TRAPS IN	Date	24/4/18	24/4/18				
	Time	19:00	19:35				
	No. traps	20	20				
	Perimeter surveyed %	60	60				
	Air temp	10	10				
	Water temp	—	—				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
Pond number		43a	43b				
TRAPS OUT	Date	25/4/18	25/4/18				
	Time	07:30	07:50				
	Air temp	7					
	Water temp	—	—				
GCN	Male						
	Female						
	Unknown						
	Eggs						
SMOOTH/ PALMATE	Smooth Male	1					
	Palmate Male	—					
	Smooth Female	2	3				
	Palmate Female						
	S/P						
	Unknown						
OTHER SPECIES	Eggs						
	Toad						
	Frog						
	Fish						
	Inverts	water boat					
Wildfowl Present							
Notes							

AMPHIBIAN TORCH SURVEY RECORDING FORM



Project		MS4/M6		Surveyors		KB + SN	
Pond Number		43a	43b				
Survey visit		1	1				
Date		24/4/18	24/4/18				
Time		21:00	21:30				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
GCN	Male	/	/				
	Female	/	/				
	Unknown	/	/				
SMOOTH/ PALMATE	Smooth Male	/	/				
	Palmate Male	/	/				
	S/P Female	/	/				
	S/P Unknown	/	/				
	Other	/	/				
OTHER SPECIES	Common Toad	/	/				
	Common Frog	/	spawn				
	Fish Present	/	/				
	Inverts	water boatman	caddisfly				
	Wildfowl Present	/	/				
Other		/	/				
Bright moonlight (Y or N)							
Perimeter surveyed %		60	60				
Air temp °C		10	10				
Water temp °C		—	—				
Water clarity (1-3)		2	2				
1 = good, pond bottom visible; 2 = intermediate, pond bottom visible in shallow water; 3 = turbid, bottom not visible							
Rain (0-3)		2	2				
0 = none, 1 = yesterday, 2 = immediately prior, 3 = during survey							
Wind disturbance (Y or N)		N	N				
Notes							

AMPHIBIAN BOTTLE TRAPPING SURVEY RECORDING FORM



Project		MSU/mb		Surveyors		KB + SN	
Pond Number		43a	43b				
Survey visit		1	1				
TRAPS IN	Date	24/4/18	24/4/18				
	Time	19:00	19:35				
	No. traps	20	20				
	Perimeter surveyed %	60	60				
	Air temp	10	10				
	Water temp	—	—				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
Pond number		43a	43b				
TRAPS OUT	Date	25/4/18	25/4/18				
	Time	07:30	07:50				
	Air temp	7					
	Water temp	—	—				
GCN	Male						
	Female						
	Unknown						
	Eggs						
SMOOTH/ PALMATE	Smooth Male	1					
	Palmate Male	—					
	Smooth Female	2	3				
	Palmate Female						
	S/P						
	Unknown						
OTHER SPECIES	Eggs						
	Toad						
	Frog						
	Fish						
	Inverts	water boat					
Wildfowl Present							
Notes							

AMPHIBIAN TORCH SURVEY RECORDING FORM



Project		MS4/M6		Surveyors		KB + SN	
Pond Number		43a	43b				
Survey visit		1	1				
Date		24/4/18	24/4/18				
Time		21:00	21:30				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
GCN	Male	/	/				
	Female	/	/				
	Unknown	/	/				
SMOOTH/ PALMATE	Smooth Male	/	/				
	Palmate Male	/	/				
	S/P Female	/	/				
	S/P Unknown	/	/				
	Other	/	/				
OTHER SPECIES	Common Toad	/	/				
	Common Frog	/	spawn				
	Fish Present	/	/				
	Inverts	water boatman	caddisfly				
	Wildfowl Present	/	/				
Other		/	/				
Bright moonlight (Y or N)							
Perimeter surveyed %		60	60				
Air temp °C		10	10				
Water temp °C		—	—				
Water clarity (1-3)		2	2				
1 = good, pond bottom visible; 2 = intermediate, pond bottom visible in shallow water; 3 = turbid, bottom not visible							
Rain (0-3)		2	2				
0 = none, 1 = yesterday, 2 = immediately prior, 3 = during survey							
Wind disturbance (Y or N)		N	N				
Notes							

AMPHIBIAN BOTTLE TRAPPING SURVEY RECORDING FORM



Project		M54 M6 Toll		Surveyors		KB + HJ	
Pond Number		43a	43b				
Survey visit		16/5/18	3				
TRAPS IN	Date	3	16/5/18				
	Time	19:40	18:40				
	No. traps	15	25				
Perimeter surveyed %		40%	50%				
Air temp		13	13				
Water temp							

Results

A = Adult, J = Juvenile, L = Larvae, E = Eggs

Pond number		43a	43b				
TRAPS OUT	Date	17/5/18	17/5/18				
	Time	09:30 09:15	08:50				
	Air temp	18°C	10°C				
	Water temp						
GCN	Male						
	Female						
	Unknown						
	Eggs						
SMOOTH/ PALMATE	Smooth Male	7	9				
	Palmate Male						
	Smooth Female	3	3				
	Palmate Female						
	S/P						
	Unknown						
OTHER SPECIES	Eggs						
	Toad						
	Frog	✓ tadpoles					
	Fish						
	Inverts						
Wildfowl Present							
Notes	Both ponds reduced water level	Duckweed	fish				

P 43 - cows/bulls in field could not survey

AMPHIBIAN TORCH SURVEY RECORDING FORM



Project		MS4 NG TOH		Surveyors		KB + HJ	
Pond Number		43a	43b				
Survey visit		3	3				
Date		16/5/18	16/5/18				
Time		22:00	21:30				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
GCN	Male						
	Female						
	Unknown						
SMOOTH/ PALMATE	Smooth Male						
	Palmate Male						
	S/P Female	x1	x2				
	S/P Unknown	x1					
	Other						
OTHER SPECIES	Common Toad						
	Common Frog						
	Fish Present						
	Inverts	Caddis Fly Larvae					
	Wildfowl Present						
Other							
Bright moonlight (Y or N)		N	N				
Perimeter surveyed %		60%	60%				
Air temp °C		9°C	9°C				
Water temp °C							
Water clarity (1-3)		2/3	3				
1 = good, pond bottom visible; 2 = intermediate, pond bottom visible in shallow water; 3 = turbid, bottom not visible							
Rain (0-3)		0	0				
0 = none, 1 = yesterday, 2 = immediately prior, 3 = during survey							
Wind disturbance (Y or N)		N	N				
Notes							

AMPHIBIAN BOTTLE TRAPPING SURVEY RECORDING FORM



Project		MS4/M6		Surveyors		KB + MN	
Pond Number		43a	43b				
Survey visit		4	4				
TRAPS IN	Date	22/5/18	22/5/18				
	Time	19:45	19:15				
	No. traps	15	25				
	Perimeter surveyed %	40%	65%				
	Air temp	20	20				
	Water temp						

Results

A = Adult, J = Juvenile, L = Larvae, E = Eggs

Pond number		43a	43b				
TRAPS OUT	Date	23/5/18	23/5/18				
	Time	08:15	08:00				
	Air temp	11	11				
	Water temp						
GCN	Male	/	/				
	Female	/	/				
	Unknown	/	/				
	Eggs	/	/				
SMOOTH/ PALMATE	Smooth Male	10	10				
	Palmate Male						
	Smooth Female	2	3				
	Palmate Female						
	S/P						
	Unknown						
OTHER SPECIES	Eggs						
	Toad						
	Frog	tadpoles	tadpoles				
	Fish						
	Inverts						
Wildfowl Present							
Notes							

AMPHIBIAN TORCH SURVEY RECORDING FORM



Project		M54/M6		Surveyors		KB + MN	
Pond Number		43a	43b				
Survey visit		4	4				
Date		22/5/18	22/5/18				
Time		21:55	21:45				
Results							
A = Adult, J = Juvenile, L = Larvae, E = Eggs							
GCN	Male						
	Female						
	Unknown						
SMOOTH/ PALMATE	Smooth Male						
	Palmate Male						
	S/P Female		3				
	S/P Unknown		1				
	Other						
OTHER SPECIES	Common Toad						
	Common Frog						
	Fish Present						
	Inverts	caddisfly	caddisfly				
	Wildfowl Present						
Other							
Bright moonlight (Y or N)		N	N				
Perimeter surveyed %		40%	70%				
Air temp °C		15	15				
Water temp °C		8	8				
Water clarity (1-3)		2/3	2/3				
1 = good, pond bottom visible; 2 = intermediate, pond bottom visible in shallow water; 3 = turbid, bottom not visible							
Rain (0-3)		0	0				
0 = none, 1 = yesterday, 2 = immediately prior, 3 = during survey							
Wind disturbance (Y or N)		N	N				
Notes							

Annex C Figure 1: Ponds Surveyed for GCN

Appendix 9.3: Otter and Water Vole Report

M54-M6/M6 Toll Link Road

Otter and Water Vole Report

**Report Number: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0002 P01 S2
December 2018**

M54-M6/M6 Toll Link Road

Otter and Water Vole Report

Report No: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0002 -P01 S2

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Figure 1: Otter & Water Vole Survey Map

1. INTRODUCTION

1.1. Background

1.1.1. The A460 currently provides a link between the M6 Junction 11, M54 Junction 1, and M6 Toll Junction T8 via Featherstone, Staffordshire. The A460 is a single carriageway road which experiences significant congestion from vehicles travelling between the M6 north, M54 and M6 Toll. To alleviate congestion Highways England are proposing a new two lane dual carriageway link road, approximately 2.5km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, herein referred to as the 'proposed Scheme'. This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.

1.1.2. A suit of ecological surveys have been produced to support the Environmental Statement including an otter (*Lutra lutra*) and water vole (*Arvicola amphibious*) survey on watercourses along the route of the proposed Scheme.

1.2. Study Area and Location

1.2.1. The study area for the proposed Scheme is located north of Wolverhampton, within the County of Staffordshire. The study area for the otter and water vole surveys is defined as the draft DCO site boundary and a 250 m buffer as shown on Figure 1.

1.2.2. The surrounding area consists predominantly of arable farmland interspersed with areas of grassland, woodland, several waterbodies and small watercourses. There are several major roadways which intersect the local landscape including the M6, M6 Toll, M54, and A460. Residential areas within the surrounding landscape include the small villages of Featherstone and Shareshill which are directly adjacent to the A460, the civil parish of Great Saredon adjacent to the M6 Toll, as well as scattered small holdings and various farmhouses.

1.3. Survey Aims and Objectives

1.3.1. The aim and objectives of the survey work and subsequent report presented herein were to:

- determine presence or likely absence of otter and water vole on water courses crossed by the proposed Scheme in order to inform the Environmental Statement;
- undertake a desk based study including review of existing ecological data to identify any records for otter and water vole within the study area;
- provide baseline information to inform design development and environmental assessment; and
- identify the risk of encountering otter and water vole whilst undertaking works for the proposed Scheme.

1.4. Legislation

1.4.1. Otter and water vole are legally protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended), which makes it an offence to:

- I. intentionally or recklessly kill, injure, or take (handle) a water vole or otter;
- II. intentionally or recklessly damage, destroy or obstruct access to any structure or place that a water vole or otter uses for shelter or protection;
- III. intentionally or recklessly disturb a water vole or otter while it is occupying a structure or place that it uses for shelter or protection; or

-
- IV. possess, sell or transport live or dead water vole or otter, or any part of a water vole or otter.
- 1.4.2. In addition, water vole is a Priority Species under the UK Biodiversity Action Plan (UK BAP), and has been adopted as a Species of Principal Importance in England under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- 1.4.3. Otter receives further protection as it is a European Protected Species under the Conservation of Habitats and Species Regulations 2017. This makes it an offence to:
- I. deliberately capture, injure or kill any otter;
 - II. deliberately disturb an otter, especially if the disturbance will likely impair their ability to survive, breed, reproduce, rear or nurture their young;
 - III. deliberately disturb an otter which will impair their ability to hibernate or migrate;
 - IV. significantly affect the local distribution or abundance of otter; or
 - V. damage or destroy a breeding site or resting place of an otter.

1.5. Limitations

- 1.5.1. The suit of otter and water vole surveys undertaken throughout the study area were undertaken during the optimal period (April, May to September; depending upon the survey methodology); in accordance with current survey guidance provided in paragraphs 2.1.14 and 2.1.15. However, sections of watercourses could not be accessed due to overly dense vegetation present on the banks of the watercourses and covering the watercourses during the May 2018 surveys. A more comprehensive level of access was achieved during the surveys undertaken in September 2018.
- 1.5.2. Habitats and features of interest outside the study area and individual landownership boundaries were observed from within accessible landownership boundaries or from areas with public access, using binoculars where necessary. Therefore, watercourses present on adjacent land (where access permission had not been granted) was not subject to a survey. These limitations are not, however, expected to have had a significant impact on the results of the survey.
- 1.5.3. The lack of evidence of a protected species does not preclude their possible presence at a later date. Any survey represents only a 'snapshot' of possible otter and water vole activity. Importantly, lack of activity / evidence of an otter and / or water vole resting feature does not guarantee their absence and therefore consideration should be given to the need to update the data in the future in the event of substantial delay to the implementation of proposed Scheme.

2. METHODOLOGY

2.1. Desktop study

- 2.1.1. A desktop study of statutory and non-statutory designated sites and protected species was completed in 2015 along the route of the proposed Scheme. This search area included the PCF Stage 2 (options selection) Scheme options and a 2 km buffer. Data was obtained from Natural England, the Environment Agency, Staffordshire Ecological Record Centre (SER), and the Ecological records centre for Birmingham and the Black Country (EcoRecord). An updated desk study and data search was completed in 2017 with data obtained from SER.
- 2.1.2. In April 2018, a data search utilising freely available information from Magic Map and NBN Atlas was undertaken for statutory and non-statutory designated sites and protected species records. OS maps were further accessed to identify the presence of standing and running water within the study area. This search included the proposed Scheme and a 2 km buffer. In addition to this SER were approached again in 2018 to identify records for species within 4 km of the draft DCO site boundary.
- 2.1.3. A review of the Otter and Water Vole Report produced in 2015 (Highways England, 2015) was also undertaken.

2.2. Field Survey

- 2.2.1. An extended Phase 1 habitat survey (Highways England, 2018) was undertaken in 2018 to identify areas of suitable habitat with potential to support otter and water vole. This survey included all accessible land plots within 250 m of the draft DCO site boundary.
- 2.2.2. Following the extended Phase 1 habitat survey, a suite of targeted otter and water vole surveys were undertaken. The surveys focused on all watercourses which were present within or intersected the study area and which were identified as having potential to support otter and water vole as summarised in Table 1. The surveys were undertaken on 18th, 23rd & 25th April, 15th & 16th May and 26th September 2018 and involved surveying 250 m of the watercourse bank, where access was permitted. Figure 1 illustrates the watercourses which were surveyed.
- 2.2.3. The survey was conducted by suitably qualified Ecologists; Stuart Graham MSc, CEcol, CEnv, MCIEEM and Dean Cordelle BSc (Hons), Grad CIEEM and Chris Hall BSc (Hons), MSc FGS. Environmental conditions experienced during the surveys were as follows:
- April*
- 18th – 16°C, cloud with sunny intervals, no precipitation and a light breeze;
 - 23rd – 11°C, cloudy, no precipitation, light breeze; and
 - 25th – 9°C, cloudy, no precipitation, light breeze.
- May*
- 15th - 20°C, light cloud, no precipitation, light breeze; and
 - 16th - 14°C, light cloud, no precipitation, light breeze.
- September*
- 26th - 21°C, light cloud, no precipitation, light breeze.
- 2.2.4. All surveys were undertaken in weather conditions considered suitable for conducting otter and water vole surveys i.e. dry and mild. There were no periods of heavy rainfall leading up to the survey, which could have washed field signs away.

2.2.5. Table 1 outlines the watercourses surveyed and their characteristics, including water quality, flow rate, and features present on the banks.

2.2.6. Water quality is described as follows:

- Bad – clearly polluted (e.g. signs of oil or sewerage) with no submerged vegetation.
- Poor – few submerged plants, low invertebrate diversity.
- Moderate – moderate invertebrate diversity.
- Good – abundant and diverse invertebrate community with submerged vegetation present.

Table 1 – Watercourses surveyed

Label Ref Figure 1	Width (m)	Depth (m)	Description
RW1	1	1	Slow flowing, stony/silty sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have poor water quality.
RW2	1.5	1	Drainage ditch - sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have poor water quality.
RW3	1.5	<0.5m	Slow flowing, sediment and stone bottom, ruderal vegetation present on both banks for most of its length, appeared to have poor water quality.
RW4	1	1	Slow flowing, sediment bottom, ruderal vegetation present on both banks, appeared to have good water quality.
RW5	1.5	1.5	Slow flowing, sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have good water quality.
RW6	1	1	Slow flowing – run off from one waterbody into the next, appeared to have bad water quality.
RW7	1.5	<0.5	Appeared to have poor water quality, culverts beneath A460, sediment bottom.
RW8	1.5	1	Slow flowing, sediment bottom, ruderal vegetation present on both banks, adjacent to a line of trees, appeared to have good water quality.

Label Ref Figure 1	Width (m)	Depth (m)	Description
RW9	1	1	Drainage ditch flows into watercourse – appeared to have poor water quality, sediment bottom, aquatic vegetation present, vegetation on both banks.
RW10	1	<0.5	Drainage ditch flows into watercourse – appeared to have poor water quality, sediment bottom, vegetation on both banks.
RW11	2	>1	Slow flowing, banks vegetated with Himalayan Balsam and common nettle, appeared to have good water quality.
RW12	1	<0.5	Drainage ditch - appeared to have bad water quality, adjacent to line of trees.
RW13	1.5	0.5	Appeared to have good water quality, adjacent to line of trees, sediment and stone bottom.
RW14	1.5	0.5	Appeared to have good water quality, adjacent to line of trees, sediment and stone bottom.

2.3. Water Vole Survey Methodology

2.3.1. Water vole surveys were conducted adopting the guidelines in The Water Vole Mitigation Handbook (Dean et al., 2016) which recommends two surveys be undertaken at least two months apart over the course of the breeding season. Two surveys were conducted at the watercourses, each of which consisted of surveying 250 m up and downstream of the proposed Scheme and 2 m up the bank (where applicable). The surveys were conducted from both banks and within the channel, where accessible. The surveys included searching for water vole field signs such as sightings, footprints, faeces, feeding remains and stations, latrines and burrows. When these were encountered, a GPS was used to obtain an accurate location of the field sign.

2.4. Otter Survey Methodology

2.4.1. Whilst conducting the water vole surveys, the watercourse sites were also surveyed for presence of otter along the same 250 m stretch upstream and downstream of the proposed Scheme. The surveys were conducted from both banks of the watercourses and from within the channel, where accessible. The survey was conducted using the guidelines in Competences for species surveys: Otter (CIEEM, 2013), and the Common Standards Monitoring Guidance for Mammals (JNCC, 2004). This was undertaken looking for field signs which include spraints which are generally found on prominent features such as rocks, logs, bridges and footprints. Other field signs looked for include feeding remains, holts and couches. When these were encountered, a GPS was used to obtain an accurate location of the field sign.

3. RESULTS

3.1. Desktop Study

- 3.1.1. Records from SER and EcoRecord (updated in 2018) show only one record of otter (date unknown) located within Walk Mill Clay pits and is in territory range of canals that link to a pond adjacent to the site. No signs of otter were recorded during the surveys undertaken in 2015 (Highways England, 2015). SER revealed records of water vole within 2 km of the proposed Scheme, with two records within 250 m of the proposed Scheme. These records were to the south and the west of the southern section the proposed Scheme. In addition to this, two records of water vole were recorded in 2000 from a tributary of the River Penk. No water vole signs were recorded during the surveys undertaken in 2015.

3.2. Field Study

- 3.2.1. No field signs indicative of the presence of either otter or water vole were observed during the surveys of the watercourses undertaken in April, May and September 2018. For water vole, there was an absence of sightings, footprints, faeces, feeding remains and stations, latrines and burrows within all watercourses. Similarly, for otter, there was an absence of sightings, spraints, food remains, holts and couches.
- 3.2.2. Evidence of brown rat (*Rattus norvegicus*); a common carrier of Leptospirosis or Weil's disease were noted during the surveys at RW11, RW15, RW11, and RW10 (Refer to Figure 1).

4. CONCLUSION AND RECOMMENDATIONS

- 4.1.1. Although historical records of otters and water voles have been identified in the wider environment, the records provided relate to sites with little or no connectivity to the study area.
- 4.1.2. No field signs indicative of the presence of either otter or water vole were observed during the 2015 and / or 2018 surveys of the watercourses surveyed.
- 4.1.3. All watercourses surveyed were found to be isolated from watercourses within the wider environment. The majority of the watercourses were noted as being culverted, either within or outside of the study area and appeared polluted. The locations of the watercourses within the landscape would suggest they receive runoff from fields in agricultural use, the fishing ponds at Brookfields Farm and possibly the adjacent road network (M6, M54, M6 Toll and A460); further re-iterating their unsuitability to support these species.

REFERENCES

Bang, P. & Dahlstrom, P. (2006) *Animal Tracks and Signs*. Oxford University Press, Oxford.

Chanin P (2003) *Ecology of the European Otter*. *Conserving Natura 2000*

COE (1979) *Convention on the Conservation of European Wildlife and Natural Habitats*. *European Treaty Series – No. 144*. Available online at:

<https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=0900001680078aff>. Accessed 24/10/2018

Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London. Available online at:

<https://www.fensforthefuture.org.uk/admin/resources/downloads/water-vole-mitigation-guidance-final-2016.pdf> Accessed 24/10/2018

EcoRecord (Ecological database for Birmingham and the Black Country. Available online at:

<http://www.ecorecord.org.uk/> Accessed 24/10/2018

Highways England (2015) *M54-M6/M6 Toll Link Road Scheme, Protected Species Report – Otter and Water Vole*.

Highways England (2015a) *M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report*

Highways England (2018) *M54-M6/M6 Toll Link Road: Extended Phase 1 Habitat Report*.

H.M.S.O (1981) *The Wildlife and Countryside Act 1981 (as amended)*. London. Available online at:

<https://www.legislation.gov.uk/ukpga/1981/69>. Accessed on 24/10/2018 Accessed 24/10/2018 Accessed 24/10/2018

H.M.S.O. (2017) *The Conservation of Habitats and Species Regulations 2017*. London. Available online at: <http://www.legislation.gov.uk/uksi/2017/1012/contents/made>. Accessed on 24/10/2018

H.M.S.O. (2006) *The Natural Environment and Rural Communities (NERC) Act*. Available online at:

<https://www.legislation.gov.uk/ukpga/2006/16/contents>. Accessed 24/10/2018

H.M.S.O (2018) *The National Planning Policy Framework (NPPF)*. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf Accessed 24/10/2018

H.M.S.O. (2000) *Countryside and Rights of Way Act*. Available online at:

<http://www.legislation.gov.uk/ukpga/2000/37/contents> Accessed 24/10/2018

Magic Map Application. 2018. Available online from: <http://magic.defra.gov.uk/MagicMap.aspx>

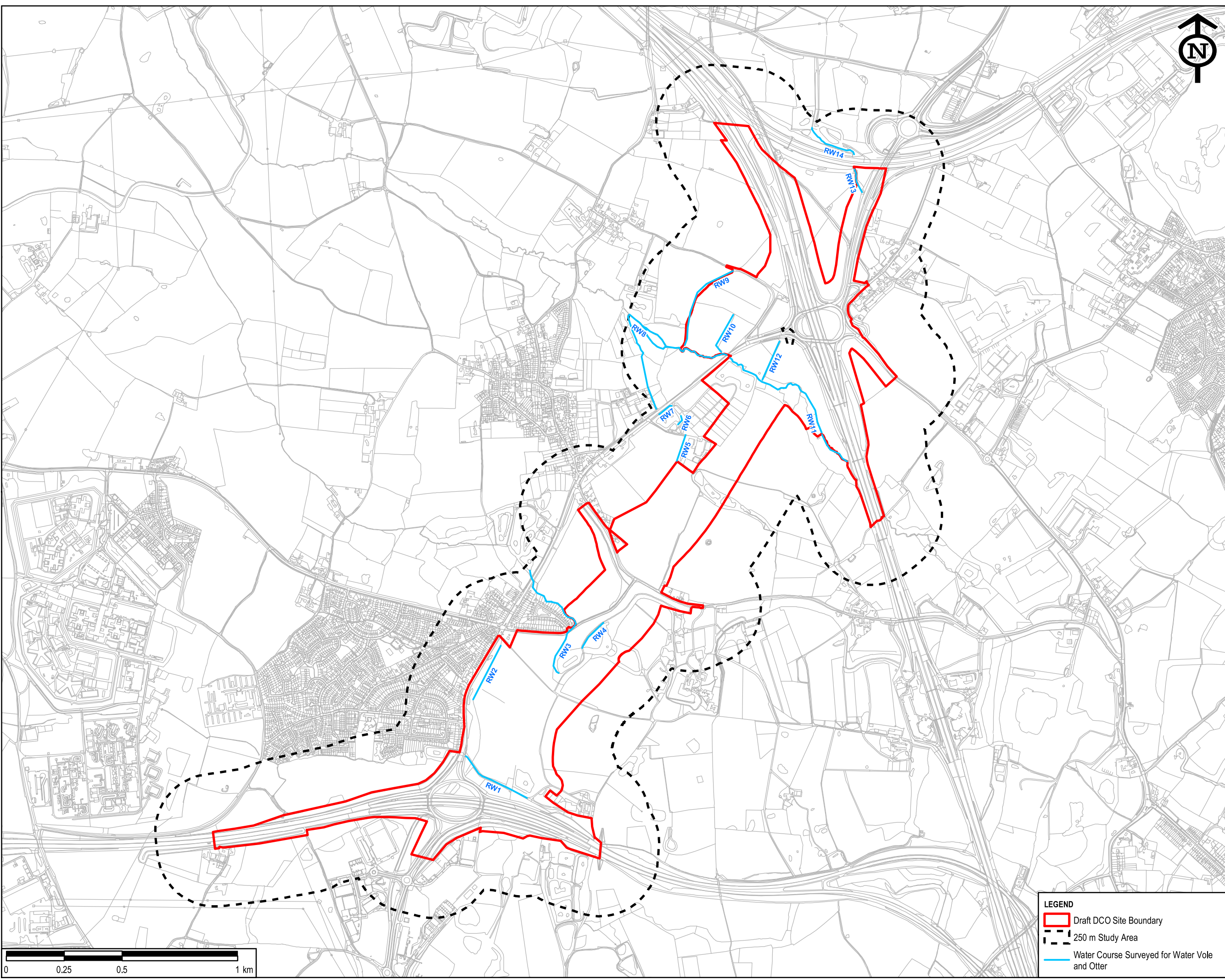
Accessed 24/10/2018 Accessed 24/10/2018

Staffordshire Ecological Record (SER). 2018 Available online from:

<http://www.sbap.org.uk/biologicalrecords/index.php?page=LRC> Accessed 24/10/2018

Figure 1: Otter & Water Vole Survey Map

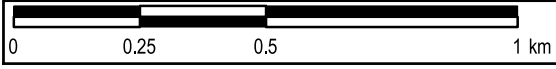
Plot Date: 05 December 2018 11:45:16
 File Name: \\ukis2pfs001\1\1\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 1 - Water Vole & Otter Survey.mxd



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Drawing Title				
FIGURE 1 WATER VOLE AND OTTER SURVEY				
Designed EC	Drawn EC	Checked AR	Approved TP	Date 05/12/2018
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LEGEND

- Draft DCO Site Boundary
- 250 m Study Area
- Water Course Surveyed for Water Vole and Otter



Appendix 9.4: Reptile Report

M54-M6/M6 Toll Link Road

Reptile Survey Report

**Report Number: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0005 P01 S2
December 2018**

M54-M6/M6 Toll Link Road

Reptile Survey Report

Report No: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0005 -P01 S2

Issue No	Current Status	Date	Prepared By	Reviewed By	Approved By
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Annexes

- Annex A. Wildlife Legislation and Policy
- Annex B. Figure 1: Reptile Matt Locations
- Annex C. Artificial Refugia¹¹

1. INTRODUCTION

1.1. Background

- 1.1.1. The A460 provides a link between the M6 Junction 11, M54 Junction 1, and M6 Toll Junction T8 by Featherstone, Staffordshire. The A460 is a single carriageway road which experiences significant congestion for vehicles travelling between the M6 north, M54 and M6 Toll. To alleviate congestion Highways England are proposing a new two lane dual carriageway road, approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, herein referred to as the 'proposed Scheme'. This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.
- 1.1.2. A suit of ecological surveys have been carried out to support the Environmental Statement including reptile surveys.

1.2. Study Area and Location

- 1.2.1. The study area for the proposed Scheme is located north of Wolverhampton, within the County of Staffordshire. The study area for the reptile surveys is defined as the draft DCO site boundary and a 250 m buffer as shown on Figure 1, Annex B.
- 1.2.2. The surrounding area consists predominantly of arable farmland interspersed with areas of grassland, woodland, several waterbodies and small watercourses. There are several major roadways which intersect the local landscape including the M6, M6 Toll, M54, and A460. Residential areas within the surrounding landscape include the small villages of Featherstone and Shareshill which are directly adjacent to the A460, the civil parish of Great Saredon adjacent to the M6 Toll, as well as scattered small holdings and various farmhouses.
- 1.2.3. The extended Phase 1 habitat survey for the proposed Scheme (Highways England, 2018) highlighted three areas which consisted of suitable habitat for reptiles. The first area is a linear corridor spanning from a large fishing pond (waterbody 8) along a field edge adjacent to a stretch of woodland, this area was split into smaller areas labelled A, B, C, D, and E. The second area was adjacent to waterbody 12, labelled F, and the third was a small section of young woodland at the edge of a semi-improved grassland field labelled G. These areas are shown in Figure 1, Annex B.

1.3. Survey Aims and Objectives

- 1.3.1. The aim and objectives of the survey work and subsequent report presented herein were to:
- determine presence or likely absence of reptiles within the study area in order to inform the Environmental Statement;
 - undertake a desk based study including review of existing ecological data to identify any records for reptiles within the study area;
 - provide baseline information to inform design development and environmental assessment; and
 - identify the risk of encountering reptiles whilst undertaking works for the proposed Scheme.

1.4. Legislation

1.4.1. Common reptiles (common lizard (*Zootocta vivpara*), adder (*Vipera berus*), grass snake (*Natrix helvetica*) and slow worm (*Anguis fragilis*)) are legally protected under Schedule 9(1) and 9(5) of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to:

- intentionally or recklessly kill, or injure a reptile;
- sell, offer or expose for sale, or having in possession or transporting for the purpose of sale any live or dead or any part of, or anything derived from, a reptile;
- publish or cause to be published any advertisement likely to be understood as conveying buying or selling, or intent to buy or sell, any of the above things;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place that a reptile uses for shelter or protection; and
- possess, sell or transport live or dead reptile, or any part of a reptile.

1.4.2. Please refer to Annex A for full details of legislation.

1.5. Limitations

1.5.1. Areas of habitat suitable for reptiles were highlighted during the extended Phase 1 habitat surveys in April and May 2018. As a result the surveys do not take into account any ecological features that may only appear at other times of the year and therefore were not evident at the time of the extended Phase 1 habitat surveys.

1.5.2. There were access restrictions for a number of land plots within the study area. However, it is considered that sufficient information was gained to inform the requirement for further surveys.

1.5.3. Areas of private residential dwellings and their associated curtilages were not surveyed due to access restrictions; however, this is not considered a significant limitation.

1.5.4. Area three (Reptile Mat Location 'G' Annex B, Figure 1), was surveyed twice due to health and safety concerns in accessing the area. Area three (G) is isolated from neighbouring suitable habitat therefore lowering the suitability for reptiles, this is therefore not considered a significant limitation.

1.5.5. Despite the limitations detailed above it is considered that there was sufficient information gathered during the survey to inform the PCF Stage 3 (preliminary design) Scoping Report, Biodiversity Chapter and the scoping out of further surveys for reptiles.

2. METHODOLOGY

2.1. Desktop study

- 2.1.1. A desktop study of statutory and non-statutory designated sites and protected species was completed in 2015 along the route of the proposed Scheme. This search area included the PCF Stage 2 (options selection) Scheme options and a 2 km buffer. Data was obtained from Natural England, the Environment Agency, Staffordshire Ecological Record Centre (SER), and the Ecological records centre for Birmingham and the Black Country (EcoRecord). An updated desk study and data search was completed in 2017 with data obtained from SER.
- 2.1.2. In 2018, an additional data search was undertaken utilising freely available sources including the NBN Atlas to identify reptile records, and Magic Map Application to identify any licence applications for reptiles within 2 km of the proposed Scheme.
- 2.1.3. In addition to this, the SER and EcoRecord were approached in 2018 to identify records for reptile species within 4 km of the draft DCO site boundary.

2.2. Field Survey

- 2.2.1. A two phase approach was undertaken during the reptile surveys to determine presence/ likely absence of reptiles across the areas highlighted from the Extended Phase One Habitat Assessment. The approaches utilised were combined 'Artificial Refugia' surveys and 'Visual Encounter' surveys, as detailed below.

Artificial Refugia Survey

- 2.2.2. Refugia were set out on site on 26th April 2018, to allow time to bed-in prior to surveys commencing. The number artificial refugia set out in each survey area is outlined in Table C1, Annex C. As per the guidelines in Froglife (1999, 2015), seven surveys were undertaken between 11th May to the 21st May 2018, 10th September to the 27th September 2018 by a competent surveyor as per IEEM (2011) throughout the three areas. Seven visits; in suitable weather conditions, is considered appropriate for surveys targeted at identifying presence/ likely absence of reptiles across a site (Froglife, 1999; Natural England, 2011). The period of time in between 21st May and the 10th May 2018 was considered unsuitable for checks as the weather was above the acceptable range for reptile surveys, with the air temperature recorded above 20°C. The acceptable range for air temperature being between 9°C and 20°C (Froglife, 2015).
- 2.2.3. Artificial refugia were placed throughout the survey areas, at a density of 50 per hectare; as per the guidelines in Froglife (1999, 2015) and Sewel *et al* (2013) for a detailed survey. See Annex C, Table 2 for numbers of refugia per area. The artificial refugia type used for this survey was 0.5 m² pieces of roofing felt ('felts') and onduline mats, located in potential reptile hotspots – i.e. sunny areas near to cover (gullies and slopes, rides or paths through scrub, grassland, scrub/grassland interfaces and sun traps created by small open patches surrounded by dense vegetation (Froglife, 1999; Natural England, 2015). So as to avoid bias within the survey and impacts from public pressure, refugia were positioned in targeted areas over the site on top of short or flattened vegetation (rather than bare ground), also overhung by vegetation and away from footpaths.
- 2.2.4. The refugia were checked periodically with care taken to replace them back in exactly the same position, visual observation of the exterior of the roofing felt or

onduline was firstly undertaken to capture all incidents of reptiles basking on top of the refugia. If no basking reptiles were observed, care was taken to approach the tiles with minimum disturbance prior to lifting of the felts or tins.

Visual Encounter Survey

- 2.2.5. The three areas and immediate surroundings was systematically walked to check for Reptiles on seven occasions between the 11th May to the 21st May 2018 and 10th September to the 27th September 2018, predominantly following the survey methodology detailed in Gent & Gibson (1998). Surveys were undertaken during optimum weather conditions, i.e. when the temperature is between 9 °C and 21 °C (Gent & Gibson, 1998; Froglife, 1999), typically between 07:00-11:00Hrs and between 16:00-20:00Hrs, during periods of 'intermittent' or hazy sunshine, with little or no wind (Gent & Gibson, 1998), as literature suggests.
- 2.2.6. Both ground and vegetation were carefully checked (approximately 3-4 m ahead), with the sun kept behind the viewer.
- 2.2.7. Where pre-existing or natural refugia was observed during the survey (especially within survey areas C to E) these were also checked, with care taken to replace the refugia back in exactly the same position. As above, visual observation of the exterior of the refugia was firstly undertaken to capture all incidents of reptiles basking on top of the refugia. If no basking reptiles were observed, care was taken to approach the refugia with minimum disturbance prior to lifting.
- 2.2.8. The surveys were conducted by suitably qualified Ecologists: Stuart Graham BSc (Hons), MSc, CEcol, CEnv, MCIEEM; Dean Cordelle BSc (Hons), Grad CIEEM; Christopher Hall BSc, MSc, GradIEMA FGS; Henry James MSc, Grad IEMA; and Katie Warren BSc(Hons), Grad IEMA.
- 2.2.9. Weather conditions experienced during the surveys are shown below in Table 2.

Table 2: Weather conditions during the surveys.

Date (2018)	Temperature (°C)			Cloud cover (%)		Wind*		Precipitation**	
	At Start	At End	Beneath Matt	At Start	At End	At Start	At End	At Start	At End
11 th May	11.7	14.1	13.3	75	100	2	2	0	0
18 th May	13.8	18.2	17.6	10	30	1	2	0	0
21 st May	15	20.5	19.7	0	10	2	2	0	0
10 th September	17.7	17.4	19.2	75	80	3	4	0	0
24 th September	12.1	13.2	14.6	25	30	1	2	0	0
25 th September	16.1	15	17.2	25	30	2	2	0	0
27 th September	19.1	15.2	16	75	75	2	1	0	0

*Wind was classified 1-5, with 1=calm and 5=strong winds

**Precipitation was classified 0-5, with 0=none and 5=heavy downpour

3. RESULTS AND DISCUSSION

3.1. Desktop Study

- 3.1.1. Records from SER and EcoRecord (updated in 2018) do not show any records of reptiles within 2 km of the draft DCO site boundary.
- 3.1.2. NBN atlas revealed one record for reptiles approximately 300 m to the east of the draft DCO site boundary. This record was for a red-eared terrapin (*Trachemys scripta*), which is a non-native species.

3.2. Site surveys

- 3.2.1. Three species of reptile including, two smooth newts (*Lissotriton vulgaris*), 46 common toad (*Bufo bufo*), and three common frog (*Rana temporaria*) were recorded during the presence/ absence surveys. No reptiles were recorded during the presence/ absence surveys undertaken in 2018.

4. CONCLUSION

- 4.1.1. The habitat present within the draft DCO site boundary offered potential for reptiles, albeit extremely limited. Potential habitat was limited to small patches and corridors consisting predominantly of field edges neighbouring woodland and watercourses for aquatic species (such as grass snake).
- 4.1.2. All three areas surveyed revealed likely absence of reptiles from the draft DCO site boundary. Area three (Reptile Mat Location G) was only surveyed twice; however, this area was considered least viable to support a reptile population due to the size and isolation of the site.
- 4.1.3. It is considered that reptile populations have not been able to migrate and establish populations with the draft DCO site boundary. This is likely due to the isolated nature of the draft DCO site boundary, surrounded by the A460, M54 and M6, in combination with the low amount of and fragmented nature of suitable habitat.
- 4.1.4. It is therefore considered that reptile species are likely to be absent from the draft DCO site boundary and are therefore unlikely to be impacted by the proposed Scheme.

REFERENCES

- All UK (and individual UK countries) legislation can be viewed at: <http://www.legislation.gov.uk/browse>
- COE (1979) Convention on the Conservation of European Wildlife and Natural Habitats. European Treaty Series – No. 144. Available online at: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=0900001680078aff>. Accessed 24/10/2018
- EcoRecord (Ecological database for Birmingham and the Black Country. Available online at: <http://www.ecorecord.org.uk/> Accessed 24/10/2018
- Froglife Advice Sheet 10, (1999) Reptile Survey: An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation.
- Gent, A.H., & Gibson, S.D., (eds) (1998). *Herpetofauna workers' manual*. Joint Nature Conservation Committee, Peterborough.
- H.M.S.O (1981) The Wildlife and Countryside Act 1981 (as amended). London. Available online at: <https://www.legislation.gov.uk/ukpga/1981/69>. Accessed on 24/10/2018 Accessed 24/10/2018 Accessed 24/10/2018
- H.M.S.O. (2017) The Conservation of Habitats and Species Regulations 2017. London. Available online at: <http://www.legislation.gov.uk/uksi/2017/1012/contents/made>. Accessed on 24/10/2018
- H.M.S.O. (2006) The Natural Environment and Rural Communities (NERC) Act. Available online at: <https://www.legislation.gov.uk/ukpga/2006/16/contents>. Accessed 24/10/2018
- H.M.S.O (2018) The National Planning Policy Framework (NPPF). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf Accessed 24/10/2018
- H.M.S.O. (2000) Countryside and Rights of Way Act. Available online at: <http://www.legislation.gov.uk/ukpga/2000/37/contents> Accessed 24/10/2018
- Highways England (2015) M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report
- Highways England (2018) M54-M6/M6 Toll Link Road, Extended Phase 1 Habitat Report
- Highways England (2018a) M54-M6/M6 Toll Link Road, PCF Stage 2 Environmental Assessment Report Addendum
- IEEM (2011) Competencies for Species Survey: Reptiles. Hampshire, Institute of Ecology & Environmental Management.
- Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth
- Magic Map Application. 2018. Available online from: <http://magic.defra.gov.uk/MagicMap.aspx> Accessed 24/10/2018 Accessed 24/10/2018
- Natural England, (2011) Technical Information Note (TIN102); Reptile Mitigation Guidelines. Sheffield, Natural England.
- Oldham R.S, Keeble J., Swan M.J.S & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10 (4), 143-155
- Sewel, D; Griffiths, R; Beebee, Trevor; Foster, J; Wilkinson, J. (2013). Survey Protocols for the British herpetofauna. Available at: http://narrs.org.uk/documents/Survey_protocols_for_the_British_herpetofauna.pdf Accessed on 05/12/2018
- Staffordshire Ecological Record (SER). 2018 Available online from: <http://www.sbap.org.uk/biologicalrecords/index.php?page=LRC> Accessed 24/10/2018
- Surveying for Reptiles (2015) Froglife: Alex Draper Available at: <https://www.froglife.org/wp-content/uploads/2013/06/Reptile-survey-booklet-3mm-bleed.pdf> Accessed on 5/12/2018

Annex A. Wildlife Legislation and Policy

The Wildlife & Countryside Act 1981 (as amended)

Provides for designation and protection of Sites of Special Scientific Interest (SSSI), which are areas that represent the most valuable habitats in the UK for nature conservation.

The Act creates the following offences:

- To intentionally kill, injure, or take any wild bird or their eggs or nests (with exception to species listed in Schedule 2). Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young.
- To intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- Certain methods of killing, injuring, or taking wild animals listed in Schedule 6.
- To pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.
- The release of certain non-native animals and planting of plants listed in Schedule 9.

It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

Conservation of Habitats and Species Regulations 2017

The principal means by which the European Habitats Directive is transposed in England and Wales.

Provide for the designation and protection of a network of 'European Sites' (also termed Natura 2000), including Special Areas of Conservation (SAC) and Special Protection Areas (SPA).

Regulation 41 creates the following offences relating to European Protected Species (EPS):

- deliberately capture, injure or kill any wild animal of a European Protected Species;
- deliberately disturb animals of any such species in such a way as to be likely to:
- impair their ability to survive, breed, rear or nurture their young, hibernate or migrate, or
- significantly affect the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

The Regulations also make it an offence (subject to exceptions) to deliberately pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5.

However, the actions listed above can be made lawful through the granting of licences (European Protected Species Licence) by the appropriate authorities (Natural England in England). Licences may be granted for a number of purposes, but only after the appropriate authority has determined that the following regulations are satisfied:

- the works under the licence are being carried out for the purposes of 'preserving public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment'.
- there is 'no satisfactory alternative'
- the action 'will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range'.

To apply for a licence, the following information is required:

- The species concerned.

- The relative size of the population at the site (note this may require a survey to be carried out at a particular time of the year).
- The impact(s) (if any) that the development is likely to have upon the populations.
- What measures will be conducted to mitigate for the impact(s).

Natural Environment & Rural Communities (NERC) Act 2006

Section 40 of NERC carries an extension of the earlier CRoW Act biodiversity duty to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. Section 41 requires the Secretary of State, as respects England, to publish a list of species and habitats which are of 'principal importance for the purpose of conserving biodiversity'. These lists generally reflect the species and habitats previously listed under the UK Biodiversity Action Plan.

National Planning Policy Framework

This framework replaces Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS 9) (ODPM 2005) and sets out the view of central Government on how planners should balance nature conservation with development. One of the key principles of the NPPF is:

The NPPF states that development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas, including biodiversity. It also states that the aim of planning decisions should be to prevent harm to biodiversity conservation interests and to 'promote the preservation, restoration and re-creation of priority habitats, ecological networks and the recovery of priority species'.

Where determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principals; 'if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'; and, 'planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss'.

This means that full ecological surveys should be carried out and suitable mitigation measures proposed prior to any planning application being submitted.

Biodiversity 2020: A strategy for England's wildlife and ecosystem services

This biodiversity strategy for England builds on the Natural Environment White Paper and the earlier UK Biodiversity Action Plan. It provides a comprehensive picture of how Government is implementing our international and EU commitments and sets out the strategic direction for biodiversity policy up to 2020. Its mission is to:

"halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people."

In relation to planning and development its priority is to:

"take a strategic approach to planning for nature within and across local areas. This approach will guide development to the best locations, encourage greener design and enable development to enhance natural networks. We will retain the protection and improvement of the natural environment as core objectives of the planning system."

Annex B. Figure 1: Reptile Matt Locations

Annex C. Artificial Refugia

Table C1: Number of Artificial Refugia per Survey Area

Area	Number of Artificial Refugia
A	10
B	10
C	10
D	5
E	5
F	14
G	14

Appendix 9.5: Barn Owl Report

M54-M6/M6 Toll Link Road

Barn Owl Report

Report Number: HE514465-AMY-EBD-M54_SW_PR_Z-RP-EG-0004 P01 S2
December 2018

M54-M6/M6 Toll Link Road

Barn Owl Report

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Issue No	Current Status	Date	Prepared By	Reviewed By	Approved By
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Annexes

- Annex A. Figure 1: Barn Owl
Annex B. Wildlife Legislation and Policy

1. INTRODUCTION

1.1. Background

1.1.1. The A460 currently provides a link between the M6 Junction 11, M54 Junction 1, and M6 Toll Junction T8 via Featherstone, Staffordshire. The A460 is currently of single carriageway road which experiences significant congestion from vehicles travelling between the M6 north, M54 and M6 Toll. To alleviate congestion Highways England are proposing a new two lane dual carriageway link road, approximately 2.5 km (1.6 miles) in length between the M54 Junction 1 and the M6 Junction 11, herein referred to as the 'proposed Scheme'. This would provide free flow links to and from the M54 and connect into an improved M6 Junction 11.

1.1.2. A suit of ecological surveys, including Barn Owl (*Tyto alba*) have been carried out to support the Environmental Statement for the proposed Scheme.

1.2. Study Area and Location

1.2.1. The study area for the proposed Scheme is located north of Wolverhampton, within the County of Staffordshire. The study area is defined as the draft DCO site boundary and a 250 m buffer as shown in Annex A, Figure 1.

1.2.2. The surrounding area consists predominantly of arable farmland interspersed with areas of grassland, woodland, several waterbodies and small watercourses. There are several major roadways which intersect the local landscape including the M6, M6 Toll, M54, and A460. Residential areas within the surrounding landscape include the small villages of Featherstone and Shareshill which are directly adjacent to the A460, the civil parish of Great Saredon adjacent to the M6 Toll, as well as scattered small holdings and various farmhouses.

1.3. Survey Aims and Objectives

1.3.1. The aim and objectives of the survey work and subsequent report, presented herein, were to:

- determine presence or likely absence of barn owl across the study area in order to inform the Environmental Statement;
- undertake a desk based study including review of existing ecological data to identify any records for barn owl within the study area;
- provide baseline information to inform design development and environmental assessment; and
- identify the risk of encountering barn owl whilst undertaking works for the proposed Scheme.

1.4. Legislation

1.4.1. All wild birds in the UK are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy the nest (whilst being built or in use) or its eggs (refer to Annex B). Barn Owl, listed in Schedule 1 of the 1981 Act (as amended), receive further protection which makes it an offence to intentionally or recklessly disturb barn owl while building a nest or in, on or near a nest containing eggs or young; or to disturb dependent young of such a bird (HMSO, 1981 & 2000).

1.5. Limitations

1.5.1. Access to certain land plots was not permitted and therefore they were surveyed from adjacent land where possible. It is possible that features of interest were missed; however, sufficient information could be gained to inform the requirement for further surveys so this is not considered a significant limitation.

- 1.5.2. One area, within a land plot, was not fully assessed due to the density of vegetation present at the time of survey. The location of this area was E 395694, N 307626. This area was assessed from adjoining land where access was granted.
- 1.5.3. Areas of private residential dwellings and their associated curtilages were not surveyed due to land access not being permitted.

2. METHODOLOGY

2.1. Desktop Study

- 2.1.1. A desktop study of statutory and non-statutory designated sites and protected species was completed in 2015 along the route of the proposed Scheme. This search area included the PCF Stage 2 (options selection) Scheme options and a 2 km buffer. Data was obtained from Natural England, the Environment Agency, Staffordshire Ecological Record Centre (SER), and the Ecological records centre for Birmingham and the Black Country (EcoRecord). An updated desk study and data search was completed in 2017 with data obtained from SER.
- 2.1.2. In 2018, an additional data search was undertaken utilising freely available sources to identify any barn owl records within 2 km of the proposed Scheme. SER and EcoRecord were approached again in 2018 to identify records for the species within 4 km of the draft DCO site boundary.
- 2.1.3. The Barn Owl Online Survey Website was also consulted to check for any records of varying observation types e.g. roost site, deceased barn owl and nesting. These records are centred on a 5 km grid reference and specific recorded locations are unknown.

2.2. General Method

- 2.2.1. A daytime external and internal inspection of all accessible buildings and trees was undertaken to locate suitable nest sites, as well as evidence of barn owls. In addition, the habitat present across the study area was assessed for its potential as foraging habitat for barns owls in line with best practice guidelines (Barn Owl Trust, 2014).
- 2.2.2. The survey was conducted by suitably experienced and qualified Ecologists; Stuart Graham (licenced surveyor) MSc, CEcol, CEnv, MCIEEM and Dean Cordelle BSc (Hons), Grad CIEEM on the 18th, 23rd and 25th April and 15th and 16th May 2018. Environmental conditions experienced during the surveys were as follows:

April

- 18th – 16°C, cloud with sunny intervals, no precipitation and a light breeze
- 23rd – 11°C, cloudy, no precipitation, light breeze
- 25th – 9°C, cloudy, no precipitation, light breeze

May

- 15th - 20°C, light cloud, no precipitation, light breeze
- 16th - 14°C, light cloud, no precipitation, light breeze

2.3. Daytime Inspection of Potential Roosting and Nesting Sites

- 2.3.1. Any trees or buildings with barn owl potential were searched during daylight hours for potential or active nest and roost sites. Features investigated included:
- buildings, including used and disused agricultural, domestic, industrial and other types;
 - mature trees, isolated or in clusters in open fields, hedgerow or on the woodland edge, of at least 0.5 m in width containing a hole >80 mm backed by a large, dark cavity;
 - stacks of hay bales both inside and outside buildings; and
 - appropriate nest boxes inside or outside buildings, on trees, poles or other structures.

2.3.2. A preliminary inspection of any potential nest or roost sites was made from the ground with the aid of binoculars and torch. Signs of barn owl presence searched for included the following:

- adult barn owls;
- young or juvenile barn owls;
- nesting material;
- eggs and egg shells;
- pellets;
- feathers; and
- white splashing caused by droppings.

2.3.3. The following criteria was set against any presence or absence for barn owls in accessible areas:

- **Site potentiality:** the sites potential to be or have previously been a roost or nest site. The suitability will be recorded as none, low, medium or high.
- **No evidence:** no evidence of barn owls was found but a clear statement of the probability that evidence has been covered, lost or removed is made.
- **Old roost site:** evidence of roosting was found but no sign of occupation within the last two years. No evidence of nesting, past or present.
- **Recent roost site:** evidence of roosting within the past two years was found but no evidence of nesting past or present.
- **Current pair roosting:** evidence of two barn owls roosting within the past month was found but no evidence of nesting, past or present.
- **Nest site:** evidence that barn owls are currently nesting or have nested at some time in the past was found.

2.4. Daytime aerial Inspection of Potential Roosting and Nesting Sites

2.4.1. Any trees with barn owl potential were inspected, at height, during daylight hours for potential nest and roost sites or active nest and roost sites. Features investigated included those listed in Sections 2.3.1 and 2.3.2.

2.4.2. Any consultation or findings from discussions with landowners will also be summarised.

2.5. Daytime Assessment of Potential Foraging Habitat

2.5.1. Habitats across the study area, which on the basis of their appearance and structure offered potential foraging habitat, were recorded and classified as follows:

- **Type 1:** habitats which provide optimum habitat for field voles (*Microtus agrestis*) and are therefore of the highest value to barn owls. This habitat type is usually permanent, unimproved or semi-improved grassland, heterogeneous in appearance, and usually of mixed height. Unmanaged fields, wasteland, ditches, riverbanks, field margins and road verges are the most common examples of this habitat type.
- **Type 2:** habitats sub-optimal for field voles but of value to barn owls in areas with sporadic Type 1 habitats. This type of semi-improved grassland is characterised by having a more even-height sward.
- **Type 3:** habitats offering poorer habitat for field voles and as such are of lower value to barn owls. These improved grasslands are characterised by having a homogeneous sward, and being heavily grazed by sheep, horses or cattle or used for public amenity.

3. RESULTS AND DISCUSSION

3.1. Desktop Study

3.1.1. Records from SER, Barn Owl Trust Online Survey and EcoRecord (updated in 2018) show several scattered records for barn owl in locations away from the study area. The closest barn owl record / observation (record type: unknown) is 200 m away from the northern end of the proposed Scheme; past the M6 Junction 11 roundabout on the A460. Records show the nearest nesting barn owls to be 1.3 km south-west of the proposed Scheme to the south of the M54.

3.2. Daytime Inspection of Potential Roost and Nest Sites

Roost and Nest sites

3.2.1. No barn owl nesting sites were identified during the surveys. Accessible barns were assessed as having low or negligible potential and no current or historical signs of occupation by barn owl were identified. Trees within the study area were generally assessed as having no potential. Two trees were assessed as having high potential. These were consequentially subject to aerial inspection, showing no current or historical signs of occupation by barn owls. A summary of the results for the daytime inspection for potential roosting and nesting sites is shown in Table 1.

Table 1: Barn owl presence, absence and suitability.

Structure and Location (Grid Ref.)	Distance from the draft DCO site boundary	Present/Absent at Time of Survey	Suitability	Notes
Buildings				
SJ 94761 04641 (Barn)	<50 m north	Absent	Low	Access was permitted into the barns but there were no current or historical signs of occupation by barn owls. There were no roosting or nesting places apart from the floor on both levels.
Farm Building	Confidential location within 200 m of the draft DCO site boundary.	Possibly present but not surveyed as access to land/buildings denied.	Unknown. Landowner reported the presence of owls.	Landowner has said that owls are present but has denied access to the land. Bat surveys have recorded barn owls flying from this location in a northwards direction towards the M6.
Trees				
SJ 9488204878	240 m east	Absent	High	Rotting Cavity in Horse Chestnut. No current or previous signs of barn owl recorded at time of surveying.
SJ 9511206985	165 m west	Absent	Medium	Oak. No current or historical signs of barn owl recorded at time of surveying.
SJ 95767 06335	>10 m south	Absent	High	Oak. No current or historical signs of barn owl recorded at time of surveying.

3.3. Daytime Assessment of Potential Foraging Habitat

- 3.3.1. The study area comprises mostly open arable and pasture fields, with good connectivity between them. There were areas of unimproved or semi-improved heterogeneous grassland as well as field margins, drainage ditches and hedgerows that provide good foraging habitat.
- 3.3.2. Habitats across the study area were considered to be sun-optimal, providing 'Type 2' habitats (habitats sub-optimal for field voles but of value to barn owls in areas with sporadic Type 1 habitats). This was re-iterated through the observation of barn owls during bat transect surveys, commuting away from known roosts adjacent to the draft DCO site boundary and not utilising the draft DCO site boundary.

4. CONCLUSION AND RECOMMENDATIONS

- 4.1.1. The habitats present immediately within the study area were considered to be sub-optimal for barn owl, limited to small patches of unimproved or semi-improved heterogeneous grassland as well as field margins, drainage ditches and hedgerows that provide good foraging habitat.
- 4.1.2. It was considered likely that barn owl prey populations have not been able to thrive within the draft DCO site boundary. This is due to the low amount of suitable habitat which is fragmented. There is therefore little opportunity for barn owls to utilise the area for foraging.
- 4.1.3. All surveys undertaken revealed likely absence of barn owl from the draft DCO site boundary. An owl roost (approximately 200 m west of the draft DCO site boundary) has been reported from an adjacent farm complex and barn owls have been observed commuting over the study area, from this location, to foraging grounds in the wider environment. This roost is 450 m west of the M6 Junction 11. All recorded flight routes recorded have been in a northwards direction, not towards the proposed Scheme. It is therefore considered that if barn owls are present within the farm complex, the proposed Scheme would not sever the barn owls from the local foraging grounds.
- 4.1.4. It is considered that barn owl is likely absent from the draft DCO site boundary and therefore the proposed Scheme is unlikely to impact upon this species.

REFERENCES

All UK (and individual UK countries) legislation can be viewed at: <http://www.legislation.gov.uk/browse>

Barn Owl Trust (2014). *Barn Owl Conservation Handbook*. Exeter: Pelagic Publishing Ltd.

Barn Owl Trust Online Survey. Available online at:

<http://www.barnowlsurvey.org.uk/portal/p/All%20your%20Records%20Mapped>. Accessed 29/11/2018.

EcoRecord (Ecological database for Birmingham and the Black Country. Available online at:

<http://www.ecorecord.org.uk/> Accessed 24/10/2018

H.M.S.O (1981) *The Wildlife and Countryside Act 1981 (as amended)*. London. Available online at:

<https://www.legislation.gov.uk/ukpga/1981/69>. Accessed on 24/10/2018 Accessed 24/10/2018

H.M.S.O (2018) *The National Planning Policy Framework (NPPF)*. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf Accessed 24/10/2018

H.M.S.O. (2000) *Countryside and Rights of Way Act*. Available online at:

<http://www.legislation.gov.uk/ukpga/2000/37/contents> Accessed 24/10/2018

Highways England (2015) *M54-M6/M6 Toll Link Road Scheme, PCF Stage 2 Environmental Assessment Report*

Highways England (2018) *M54-M6/M6 Toll Link Road, PCF Stage 2 Environmental Assessment Report Addendum*

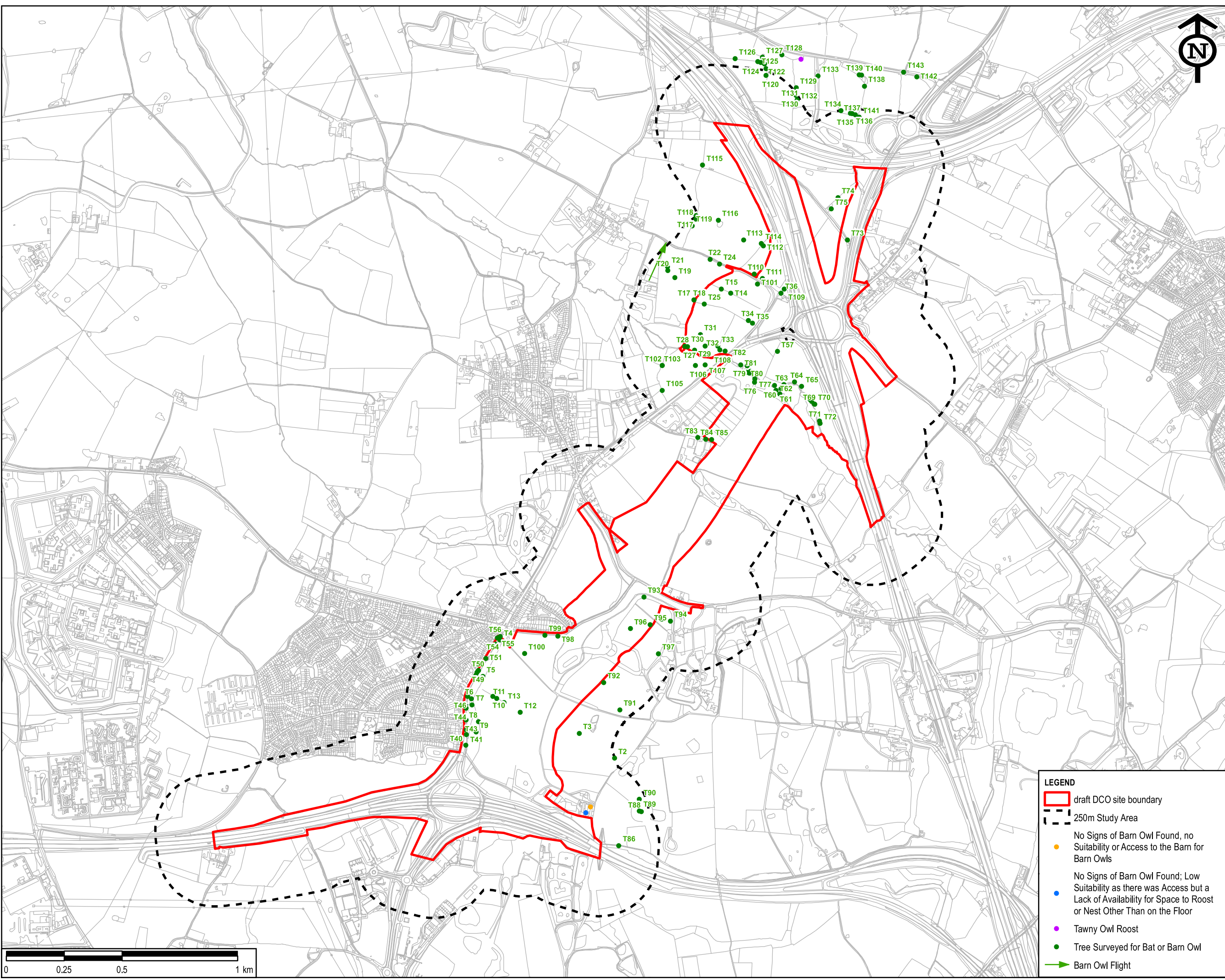
Magic Map Application. 2018. Available online from: <http://magic.defra.gov.uk/MagicMap.aspx> Accessed 24/10/2018 Accessed 24/10/2018

Staffordshire Ecological Record (SER). 2018 Available online from:

<http://www.sbap.org.uk/biologicalrecords/index.php?page=LRC>. Accessed 24/10/2018

Annex A. Figure 1: Barn Owl

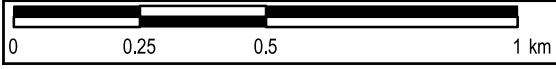
Plot Date: 20 December 2018 08:54:14
 File Name: \\ukisapfs001\1\ie\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Fig 1 - Barn Owl Survey.mxd



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M54 TO M6/M6 (TOLL) LINK ROAD				
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FIGURE 1 BARN OWL SURVEY				
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LEGEND

- draft DCO site boundary
- 250m Study Area
- No Signs of Barn Owl Found, no Suitability or Access to the Barn for Barn Owls
- No Signs of Barn Owl Found; Low Suitability as there was Access but a Lack of Availability for Space to Roost or Nest Other Than on the Floor
- Tawny Owl Roost
- Tree Surveyed for Bat or Barn Owl
- ➔ Barn Owl Flight



Annex B. Wildlife Legislation and Policy

The Wildlife & Countryside Act 1981 (as amended)

Provides for designation and protection of Sites of Special Scientific Interest (SSSI), which are areas that represent the most valuable habitats in the UK for nature conservation.

The Act creates the following offences:

- To intentionally kill, injure, or take any wild bird or their eggs or nests (with exception to species listed in Schedule 2). Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young.
- To intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and interference with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- Certain methods of killing, injuring, or taking wild animals listed in Schedule 6.
- To pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.
- The release of certain non-native animals and planting of plants listed in Schedule 9.

It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

Conservation of Habitats and Species Regulations 2017

The principal means by which the European Habitats Directive is transposed in England and Wales.

Provide for the designation and protection of a network of 'European Sites' (also termed Natura 2000), including Special Areas of Conservation (SAC) and Special Protection Areas (SPA).

Regulation 41 creates the following offences relating to European Protected Species (EPS):

- deliberately capture, injure or kill any wild animal of a European Protected Species;
- deliberately disturb animals of any such species in such a way as to be likely to:
 - impair their ability to survive, breed, rear or nurture their young, hibernate or migrate; or
 - significantly affect the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

The Regulations also make it an offence (subject to exceptions) to deliberately pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5.

However, the actions listed above can be made lawful through the granting of licences (European Protected Species Licence) by the appropriate authorities (Natural England in England). Licences may be granted for a number of purposes, but only after the appropriate authority has determined that the following regulations are satisfied:

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To apply for a licence, the following information is required:

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Where determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principals; 'if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused'; and, 'planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss'.

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