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Local Environmental Management Plan for Buckinghamshire Council

P1C-HS2-EV-PLN-C000-000007 P03

Security classification: OFFICIAL

Handling Instructions: None

Contents

1	Introduction	1
1.2	Area and scope	3
2	Purpose of the Local Environmental Management Plan	7
3	Policy and environmental management principles	7
4	Implementation	7
5	General requirements	8
5.1	Introduction	8
5.2	Community relations	8
5.3	Working hours	9
5.4	Construction site layout and good housekeeping	11
5.5	Site lighting	11
5.6	Worksite security	11
5.7	Hoardings, fencing and screening	12
5.8	Unexploded ordnance	12
5.9	Electromagnetic interference	12
5.10	Temporary living accommodation	12
5.11	Occupational healthcare	13
5.12	Clearance and re-instatement of sites on completion	13
5.13	Pollution incident control and emergency preparedness	13
5.14	Local control measures	14
5.15	Fire prevention and control	15
5.16	Extreme weather events	15
5.17	Carbon Management Plans	15
5.18	Interface management between adjacent construction areas	15
6	Agriculture, forestry and soils	15
6.1	Introduction	15
6.2	Sensitive receptors	16
6.3	Local control measures	16
7	Air quality	17
7.2	Sensitive receptors	17
7.3	Local control measures	19
7.4	Monitoring Procedures	20
8	Cultural heritage	21
8.1	Introduction	21
8.2	Sensitive receptors	21

8.3	Local control measures	24
8.4	Monitoring	25
9	Ecology	26
9.1	Introduction	26
9.2	Sensitive receptors	26
9.3	Local control measures	31
9.4	Monitoring	39
10	Ground settlement	39
11	Land quality	40
11.1	Introduction	40
11.2	Potential contamination sources and sensitive receptors	40
11.3	Local control measures	41
11.4	Minerals	42
12	Landscape and visual	42
12.1	Introduction	43
12.2	Sensitive receptors	43
12.3	Local control measures	45
12.4	Trees	45
12.5	Site Buildings for Office and Welfare	45
13	Noise and vibration	46
13.1	Introduction	46
13.2	Sensitive receptors	46
13.3	Local control measures	47
13.4	Monitoring	48
14	Traffic and transport	48
14.1	Introduction	48
14.2	Local control measures	49
14.3	Works to the Highway and Access Measures	50
14.4	Monitoring procedures	55
15	Waste and materials	55
15.1	Introduction	55
15.2	Local control measures	55
15.3	Transport of waste and materials	56
16	Water resources and flood risk	56
16.1	Introduction	56
16.2	Sensitive receptors	56
16.3	Potential sources of contamination	58
16.4	Local control measures	58

Appendix 1: Glossary of Terms	61
Appendix 2: Non-exhaustive list of Community Groups in Buckinghamshire	63
Appendix 3: Bernwood Forest – Key Environmental Sensitive Worksite Management Plan	
Appendix 4: Chilterns Area of Outstanding Natural Beauty (AONB) – Key Environmentally Sensitive Worksite Management Plan	
List of Figures	
Figure 1: Key workstreams that will provide additional information for the LEMPs	2
Figure 2: Buckinghamshire Council area context map	6
List of Tables	
Table 1: Standard ecological issues and control measures relevant to this area	32

1 Introduction

- 1.1.1 This Local Environmental Management plan (LEMP) sets out site specific control measures to be adopted by HS2 Contractors working within the Buckinghamshire Council area. Since Buckinghamshire Council became a unitary authority in April 2020 combining Aylesbury Vale, Chiltern, South Bucks and Wycombe district councils and Buckinghamshire County Council, this LEMP combines a number of LEMPs for each of these authorities.
- 1.1.2 This LEMP builds upon but does not repeat, the HS2 general environmental requirements set out in the Code of Construction Practice (CoCP) (available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/593592/Code_of_Construction_Practice.pdf).
- 1.1.3 This LEMP contains control measures and standards to be implemented within the Buckinghamshire Council area. The sections within this LEMP should not be read in isolation from other sections due to the interconnected nature of the measures between disciplines.
- 1.1.4 For ease of reference the LEMP mirrors the topic headings in the CoCP.
- 1.1.5 Information of relevance to the formation and development of this LEMP (as shown in Figure 1) is contained within this document, or links are provided to where it can be assessed. This includes:
- Information from traffic, environmental surveys and ground investigation works. This could either be seasonal ecological surveys, tree surveys, air quality monitoring, noise monitoring, ground settlement or the results of ground investigations detailing levels of contamination (where present) and the nature of the ground;
 - Feedback on pertinent information from on-going engagement; and
 - Results of petitions of the Parliamentary process which have resulted in amendments to the mitigation measures contained within the CoCP.



Figure 1: Key workstreams that will provide additional information for the LEMPs

- 1.1.6 This LEMP has been prepared taking into account findings of the Environmental Statement (ES), Supplementary Environment Statement (SES), The Greatmoor Railway Sidings Transport and Work Act Order and Additional Provision 1 and 2 ES (AP1, AP2 ES) and the SES2, SES4 and AP3, AP5 ES where relevant. It has evolved during the Parliamentary process and engagement with the Local Authority and other Stakeholders, such as members of the National Environment Forum¹, which have informed its development. This LEMP may be subject to further refinement, amendment and expansion as necessary as the project design progresses.
- 1.1.7 The Contractors will implement the requirements of the LEMPs and the CoCP through their own Environmental Management System (EMS), which will be certified to BS EN ISO 14001.
- 1.1.8 The Nominated Undertaker (HS2 Ltd)² and/or its Contractors (refer to Section 4 below) will engage with the local Stakeholders. This will take the form of engagement events which will be carried out to introduce and brief the communities on local environmental information, management and mitigation as detailed within this document.
- 1.1.9 The HS2 Environmental Memorandum identifies key worksites along the route of HS2 Phase One that are environmentally sensitive in terms of nature conservation, terrestrial and aquatic ecology, water resources, geomorphology, recreation and amenity, landscape, public open space and agricultural land. The criteria for inclusion are 'worksites where a key significant impact (that has been agreed with the National Environment Forum³ members) is generated in any of the environmental topics' as mentioned above. Within the Buckinghamshire County, the following sites have been identified as key environmentally sensitive areas:
- Bernwood Forest due to the presence of Bechstein's Bats, which are an international asset of importance in nature conservation and landscape; and
 - The Chilterns Area of Outstanding Natural Beauty (AONB) is an environmentally sensitive worksite. Refer to Annex 4 of the HS2 Environmental Memorandum for details.
- 1.1.10 The Nominated Undertaker will prepare site-specific management plans for these identified environmentally sensitive worksites (ESW), focusing on mitigation, compensation and monitoring requirements, with opportunities for enhancement in relation to the identified environmental topics as outlined within Annex 4 of the HS2 Environmental Memorandum.

¹ The National Environment Forum comprises Government departments and statutory bodies and was established to advise on environmental policy for HS2, including project-wide strategies for reducing the environmental impact of the line and principles for a Code of Construction Practice.

² HS2 Ltd is the Nominated Undertaker. The two terms are used interchangeably throughout this LEMP.

³ The National Environment Forum comprises Government departments and statutory bodies and was established to advise on environmental policy for HS2, including project-wide strategies for reducing the environmental impact of the line and principles for a Code of Construction Practice

1.1.11 The controls within this LEMP, as with those in the CoCP, are in line with HS2's Safe at Heart Health & Safety (H&S) brand. Safe at Heart seeks to ensure that health and safety are at the heart of everything that we do including in the design and operation of the scheme. This aim stretches beyond the scheme itself, through instruments such as this LEMP, and into the communities along the scheme to ensure that we protect their safety and wellbeing.

1.1.12 HS2 documents referenced in this LEMP can be found on the [High Speed Two \(HS2\) Limited - GOV.UK \(www.gov.uk\)](https://www.gov.uk) website.

1.2 Area and scope

1.2.1 Plans showing more details of the Scheme, as revised in AP5, an overview of the Local Authority area covered by this LEMP, are presented in the Environmental Statement (ES) maps (CFA8 to CFA14 Volume 2 Map Books).

1.2.2 Construction worksites and areas required for construction works are shown within the CT- 05 maps. The following construction compound locations in Buckinghamshire will be:

- Align
 - Chalfont St Peter;
 - Chalfont St Giles;
 - Amersham;
 - Little Missenden;
 - Chesham Road; and
 - North Portal.

- EKFB - NCA
 - CTNP – Great Missenden;
 - Mulberry Park;
 - Wendover Dean VL;
 - Rocky Lane Cutting;
 - Rocky Lane UB;
 - SDVL;
 - Wendover Green TNP; and
 - Nash Lee.

- EKFB - Aylesbury
 - A418 Oxford Road Compound; and
 - A41 Bicester Road Compound.

- EKFB - Calvert
 - West Street Amin Compound;
 - School Hill, Calvert; and
 - Station Rd Quainton.

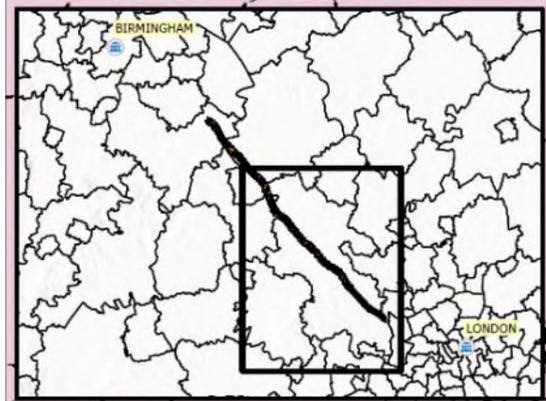
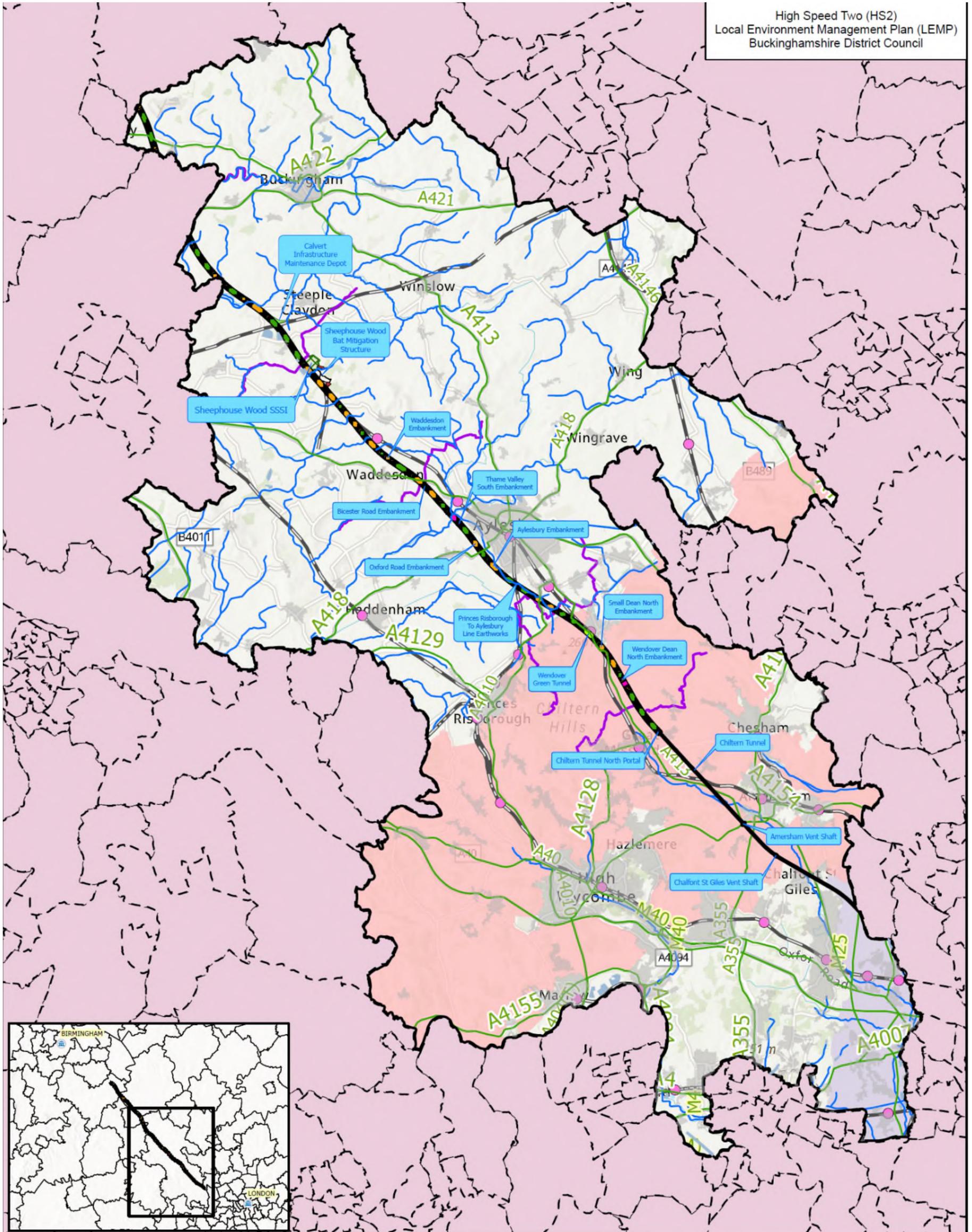
- EKFB - T2G
 - A422 North Compound;
 - A422 South Compound;
 - School End by Chetwode compound;
 - Rosehill Farm Chetwode;
 - Twyford Crossing;
 - Street Overbridge; and
 - Turweston.

- 1.2.3 In addition to the above, further scope is outlined in the Greatmoor Railway Sidings Transport and Works Act Order (available online at: <https://www.gov.uk/government/publications/hs2-greatmoor-railway-sidings-transport-and-works-act-order>).
- 1.2.4 The scheme includes an Infrastructure Maintenance Depot (IMD) from which infrastructure maintenance will be managed. The IMD will comprise of sidings, workshops and welfare facilities plus additional support facilities such as a training compound, admin building for support staff and will act as a central storage location. Calvert IMD will also provide a base for the British Transport Police (BTP). The IMD will be constructed on the site used as a construction railhead.
- 1.2.5 The Enabling Works Contractor (EWC) in the Buckinghamshire area is Fusion JV (a joint venture of Morgan Sindall Infrastructure, BAM Nuttall and Ferrovial Agroman), have carried out a range of survey and investigation works which commenced in early 2017. The EWC have also carried out some construction work including the provision of early ecological mitigation sites and highways improvement work. The EWC contracts are coming to a close and the majority of their work will be complete by the end of 2021.
- 1.2.6 The Main Works Civils Contractor (MWCC) is EKFB, developed the Scheme Design between July 2017 and April 2020 and Notice to Proceed, which provided approval to begin detailed design and construction works.
- 1.2.7 It is anticipated that the following work activities are to take place prior to and during the construction period within Buckinghamshire Council boundary:
- Advance works, including site investigations further to those already undertaken;
 - Enabling works, including utilities works in the wider area; highway and public right of way (PRoW) diversions; building demolitions; site clearance, habitat removal and creation; environmental mitigation measures;
 - Subsurface tunnelling and excavations;
 - Earthworks to create cuttings and embankments along the route;
 - Construction of structures including bridges, viaducts and culverts;
 - Works to conventional railway track, signalling and other railway systems;
 - High speed railway installation works, and systems fit-out, including: infrastructure installation, traction power supplies, overhead line equipment and

communications features; connections to utilities; removal of construction compounds; and

- System testing and commissioning.

1.2.8 A map of the Buckinghamshire Council area is presented in Figure 2.



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Legend	
	Urban Area
	Local Authority Boundary
	District Region
	Woodland Park & Garden
	Lakes/Reservoir
	Chilterns AONB
	Colne Valley Regional Park
	Sheephouse Wood SSSI
	Sheephouse Wood Bat Mitigation Structure
	Calvert Infrastructure Maintenance Depot
	Community Forum Divisions
	Road & Motorway
	Existing Railway
	HS2 Stage 1
	HS2 Route Alignment - Stage 2 Cutting
	Embankment
	Green Tunnel
	Viaduct
	Airport
	Railway Station

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Figure 2: Buckinghamshire Council area context map

2 Purpose of the Local Environmental Management Plan

- 2.1.1 This LEMP focuses on the area specific control measures by topic as relevant to construction works within the Buckinghamshire Council area. The measures described will be applied by the Nominated Undertaker and its Contractors throughout the construction period to minimise the potential environmental and community impacts within the Buckinghamshire Council area during construction.
- 2.1.2 The Nominated Undertaker and its Contractors will develop the detailed Environmental Management Plans, taking into account this LEMP and the Environmental Minimum Requirements. The detailed Environmental Management Plans will remain confidential due to contractual agreements. However, certain plans will be discussed with the relevant environmental bodies. Management plans for the environmentally sensitive worksites will be submitted for information with relevant Schedule 17, or where appropriate heritage, applications.

3 Policy and environmental management principles

- 3.1.1 Information relating to the HS2 Ltd Sustainability Policy and environmental management principles is provided in Section 3 of the CoCP.

4 Implementation

- 4.1.1 Details relating to implementation, such as enforcement and site management measures, are provided in Section 4 of the CoCP.
- 4.1.2 On 16 November 2016 contracts were awarded for three Enabling Works Contractors (EWC) working on behalf of HS2 Ltd across Phase 1 of the project. The EWC covering the Buckinghamshire Council area is Fusion, a joint venture between Morgan Sindall Infrastructure Services, BAM Nuttall Ltd and Ferrovial Agroman.
- 4.1.3 On 17 July 2017 contracts were awarded for HS2's Main Works Civils Contractors (MWCC). The MWCC for the Buckinghamshire Council area was EKFB, a joint venture made of Eiffage, and Kier. In Stage 1, the Joint Venture was Eiffage Kier but following notice to Proceed the Joint Venture was strengthened with Ferrovial and BAM to become EKFB for the delivery of Stage 2 (detailed design and construction). Another MWCC, Align, is present at the North Portal where they meet EKFB.

5 General requirements

5.1 Introduction

- 5.1.1 General control measures relating to community relations, hours of work, pollution incident control and security etc. are identified in Section 5 of the CoCP.
- 5.1.2 To reduce the likelihood of an environmental incident or nuisance occurring, measures from Section 5 of the CoCP will be implemented, as detailed in sections 5.2 to 5.16 below.
- 5.1.3 There have been many engagement events in the Buckinghamshire Council area with multiple stakeholders and this will continue for the duration of the project.

5.2 Community relations

- 5.2.1 As detailed within Section 5 of the CoCP, the Nominated Undertaker and Contractors will implement the Community Engagement Framework. The framework will focus on engagement during construction with the local communities and on the specific needs of protected groups (as defined in the Equalities Act 2010) especially those who may be affected by construction impacts in the immediate vicinity of the works. A range of tools will be used to achieve this that will tailor engagement to local needs.
- 5.2.2 Successful management of the project will involve understanding communities and their needs, actively engaging, listening and responding. The arrangements for this are set out in the HS2 Community Engagement Framework. Liaison with the local community will take place to consistently provide timely, clear tailored information on the construction programme and updates on forthcoming works. It will also provide the opportunity for members of the public to respond, discuss issues and provide feedback that can be acted upon. This information will be included in the local area plan for community engagement. HS2 and its Contractors have initiated engagement along the route via focussed engagement events.
- 5.2.3 The local area plan will take account both of distinct geographic distribution of the communities within the Buckinghamshire Council area and will involve the Contractors and any relevant third parties and Stakeholders, for which there will be co-ordination arrangements.
- 5.2.4 For the purposes of this LEMP, a third party is an organisation with whom HS2 Ltd has entered into an agreement to undertake works on its behalf, to be delivered under the powers of the High Speed Rail (London – West Midlands) Act (the Act), or the third party's own powers (e.g. permitted development). Such agreements require the third parties to comply with the requirements of the Act and the EMRs, including the CoCP. Third parties relevant to this LEMP include Network Rail, Highways England, and utility companies such as National Grid and Western Power Distribution.

5.2.5 In addition, information on the construction of HS2 in Buckinghamshire will be made available to the local community through the HS2 website (available online at: <https://www.hs2.org.uk/in-your-area/local-community-webpages/>).

5.2.6 Ongoing engagement with local interest and community groups will occur during construction, as listed in Appendix 2 of this LEMP. (NB: This list is indicative and will be subject to change as more information becomes available.)

Advanced notice of works

5.2.7 The Nominated Undertaker and its Contractors are committed to informing communities on matters of interest and relevance. They will ensure that Stakeholders affected by the proposed construction works, as outlined in the ES, will be informed in advance of works by methods outlined in the community engagement framework and as per Section 5.1.4 of the CoCP.

5.3 Working hours

Consents

5.3.1 The framework for seeking consent from Buckinghamshire Council for working hours under Section 61 of the Control of Pollution Act 1974 is set out in the CoCP.

Core working hours

5.3.2 Core working hours will be from 08:00 – 18:00 on weekdays (excluding bank holidays) and 08:00 – 13:00 on Saturdays. See also HS2 Information Paper D4: Working Hours.

5.3.3 A period of up to one hour before and up to one hour after core working hours will be required for start-up and close down activities as detailed within the CoCP. To maximise the productivity within the core working hours, the one hour start up and close down periods will include activities such as deliveries, workforce arrival/departure, unloading, maintenance and general preparation works etc. During this period plant and machinery that is likely to cause disturbance to local residents will not be allowed to operate. This period will not be an extension of the core working hours. Such an extension will be agreed through Section 61 consenting process with Buckinghamshire Council. Emergency works (not repairs and maintenance) may be undertaken outside core hours.

5.3.4 Certain work activities at specific locations within the Buckinghamshire Council area will need to take place outside of the core working hours for safety and engineering purposes. These work activities (which may include construction associated with Infrastructure works and Rail works, including Possessions) will be covered by the Section 61 process and are likely to include:

- Ground investigation works;
- Archaeological excavation and recording;
- South Heath cutting;

- Tunnel boring in the Chiltern tunnel, on the border of Chiltern District and Three Rivers District, will be a 24-hour a day operation;
- Excavation and concrete supply for sprayed concrete lined cross passage tunnels during the evening and night-time;
- Some tunnelling support activities at Chilterns tunnel north portal during the evening and night-time;
- Chalfont St Peter vent shaft earthworks;
- Chalfont St Giles vent shaft and auto-transformer station earthworks;
- Amersham vent shaft earthworks;
- Little Missenden vent shaft and auto-transformer station earthworks;
- Chesham Road Vent Shaft earthworks;
- Chiltern tunnel north portal and Chiltern tunnel north cutting earthworks;
- South Heath cutting earthworks;
- Leather Lane overbridge earthworks;
- Wendover north cutting earthworks;
- Wendover Dean viaduct and adjacent earthworks;
- Small Dean viaduct and adjacent earthworks;
- Stoke Mandeville south embankment and Aylesbury south cutting;
- Princes Risborough to Aylesbury overbridge;
- Aylesbury South embankment and Aylesbury north cutting;
- A418 Oxford Road realignment and overbridge;
- A41 Bicester Road realignment and overbridge;
- A41 Bicester Road concrete batching plant;
- Thame Valley viaduct and adjacent earthworks;
- Bicester Road embankment;
- Waddesdon south and north cuttings;
- Quainton South and Doddershall embankments and adjacent cuttings;
- Grendon Underwood embankment and Woodlands cutting;
- Calvert cutting and Aylesbury link realignment;
- Twyford viaduct and adjacent earthworks;
- Godington east and west viaducts and adjacent earthworks;
- Chetwode cutting and Barton Hartshorn embankment;
- Rail deliveries into Calvert railhead main compound;
- Small Dean viaduct;
- Turweston viaduct;
- Realignment of the Princes Risborough to Aylesbury Line;
- Realignment of the Aylesbury Link railway line; and
- Realignment of the Bicester to Bletchley Line.

- 5.3.5 To limit possessions, a protective barrier will be installed, where practicable, between the existing railway and HS2 sites to maximise the works to be carried out during core working hours where stipulated clearance can be met. In circumstances where this is not practicable, the work will typically be carried out during possessions either during midweek nights or extended weekend nights. Every effort will be made to reduce work outside of core hours so as to avoid excessive community disturbance.
- 5.3.6 Where Road Rail Vehicles (RRVs)⁴ are to be used, these will generally be delivered and operated outside normal working hours for works associated with the existing railway. Material delivery and removal for these works interfacing with conventional rail will be carried out during the same periods.

5.4 Construction site layout and good housekeeping

- 5.4.1 The measures set out in Section 5.3 of the CoCP will be used to reduce the likelihood of an environmental incident or nuisance occurring.

5.5 Site lighting

- 5.5.1 All construction sites will be lit in accordance with the requirements of the CoCP as detailed within Section 5.4, approval of site lighting in Schedule 17 Part 1 to the HS2 Act 2017 (known as the Act) and High Speed Rail (London-West Midlands) Act 2017 Class approval for matters ancillary to development under Schedule 17.
- 5.5.2 Site lighting will be designed to minimise light pollution to surrounding buildings, ecological receptors, structures used by protected species, local residents, railway operations, passing motorists and other sensitive land uses.
- 5.5.3 It is recognised that for works related to the Infrastructure Maintenance Depot at Calvert, HS2 will submit plans and specifications to Buckinghamshire Council for approval of artificial lighting under Schedule 17 of the Act.

5.6 Worksite security

- 5.6.1 The intention is to achieve safe and secure worksites, with balanced and appropriate security measures that are commensurate with the risk, as detailed within Section 5.5 of the CoCP.
- 5.6.2 A security plan will be required for each site and where appropriate, security fencing and gates provided to perimeters of construction locations and site compounds. Fence type and construction will be appropriate to the level of security required and depend upon the likelihood of intruders, level of danger and visual impact to the environment.

⁴A vehicle which can operate both on rail tracks and road, often used for railway maintenance.

- 5.6.3 Contractors will be responsible for ensuring that the site/working areas and plant and materials are secure from use by unauthorised persons at all times and plant machinery will be securely locked away and immobilised each night. Securing sites will involve the use of physical, electronic and human resources in a proportionate and cost effective manner.
- 5.6.4 In some situations, particularly in an urban setting, consideration will be given to extra visibility for the public and workforce at night, e.g. use of half-timber / half-infill (i.e. perspex) at hoarding corners together with convex mirror to prevent blind spots. All sites will have security lighting to ensure the safety of passing pedestrians and other traffic.
- 5.6.5 Security provisions will be deployed at all HS2 sites and working areas on a 24/7 basis this may include CCTV cameras, alarms and security personnel. This approach will help protect assets with measures that deter, delay and detect intrusion.

5.7 Hoardings, fencing and screening

- 5.7.1 Hoardings may, on occasions, be used to control construction noise in line with measures described within Section 5.6.1 of the CoCP, if appropriate. At locations where existing fencing may need to be removed, temporary wire mesh fencing or other suitable alternatives will be used. Specific hoarding heights in Buckinghamshire Council will be included in this LEMP as and when the hoarding designs are finalised.
- 5.7.2 Where there are earthworks along the track, such as cuttings and embankments, and at the west of Hyde Heath to the east of The Lee and north-west of Nash Lee, temporary fencing will be erected along the site boundaries. The type of fence will be dependent upon the nature of use of the adjacent land, as well as environmental, design and safety considerations.
- 5.7.3 Opportunities to include temporary landscaping measures including but not limited to green hoardings, ivy screens, artificial ivy and instant hedging will be considered and where reasonably practicable implemented where there are clear benefits to local air quality, biodiversity and visual appearance of the area, taking into account costs, longevity and ease of maintenance.

5.8 Unexploded ordnance

- 5.8.1 A risk assessment for the possibility of unexploded ordnance being found within construction areas will be carried out, as detailed within Section 5.7 of the CoCP.

5.9 Electromagnetic interference

- 5.9.1 The impacts of electromagnetic interference during design and construction will be undertaken, as detailed within Section 5.8 of the CoCP.

5.10 Temporary living accommodation

5.10.1 The provision of on-site workers' temporary living accommodation will be considered and approved in advance by the local authority, as detailed within Section 5.9 of the CoCP. There are no proposals to have on-site workers temporary accommodation within the Buckinghamshire Council area.

5.11 Occupational healthcare

5.11.1 The Nominated Undertaker will ensure there is provision for either access to on-site or near site occupational healthcare for site workers, as detailed within Section 5.10 of the CoCP.

5.12 Clearance and re-statement of sites on completion

5.12.1 This will be carried out as detailed within Section 5.11 of the CoCP.

5.13 Pollution incident control and emergency preparedness

5.13.1 The Contractor's Pollution Incident Control and Emergency Preparedness Plan(s) will need to have due regard to local receptors as detailed in Sections 6 to 16 of this LEMP.

5.13.2 The Contractor will also consider measures and processes to be implemented in the event of environmental non-conformances.

5.13.3 There are Source Protection Zones (SPZ) associated with the public abstraction in the Buckinghamshire Council area, including SPZ1, 2 and 3.

5.13.4 The Contractors will need to pay particular attention to pollution incident control during the following construction activities:

- Circular twin-bore tunnels and cross passages through the Chalk aquifer within SPZs for public water supply (PWS) boreholes;
- Circular twin-bore tunnels and cross passages beneath the River Misbourne and Shardeloes Lake;
- Vent shaft construction near River Misbourne and Shardeloes Lake;
- Stockpiling of material;
- Culverts of Chalkshire Stream and its tributaries;
- Diversion of Chalkshire Stream along west side of Stoke Mandeville south embankment at Nash Lee Orchard;
- Realignment and culvert of the Stoke Brook and tributaries along Stoke Mandeville south embankment;
- Realignment and extension to an existing culvert, carrying the Stoke Brook under the Princes Risborough to Aylesbury Line;
- Culvert of an unnamed drain near Hall End (SWC-CFA11-20);
- Culvert and channel works to Sedrup Ditch and tributary at Aylesbury embankment;
- Culverts and channel diversions of Hartwell Ditch at Oxford Road embankment and Footpath SBH/32 overbridge;

- Culverts of Lower Hartwell Ditch and drain north of Lower Hartwell Ditch at Oxford Road embankment;
- Thame Valley viaduct and pier construction at River Thame and unnamed tributary south of Bear Brook;
- Realignment and culvert of an unnamed drain south of Putlowes;
- Realignment of the tributary of Fleet Marston Brook (field drain from Coney Hill and Fleet Marston Spinney) near Upper Cranwell Farm;
- Culvert of tributary of Fleet Marston Brook near Upper Cranwell Farm at Bicester Road embankment;
- Culverts and realignment of Fleet Marston Brook at Quainton south embankment;
- Five culverts and realignment of the headwaters of the Tetchwick Brook at Quainton south embankment and Station Road overbridge;
- Three culverts (including work on an existing culvert) of an unnamed drain at Doddershall embankment near Lower South Farm;
- Five culverts and diversions of Doddershall Brook and tributaries north-east of Doddershall House;
- Alterations to existing culvert of River Ray at Grendon Underwood embankment (Adam's Underbridge);
- Alterations to existing culverted tributary of River Ray at Finemere Wood;
- Alterations to existing culvert and diversion of an unnamed drain at Greatmoor Farm;
- Two culverts and diversions of the Muxwell Brook and unnamed drains (secondary channels) at Grendon Underwood embankment south of Sheephouse Wood;
- Culvert of a tributary to the M23 drain originating in Calvert Jubilee Nature Reserve LWS lake;
- Realignment and culvert of Padbury Brook and its tributaries near Twyford and Godington;
- Realignment of an unnamed drain (tributary of the Padbury Brook) at Barton Hartshorn;
- Viaduct and pier construction at the Great Ouse, Westbury; and
- Realignment of the Great Ouse at Turweston.

5.14 Local control measures

5.14.1 The Contractors' Pollution Incident Control and Emergency Preparedness Plan(s) will need to include the following pollution prevention and control mechanisms:

- Static plant will be used with secondary containment measures such as plant nappies to retain any leakage of fuel or oil and reduce the risk of surface water or groundwater pollution;
- Spill kits will be provided where appropriate, such as at the main compounds, and the satellite compounds to reduce the risk of surface water or groundwater pollution, particularly in vulnerable areas;

- The use of oil interceptors at site offices and work compounds;
- Appropriate measures such as use of bunds of non-erodible material or silt or sediment fences adjacent to watercourses, such as Padbury Brook and the River Great Ouse;
- Implementing a surface water or groundwater monitoring plan, particularly in relation to works which may affect aquifers, for example, excavations and piling; and
- Any work that might have an impact on water quality will need formal approval by the Environment Agency via the Schedule 33 Part 5 in the Act.

5.14.2 The Contractor's pollution incident control and emergency preparedness plan(s) will need to have due regard to local context, such as the fact that the whole area is a nitrate vulnerable zone which is an area where nitrate pollution is a potential problem.

5.15 Fire prevention and control

5.15.1 The Contractors will ensure all construction sites, welfare facilities and associated accommodation will have in place appropriate plans and management controls to prevent fires. See also Section 5.13 of the CoCP.

5.16 Extreme weather events

5.16.1 The Contractor's pollution incident control and emergency preparedness systems will need to have due regard to the potential of extreme weather events and key receptors and take into account any proposed risk management or mitigation measures. See also Section 5.14 of the CoCP. Where necessary, the statutory bodies will be consulted with regards to emergency planning.

5.17 Carbon Management Plans

5.17.1 The Contractor will produce carbon management plans, in accordance with the HS2 Carbon Minimisation Policy as detailed within Section 5.15 of the CoCP.

5.18 Interface management between adjacent construction areas

5.18.1 The Nominated Undertaker will oversee the interface between the Contractors as detailed within Section 5.16 of the CoCP, which may be within the same or adjacent Local Authority boundaries.

6 Agriculture, forestry and soils

6.1 Introduction

6.1.1 General control measures relating to agriculture, forestry and soils are provided in Section 6 of the CoCP.

6.2 Sensitive receptors

- 6.2.1 Approximately 1,544ha of agricultural land will lie within the construction boundary in Buckinghamshire Council area. Over 39% of this land is of the best and most versatile quality in Grades 2 and 3a, with the remainder being moderate quality land in Subgrades 3b and 4.
- 6.2.2 Approximately 607ha will be required permanently for the Scheme, with 936ha restored to agriculture.
- 6.2.3 The generally high quality soils that will be permanently displaced and reused in the design of the Scheme for agriculture and other uses, represent a sensitive receptor.
- 6.2.4 Some land uses situated adjacent to the construction boundary may be considered sensitive receptors, particularly in respect of farm infrastructure and crops. This includes interruptions to drainage systems, livestock water supplies and irrigation systems, the potential for dust deposition on crops, particularly field vegetables; interruptions to farm and field accesses; and the maintenance of appropriate stock-proof fencing. This also applies to approximately 936ha of land within the construction boundary of the Buckinghamshire area that is to be restored to agriculture. Nitrate rich soil may need to be stored on an impervious membrane.

6.3 Local control measures

- 6.3.1 Where topsoil and subsoil will be stripped across the site, a Soil Resources Plan (SRP) will be prepared. The SRP will establish the type and volume of the topsoil and subsoil to be stripped, the designated location of the stockpiles and the proposed use of conserved soils for land restoration. There is a commitment in the ES for the reuse of soils on the scheme.
- 6.3.2 In the provision of early ecological mitigation areas, the topsoil and subsoil will be entirely reused within the boundaries of each site and therefore an SRP will not be produced for these sites.
- 6.3.3 In areas where compounds are to be created, it is envisaged that the area will be stripped of topsoil (and subsoil where required). Temporary material stockpiles will be clearly recorded, and the topsoil and subsoil will be reinstated.
- 6.3.4 In respect of storage areas for soil and excavated materials, and within the wider construction site, the presence and spread of invasive, non-native species (plants and animals) and noxious weeds will be controlled through the adoption of an appropriate management regime. This will identify and effectively treat areas which might also threaten adjoining agricultural areas.

6.3.5 Appropriate construction, handling, treatment and disposal procedures will be implemented in relation to invasive species and noxious weeds. Route-wide measures will also be implemented to promote bio-security and minimise the risk that invasive non-native species and diseases are spread as a consequence of the project. Further details are provided in Section 6 of the CoCP.

6.3.6 Measures for the protection of farm infrastructure and crops will be the subject of liaison with landowners, occupiers and land agents.

6.3.7 Following consultation with individual farmers, arrangements are being made with the farmer and documented in Farmers and Growers' packs. Details on the scope of these packs is included in the HS2 Guide for Farmers and Growers and can be seen at this link: <https://www.gov.uk/government/publications/hs2-guide-for-farmers-and-growers>

7 Air quality

7.1.1 General control measures relating to air quality are provided in Section 7 of the CoCP.

7.1.2 Contractors will be required to manage dust, air pollution, odour and exhaust emissions during the construction works in accordance with Best Practicable Means (BPM) and refer to current publications on 'best practice'⁵.

7.2 Sensitive receptors

7.2.1 The Contractor's working methods will have due regard to local sensitive receptors where there may be impacts due to dust emissions from construction works and exhaust emissions of air pollutants from construction traffic vehicles travelling to and from construction areas.

7.2.2 For air quality, relevant sensitive receptors include locations where there are residential properties, other types of property where there is human exposure over extended periods, for example hospitals and schools, and locations where there are designated ecological sites with sensitive vegetation. The potential impacts are considered in terms of dust soiling on people and property; human health effects of dust and air pollutant emissions; and effects of dust deposition on vegetation.

7.2.3 The construction works within Buckinghamshire Council have been assessed to determine the risk of impacts due to construction dust. The locations of these receptors have been classified as 'low', 'medium' and 'high' risk using the Institute of Air Quality Management (IAQM) methodology⁶, in relation to emissions of dust from construction and demolition activities. Sensitive receptors are located within 20m of the site boundary and of dust generating activities along certain sections of the route.

7.2.4 In the Buckinghamshire Council area, these can include residential properties at:

- Cricket Field Cottages;

⁵ Guidance on the assessment of dust from construction and demolition: Institute of Air Quality Management, February 2014.

⁶ Guidance on the assessment of dust from construction and demolition: Institute of Air Quality Management, February 2014.

- Turners Wood Farm;
- Ashwell's Farm;
- Upper Bottom House Farm;
- Lower Bottom House Farm;
- Pipers Wood Cottages;
- Park View Cottages, Mantle's Farm;
- Chapel Farm, Sheepcotts Cottage;
- Mantle's Green Cottage, Orchard Cottage;
- Frith Hill Farm, Cudsdens Court and Brambles;
- Amersham Hospital;
- Properties on B4009 Nash Lee Road;
- Ellesborough Road, Bacombe Lane;
- Nash Lee Lane;
- Hartley Farm;
- The Laurels;
- Properties on Old Risborough Road;
- Whitethorn Farmhouse;
- Park Villa;
- Putlowes;
- Fleet Marston Cottages;
- Long Acre;
- Properties on Meadoway;
- Wayside Farm;
- Crossroads Farm;
- Upper South Farm;
- Woodlands Farm;
- Brackley Lane;
- School Hill;
- Rosehill Farm;
- Sunflower Farm;
- The Hermitage;
- Manthorn Farm;
- Lake Farm;
- Stone Court Farm;
- Pear Tree House;
- School End and Turweston Glebe; and
- Bacombe Hill Site of Special Scientific Interest (SSSI), Helmdon Disused Railway SSSI and Sheephouse Wood SSSI have been identified as ecological receptors.

7.2.5 The mitigation measures as set out in the CoCP will be employed to allow active management of the construction works.

7.2.6 Sensitive receptors affected by changes in road traffic emissions during construction are:

- Along Bircham Cottage;

- King's Pond Cottage;
- 59 King's Lane;
- Bicester Road and A418 Oxford Road;
- The Oaks/Hartwell Cottages;
- Hatters End;
- Hall End;
- The Georgian Dolls House;
- Pear Tree Cottage;
- Winding Brook;
- Perry Hill Cottages;
- Cheshire Cottages;
- 8 School Hill;
- 60 West Street;
- The Bungalow and Gawcott Fields;
- Chilterns Beechwoods Special Area of Conservation (SAC); and
- Ham Home-cum-Hamgreen Woods SSSI and Long Herdon Meadow SSSI have been identified as ecological receptors.

7.2.7 There are receptors located near roads that will be subject to realignment including 145 Station Road, Park Villa, Wayside Farm and Woodlands Farm Cottages.

7.3 Local control measures

7.3.1 All the relevant methods outlined within the CoCP will be applied to control and manage potential air quality effects. These methods are considered sufficiently effective within areas in and around those listed in Section 7.2.2 and 7.2.3, which can include; ensuring drop heights from excavators to vehicles involved in the transport of excavated material are kept to the reasonably practicable minimum; the provision of dust suppression measures to be carried out in all areas of the site that are likely to generate dust; measures to keep roads and accesses and vehicles clean; covering materials, deliveries or loads entering and leaving the construction site; buildings or structures to be demolished will be sprayed with water or screened as necessary, prior to and during demolition; and, the enclosure, shielding or provision of filters on plant likely to generate excessive quantities of dust beyond the site boundaries.

7.3.2 Dust suppression measures and works screening will be subject to approval in accordance with Schedule 17 of the Act. Further measures are detailed within Section 7 of the CoCP.

7.3.3 HS2 has set emission requirements and targets for the engines of Contractor cars, vans, and heavy road vehicles. These have been developed for the whole route and are categorised as follows: London Low Emission Zone, Clean Air Zone and Rest of Route.

- 7.3.4 For Buckinghamshire Council the relevant category of vehicle emission standard is the 'Rest of Route'. Within the 'Rest of Route' category, there are requirements for heavy road vehicles to be powered by EURO VI engines (with targets for cleaner engines) and for cars and vans to be Euro 6 diesel and Euro 4 petrol⁷. There are also targets for the use of Ultra Low Emission vehicles.
- 7.3.5 HS2 has also set requirements for Non-Road Mobile Machinery (NRMM) (i.e. stationary plant and off road vehicles). These have been developed for the whole route and are categorised as follows: Central Activity Zone, Rest of Greater London and Rest of Country. For Buckinghamshire Council, the relevant category of NRMM emission standard is 'Rest of Country'. Within the 'Rest of Country' the requirement is for NRMM to be powered by EU stage IIIB engines from 2017 (and EU stage IV from 2020).
- 7.3.6 The HS2 Information Paper E31: Air Quality gives further information on the HS2 emissions standards.

7.4 Monitoring Procedures

- 7.4.1 An inspection and monitoring programme will be implemented by the Contractor to assess the effectiveness of the control measures as outlined in Section 7.3 of the CoCP. In Buckinghamshire Council, the monitoring procedures may include continuous automatic monitoring of airborne dust, including the setting a relevant site action level for dust (defined as a dust measurement threshold above which investigation will be required). The monitoring being undertaken by HS2 supplements existing air quality monitoring which is part of national and Local Authority surveys. Monitoring of NO_x or nitrogen deposition is not necessary in this area as the relevant CFAs state that there are no impacts originating from the proposed works.
- 7.4.2 The monitoring programme, including locations for dust monitoring equipment, are to be deployed at the following locations:
- Old Risborough Road;
 - To the west of the Walton Hall area, Aylesbury;
 - North of Hartwell;
 - South of the A418 Oxford Road;
 - To the west of the Fairford Leys area, Aylesbury;
 - Station Road;
 - School Hill; and
 - FCC Access Road.

⁷ Euro standards for heavy vehicles are given in terms of roman numerals. Euro standards for light vehicles are given in terms of numerical values and different Euro standards apply for petrol and diesel vehicles.

- 7.4.3 Monthly reports of monitoring data from HS2 air quality surveys will be made publicly available throughout construction on the HS2 website at this address: <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2> .
- 7.4.4 The HS2 Air Quality Strategy gives further information on monitoring, including the process to determine where monitoring would be required and the monitoring methods to be used. This document is available at the same website address as referenced in paragraph above.

8 Cultural heritage

8.1 Introduction

- 8.1.1 General control measures relating to Cultural Heritage are provided in Section 8 of the CoCP. Further control measures for Cultural Heritage are provided in the Hs2 Phase One Heritage Memorandum within the Environmental Minimum Requirements and the specific documents identified therein.
- 8.1.2 A route-wide Generic Written Scheme of Investigation: Historic Environment Research and Delivery Strategy (GWSI:HERDS) has been prepared which sets out the general principles for design, evaluation, mitigation, analysis, reporting and archive deposition to be adopted for the design development and construction of the Scheme.
- 8.1.3 Works associated with the Scheme will impact both designated and non-designated archaeological and built heritage assets in Buckinghamshire Council. Full details of the works to be undertaken (i.e., archaeological investigations and built heritage recording) will be determined during the detailed design and will be set out in Project Plans and Location-Specific Written Scheme of Investigations (LS-WSI) and Heritage Agreement Method Statements (HAMS).
- 8.1.4 Schedule 18 and Schedule 19 of the Act concern how legislation in respect of listed buildings and scheduled monuments respectively apply to the Phase One works. Schedule 20 to the Act provides a regime for the removal of human remains and related funerary monuments.

8.2 Sensitive receptors

- 8.2.1. Details of all designated and non-designated heritage assets within 500m of the land required, temporarily or permanently, for the construction of the Scheme are listed in Volume 5 of the ES (Appendices CH-002-008 to CH-002-14) and Volume 5 Cultural Heritage Map Book (Maps CH-01-025b to CH-01-046).
- 8.2.2. Schedule 18 'Listed Buildings' to the Act concerns how legislation in respect of listed buildings under the Planning (Listed Buildings and Conservation Areas) Act 1990 ("the 1990 Act") applies to the Phase One works. Paragraph 1 of Schedule 18 dis-applies some of this legislation, and in particular the requirement for listed building consent, from the Phase One works in respect of the listed buildings set out in Table 1 of Schedule 18, or which were listed on or after 30 September 2013. Paragraph 2 of Schedule 18 of the Act dis-applies controls under the Planning (Listed Buildings and Conservation Areas) Act 1990 for those listed buildings specified in Table 2 of Schedule 18, specifically with regards to works to maintain or restore their character, or for the affixing of monitoring apparatus.
- 8.2.3. A link to Schedule 18 of the High Speed Rail (London - West Midlands) Act 2017 is below:
- Table 1: [High Speed Rail \(London - West Midlands\) Act 2017 \(legislation.gov.uk\)](#)
 - Table 2: [High Speed Rail \(London - West Midlands\) Act 2017 \(legislation.gov.uk\)](#)
- 8.2.4. Heritage agreements between the Nominated Undertaker, Historic England and relevant Local Authorities require the submission of method statements and other details to the relevant Local Authority for approval and Historic England for consultation, where applicable.
- 8.2.5. Under Schedule 18 of the Act, the following sensitive receptors have been identified in Buckinghamshire within Table 1. Table 1 comprises the buildings which are authorised to be demolished, altered or extended for the purposes of the scheme. This does not include works undertaken for heritage or monitoring purposes:
- Hartwell House Wall - curtilage listed with Hartwell House Hotel. Partial demolition of perimeter estate wall relating to realignment of A418 only (list entry 1000192);
 - Glebe House (list entry 1040521); and
 - Shepherd's Furze Farmhouse (list entry 1214845).

8.2.6. While Glebe House is listed as a Table 1 building and was due to be demolished, changes to the design now mean the building can be retained. However, the building remains a table 1 asset and the act will not be amended. Retention of the asset is a design-led development and therefore HS2 has obligations to ensure the safety of the scheme as well as to divest property where possible. Since the building will require works to ensure its safety and continued viable use during construction, operation and to realise return on public investment when divested, it is appropriate that the building remain on Table 1. Any works to the building would be for the purposes of the scheme rather than for purely heritage reasons. Monitoring is excluded from Table 1 buildings. Should monitoring be required, methodology would preferably be developed in such a way that does not require listed building consent. However, if monitoring works would require listed building consent, this would be achieved through planning consent with District of Aylesbury Vale.

8.2.7. Under Schedule 18 of the Act, the following sensitive receptors have been identified in Buckinghamshire within Table 2. Table 2 lists the buildings which are authorised to be altered or extended for heritage or monitoring purposes.

- 86 Kings Lane Grade II (list entry 1252820);
- Barn to north of Hunts Green Farmhouse Grade II (list entry 1332476);
- Briarwood Grade II (list entry 1158858);
- Entrance arch and gates adjoining Park Lodge Grade II (list entry 1160647);
- Granary to former Cudsdens Farm Grade II (list entry 1124811);
- Hartwell House Grade I (list entry 1118471);
- Hunts Green Farmhouse Grade II (list entry 1309272);
- Obelisk south of Hartwell House Grade II (list entry 1160713);
- Outbuildings to west of Rosehill Farmhouse forming north and west sides of courtyard Grade II (list entry 1214846);
- Pair of statues south of Hartwell House Grade II (list entry 1332846);
- Park Lodge Grade II (list entry 1160647);
- Rosehill Farmhouse Grade II (list entry 1214846);
- South Heath Farmhouse with attached barn Grade II Grade II (list entry 1311111);
- Stable Block at Cottage Farm Grade II (list entry 1124809);
- Sunflower Farmhouse Grade II (list entry 1289964);
- The Hermitage Grade II (list entry 1289963); and
- Whaddon Hill Farmhouse Grade II (list entry 1118421).

1.1.7 Buildings and works which fall outside of Schedule 18 consent may be subject to listed building consent where required. There is currently one structure known to require listed building consent, this is Hartwell House Wall, a curtilage listed building. Other listed building consents may be required where secondary glazing is proposed or where other impacts on listed buildings are predicted. Where practicable, works methodology will be altered to avoid the need for listed building consent.

- 8.2.1 Both schedule 18 and the Listed Buildings Act contain provisions for emergency works for the purposes of ensuring safety, where consent would not have been viable to obtain in good time.
- 8.2.2 Where the construction of Phase One of HS2 may damage or disfigure a scheduled monument, Schedule 19 of the Act dis-applies the various legislative provisions to enable specified construction activities to be carried out.
- 8.2.3 Heritage Agreements between the Nominated Undertaker and Historic England will be required rather than the usual requirement to seek Scheduled Monument Consent from the Department of Cultural, Media and Sport (DCMS). Heritage Agreements require the submission of method statements and other details to the relevant Local Authority, DCMS/Department for Transport (DfT) for approval, as well as for consultation with Historic England where applicable.
- 8.2.4 There is one scheduled monument within Schedule 19 of the act. This is Grim's Ditch (list entry 1021198). This is to be archaeologically excavated and recorded by Fusion JV prior to and during main works. EKFB will undertake works for preservation in situ, subject to the approved Project Plan and managed per the Routewide Heritage Management Plan.
- 8.2.5 In addition, non-designated assets include sites such as ruin of St Mary's Church at Stoke Mandeville, the location of a medieval church, its graveyard and remains of a medieval manorial centre will mills, moated site and associated village remains. All advance archaeological works (save for those noted above for Grim's Ditch scheduled monument) are being undertaken by Fusion-JV. It is planned to complete these works by the end of 2021. After this, there should be no further archaeology to protect in this area, subject to DRNs.
- 8.2.6 If new assets are identified, the Contractor shall develop Project Plans and Written Schemes of Investigation to consider those assets, if the investigation of those new assets would contribute to answering the Specific Objectives in the Historic Environment Research and Discovery Strategy (HERDS). The County Council have a two-week consultation period to review project plans and will be consulted in the development of those plans by the Contractor.

8.3 Local control measures

- 8.3.1 Where practicable, below ground assets will be preserved in situ beneath mitigation earthworks through the adoption of appropriate design measures. Sites within Buckinghamshire have been designed for preservation in situ and 'Form A' method statements are available detailing how preservation is to be managed. These will be consulted prior to any works being undertaken within the vicinity.
- 8.3.2 Where practicable, construction methodologies will reduce the impacts on buried and above ground remains.

- 8.3.3 The programme of archaeological and built heritage works will be undertaken by a specialist Contractor appointed by the Nominated Undertaker prior to and during, the construction period in accordance with the provisions of the Location-Specific Written Scheme of Investigation for archaeology and built heritage.
- 8.3.4 For the buildings listed in Schedule 18 Table 2, the Heritage Agreement would set out the process by which protective or monitoring works will be approved and the specific arrangements for each building. These Heritage Agreements will ensure that appropriate mitigation measures are in place and that any works undertaken are appropriate to the special architectural or historic interest of the listed building and its significance as a heritage asset.
- 8.3.5 As stated in the Route-wide Heritage Management Plan, the Nominated Undertaker will comply with the Heritage Agreements by liaising with the Local Authority and Historic England (where appropriate) during the preparation of the methodology for the works ('Works Details'), obtain the approval of the local council in writing and ensure works are carried out according to the agreed scheme. Any other specifications within the Heritage Agreements must also be met. Special provision is made in cases considered to be an Emergency. If this arises the Nominated Undertaker must as soon as reasonably practicable inform the council and Historic England
- 8.3.6 Schedule 20 'Burial Grounds' to the High Speed Rail (London – West Midlands) Act provides a regime for the removal of human remains and related funerary monuments. A programme of archaeological works will be prepared to investigate, analyse, report and archive these assets. All human remains affected by HS2 works will be treated with all due dignity, respect and care.
- 8.3.7 The programme of archaeological and built heritage works will be undertaken by specialist Contractors appointed by the Nominated Undertaker prior to and during, the construction period in accordance with the provisions of the Location-Specific Written Scheme of Investigation for archaeology and built heritage.
- 8.3.8 The direct impact on human remains, burial grounds and monuments at St Mary's Church has been treated in accordance with Schedule 19 to the Act. This includes specific procedures to be followed for the removal of the burial ground at St Mary's Church at Stoke Mandeville, such as the requirement to determine the extent of archaeological investigation with Historic England, Buckinghamshire Council and, where applicable, the appropriate religious authority. These works are delivered through Fusion JV. EKFB will continue to liaise with them to understand any further works that may be required, as directed by HS2.
- 8.3.9 The Nominated Undertaker has developed a 'Burial Grounds, Human Remains and Monuments Procedure' to implement the legal requirement of the Act. This is contained within the Routewide Heritage Management Plan.

8.4 Monitoring

8.4.1 Risk assessments, appropriate structural and/or condition surveys and vibration monitoring will be undertaken at locations of archaeological or built heritage interest adjacent to construction sites, prior to, during and following construction works, as detailed within Section 8.4 of the CoCP.

9 Ecology

9.1 Introduction

9.1.1 General control measures relating to ecology are provided in Section 9 of the CoCP.

9.2 Sensitive receptors

9.2.1 The following locations which lie within or are adjacent to the Scheme in Buckinghamshire Council are designated for nature conservation. These locations are shown within the Volume 5 map books of the ES (ES 3.5.1.5.08 to ES 3.5.1.5.10 and 3.5.1.5.13 and 3.5.1.5.14). These include:

- Chalfont St Giles Churchyard Biological Notification Site (BNS) east of Chalfont St Giles (Ch35+000 to Ch35+200);
- Hodgemoor Wood Site of Special Scientific Interest (SSSI) adjacent to the A355 Amersham Road (Ch36+700 to Ch38+000);
- Brentford Wood Local Wildlife Site (LWS) east of Coleshill (Ch38+400 to Ch39+000);
- Shardeloes Lake LWS (Ch41+500 to Ch42+600);
- Weedonhill/High Springs/Ostlers Woods LWS near Little Missenden (Ch42+700 to Ch43+300);
- Mop End Lane LWS to the west of Shardeloes Lake (Ch42+700);
- Sibley's Coppice LWS immediately south of South Heath (Ch46+500 to Ch46+900);
- Wendover Rifle Range BNS, the boundary of the site comprises woodland and its southern edge is within the land required for construction (Ch52+700 to Ch52+800);
- Bacombe and Coombe Hills SSSI, 25m south-west of land required for construction at its nearest point (Ch53+800 to Ch55+000);
- Bacombe Hill Local Nature Reserve (LNR), the northern part of the Bacombe Hills SSSI is also designated as a LNR, which is therefore also 25m from the land required for construction (Ch54+000 to Ch54+500);
- Ellesborough and Kimble Warrens SSSI, the same 50m long section of woodland as Chilterns Beechwoods SAC is also designated as a SSSI and will be adjacent to the proposed construction traffic route (Ch54+600 to Ch56+000);
- Chilterns Beechwoods SAC, comprising nine separate blocks of woodland. The western tip of one of these blocks, a 50m long section of woodland that is designated as Ellesborough and Kimble Warrens SSSI, is adjacent to the A4010

Little Kimble Hill/Aylesbury Road, which will be used by construction traffic (Ch54+600 to Ch56+000);

- Grassland at Nash Lee BNS, which is partially within the land required for construction (Ch57+100 to Ch57+700);
- North Lee BNS off North Lee Lane (Ch57+200 to Ch57+700);
- Aylesbury Sewage Works LWS, approximately 60m from land that is required for construction (Ch64+400 to Ch65+000);
- River Thames BNS, next to the Aylesbury Sewage Works LWS and approximately 140m north-east of land required for the construction (Ch64+900);
- Waddesdon Park BNS, part of the site's northern boundary is adjacent to the A41 that is affected by the construction of the A41 Bicester Road overbridge (Ch67+500 to Ch70+500);
- Sunny Hill Farm Pastures LWS, adjacent to land required for construction of an access route to the north of the Aylesbury Link railway line (Ch68+800 to Ch69+000);
- Waddesdon Station Complex LWS, partly within the land required for construction (Ch69+000 to Ch69+500);
- Waddesdon Common LWS, partly within the land required for construction (Ch69+000 to Ch70+500);
- Blackgrove meadows BNS, adjacent to a drain that will be modified during the construction of the Scheme (Ch69+000 to Ch70+500);
- Ham Home-cum-Hamgreen Woods SSSI, approximately 2km from land required for the construction of the Scheme but approximately 100m of the site's boundary is adjacent to the A41 Bicester Road, which will be used by construction traffic (Ch73+500 to Ch74+000);
- Grendon and Doddershall Woods SSSI, located approximately 325m south of the land required for construction (Ch74+200 to Ch75+900);
- Grendon and Doddershall Meadows LWS, which is crossed by the Scheme (Ch74+200 to Ch75+900);
- Finemere Wood SSSI, the northern and southern parts of the SSSI are directly adjacent to areas of the Scheme that will be used for ecological compensation and close to utilities (overhead power lines) that are within the land required for construction (Ch74+300 to Ch75+500);
- Finemere Wood LNR, the western edge of the site is within an area required for habitat management for bats (Ch74+300 to Ch75+500);
- an unnamed BNS comprising a track leading to the Aylesbury Link railway line, partly within the land required for construction (Ch75+300);
- Greatsea and Romer Wood LWS, adjacent to land required for ecological mitigation (Ch75+700 to Ch76+500);
- Muxwell Brook and Akeman Street Disused Railway, not within the land required for construction but it is an important commuting route for Bechstein bats (Ch76+000 to Ch76+600);

- Sheephouse Wood SSSI, the extent of land required for the construction of the Scheme is directly adjacent to the western edge of the SSSI and areas that will be used for ecological compensation are adjacent to the wood's northern and southern boundaries (Ch76+500 to Ch77+600);
- Decoypond Wood LWS, the western edge of the site is within land required for the construction of the Scheme and areas for ecological mitigation adjoin the eastern and northern boundaries (Ch77+800 to Ch78+300);
- Calvert Railway Station LWS, within land required for construction (Ch78+600 to Ch79+000);
- Calvert Jubilee Nature Reserve LWS, the eastern and northern edges of the site are within the land required for construction (Ch79+000 to Ch80200);
- Calvert Brick Pits LWS, the northern edge of the site, which is also called Grebe Lake, is within the land required for construction (Ch79+300 to Ch80+100);
- Redland Bridge BNS, within the land required for construction (Ch80+000);
- Padbury Brook Three Bridge Mill BNS, a small section at the western end of the BNS lies within land required for construction (Ch81+400);
- Railway Cutting North of Twyford BNS, partially within land required for construction (Ch82+500 to Ch83+000);
- Chetwode Cutting BNS (3.3ha), most of which is within land required for construction (Ch85+200 to Ch85+700);
- Barton Hartshorn Railway Wood LWS, whose western edge of the site is within land required for construction (Ch87+000 to Ch87+300); and
- Turweston Manor Grassland LWS, the southern part of the site lies within the extent of the land required for construction (Ch95+400 to Ch95+600).

In addition, there are sensitive habitat receptors outside of designated sites that are identified in the Volume 5 map books of the main ES. These include:

- Roberts Wood, ancient semi-natural broad-leaved woodland east of Chalfont St Peter (Ch32+700 to Ch32+800);
- Rushcroft Wood, semi-natural broadleaved woodland north of Chalfont St Giles (Ch36+200 to Ch36+400);
- Perryfield Plantation, semi-natural broadleaved woodland adjacent to Rushcroft Wood (Ch36+200 to Ch36+400);
- Bow Wood, ancient semi-natural woodland on Bottom House Farm Lane (Ch36+800 to Ch36+900);
- Hales Wood is a plantation woodland qualifying as ancient, replanted woodland on Bottrells Lane (Ch37+200 to Ch 37+700);
- David's Wood, semi-natural broadleaved woodland east of Coleshill (Ch38+700 to Ch39+000);
- Second Wood and Wheatley Wood are both plantations on ancient woodland sites south-west of Amersham (Ch40+500 to Ch41+200);
- First Wood, semi-natural broadleaved woodland south-west of Amersham (Ch40+500 to Ch40+600);

- Bellhouse Wood, semi-natural broadleaved woodland south-west of Amersham (Ch40+900 to Ch41+100);
- Wet woodland around Shardeloes Lake (Ch41+600 to Ch41+900);
- The River Misbourne (Ch42+400);
- One small traditional orchard at Mantle's Farm (Ch44+400 to Ch44+500);
- One small traditional orchard north-east of Hyde Farm (Ch45+600 to Ch45+700);
- Jenkin's Wood, ancient semi-natural deciduous woodland north-west of South Heath (Ch47+300 to 47+600);
- Two small traditional orchards near Park Farm (Ch47+700 to Ch47+800);
- Havenfield Wood, ancient semi-natural deciduous woodland north of Great Missenden (Ch48+200 to Ch48+400);
- Small areas of parkland with scattered trees near Havenfield Wood;
- Rushmoor Wood, ancient semi-natural broadleaved woodland south-west of the Lee (Ch49+700 to Ch 49+900);
- An un-named wood located north-west of Rushmoor Wood (Ch49+900 to Ch50+100);
- Semi-improved neutral grassland at Mulberry Park Hill, near Mantle's Farm and Woodland's Park;
- A number of hedgerows;
- An area of ancient semi-natural broadleaved woodland, Rushmoor Wood (Ch49+700 to Ch49+900);
- An area of ancient semi-natural broadleaved woodland, Jones' Hill Wood (Ch50+300 to Ch50+400);
- An un-named wood between Jones' Hill Wood and Rushmoor Wood (Ch50+000);
- A number of ponds, including a pond off B4009 Nash Lee Road (Ch56+000 to Ch56+100);
- A traditional orchard to the north of B4009 Nash Lee Road (Ch56+300 to Ch56+700);
- The southern branch of the Stoke Brook (Ch56+800);
- Several linear strips of lowland mixed deciduous woodland at Hartwell House (Ch62+300 to Ch62+700);
- Several small, isolated patches of plantation broadleaved woodland throughout the Aylesbury Park Golf Club (Ch62+300 to Ch64+500);
- Fragments of ancient woodland adjacent to the south of Calvert (Ch78+000);
- Lowland mixed deciduous woodland present around the margins of Calvert Brick Pits LWS and Calvert Jubilee Nature Reserve LWS (Ch79+200 to Ch80+100), in a single stand south-east of Steeple Claydon (Ch79+700) and either side of the Scheme south-east of Calvert (Ch78+500);
- Woodland along the Great Central Main Line near Chetwode (Ch85+500 to Ch86+500), at Manthorn Farm in Chetwode (Ch85+700) and at Manor Farm in Barton Hartshorn (Ch87+200);
- Various young broadleaved plantations, located north and east of Calvert Jubilee Nature Reserve LWS and north of Barton Hill Farm (Ch80+200 to Ch87+500);

- Six small plantation broadleaved woodlands east and south-east of Turweston (Ch93+700 to Ch94+500);
- Areas of semi-improved neutral grassland north of Wendover Dean, north-west of Wendover, on the verges of Chesham Lane, at Stoke House Farm, Whitethorn Farm, land north of Hartwell House, Aylesbury Park Golf Club, Putlowes Farm, near Oak Tree Farm and west of Westbury;
- Large area of semi-improved grassland at Finemere Wood LNR (Ch74+500 to Ch75+500);
- Small areas of disturbed but species rich marshy grassland along parts of the Muxwell Brook;
- Semi-improved grassland near Oak Tree Farm similar to *MG5 Cynosurus cristatus-Centaurea nigra* grassland;
- Traditional orchards north of Nash Lee Road, at Road Barn Farm, at Stoke House, near Woodlands Farm, Rose Hill Farm in Steeple Claydon and Rosehill Farm in Chetwode;
- Mature scrub at Aylesbury Park Golf Club (Ch62+300 to Ch64+500);
- Areas of scrub, mainly along the Aylesbury Link railway line and River Ray corridor, at Portway Farm (Ch80+300), the Hermitage near Chetwode and along Padbury Brook in Twyford;
- A mosaic of hawthorn scrub and grassland along the disused Great Central Main Line railway near Church View Farm and south of the Railway Cutting North of Twyford BNS (Ch82+300);
- Dense scrub along Great Central Main Line disused railway cutting between Twyford and Newton Purcell (Ch82+800 to Ch86+800);
- Extensive arable and cultivated land and areas of open grassland with scattered trees (parkland), including at Aylesbury Park Golf Club and at Hartwell House (Ch62+300 to Ch64+500);
- Two arable field margins, which are managed for conservation purposes, to the south of Preston Bissett and to the north of Calvert (Ch80+000 to Ch84+500);
- Hedgerows occurring throughout the area (see Volume 5 maps for specific locations);
- Ponds occurring throughout the area, with the majority between Lower Hartwell and Putlowes Farm, near Woodlands Farm and concentrated near Calvert and Chetwode (see Volume 5 maps for specific locations);
- Stoke Brook (see Volume 5 maps for specific locations);
- Bear Brook, Sedrup Ditch, Hartwell Ditch, Lower Hartwell Ditch, the Fleet Marston Brook and tributaries, a large drain referred to as the Mega Ditch and several drainage ditches which have been heavily modified (straightened or over-deepened);
- River Thames (see Volume 5 maps for specific locations);
- River Ray (see Volume 5 maps for specific locations);
- Fleet Marston Brook (see Volume 5 maps for specific locations);
- Padbury Brook and its tributaries (Ch82+300); and

- River Great Ouse, crossed by the scheme on the border with South Northamptonshire (Ch92+600).

9.2.2 Key protected or important species known to occur in the vicinity of the works are:

- Bats, including roosts and foraging and commuting routes;
- Breeding birds including barn owls;
- Bird assemblages;
- Great crested newts;
- Otter;
- Fish;
- Adders;
- Common reptiles;
- Badgers;
- Water vole;
- Terrestrial invertebrates including nationally scarce beetles;
- Aquatic invertebrates;
- Aquatic macroinvertebrates;
- Tubular water-dropwort;
- Species wild cabbage;
- Marsh pea;
- White helleborine;
- True fox sedge; and
- Marsh stitchwort.

9.2.3 Further information on designated sites and legally protected species occurring in this area can be found within Volumes 2 and 5 of the ES.

9.2.4 Natural England has granted the HS2 organisational Great Crested Newt and badger licences across Phase 1 in April 2017. Contractors will be required to check whether other protected species licences are required prior to work commencing or where such licences have been obtained, to ensure compliance with the requirements of the licence. Of note are the specific limitations applying to work in the Bernwood Forest area between Quanton and Calvert due to the presence of an important colony of bats, including Bechstein's bats. All work in the Bernwood Forest is controlled under the HS2 organisational bat licence WML-OR32.

9.2.5 All actions required to comply with licences will be undertaken by suitably qualified specialist ecologists licensed to undertake the work.

9.3 Local control measures

9.3.1 The standard ecological issues and associated control measures outlined in Table 1 are of particular relevance to Buckinghamshire Council.

Table 1: Standard ecological issues and control measures relevant to this area

Receptor	Issue	Standard control measure/s
Designated Sites	The Scheme affects SSSI, LNR and non-statutory wildlife sites.	<p>Measures to reduce impacts, such as habitat loss, should be included in planning of construction works, such as avoiding siting temporary material stockpiles, construction materials and vehicle parking within designated sites.</p> <p>Potentially hazardous materials should also be located away from designated sites and stored correctly.</p> <p>Specific measures for control of surface water and for air and water-borne pollution should also take account of the proximity of these designated sites.</p>
Habitats	The Scheme affects habitats such as watercourses and ponds outside of sites of nature conservation importance.	Measures to avoid adverse effects of construction on retained aquatic habitats are required to avoid unnecessary habitat removal or damage, inputs of dust and pollutants and changes in surface water drainage.
Ancient Woodland	The Scheme will result in the loss of ancient woodland.	<p>Measures to minimise habitat loss should be included in planning of construction works.</p> <p>Translocation of ancient woodland soils and vegetation will be undertaken where appropriate, following the design specification set out in the relevant Ecology Site Management Plans.</p>

Receptor	Issue	Standard control measure/s
Bats	<p>All UK bat species and their roosts (even if bats are not present) are fully protected under both UK and European legislation.</p> <p>The Scheme will result in the loss of confirmed bat roosts in trees and buildings.</p>	<p>Measures to reduce impacts to bats such as loss of roost features should be included in planning of construction works where possible.</p> <p>Where unavoidable, adhere to requirements and conditions set out within applicable licences and, where relevant, Ecology Site Management Plans.</p>
	<p>The Scheme will result in the loss of trees and buildings identified as having moderate or high potential to support roosting bats, but no evidence of their use has been recorded to date through survey work.</p>	<p>Where sufficient survey data exists, adopt precautionary approach.</p> <p>Follow appropriate Working Method Statement for demolition of buildings and felling of trees.</p>
	<p>Retained bat roosts are present in close proximity to the Scheme. Caution is required to ensure that these roosts are not disturbed during works.</p>	<p>Suitable protection zones should be demarcated on site with suitable fencing and/or signage, throughout the duration of works.</p> <p>Where practicable, undertake activities with the potential to cause disturbance to maternity or hibernation roosts, such as noise and vibration, during seasonal periods when these bats are likely to be absent.</p> <p>Reduce night- time working in close proximity to retained roosts. Where night working is unavoidable ensure lighting is deigned, positions and directed away from known roosts.</p> <p>Where practicable, temporary structures will be erected to screen the entrances/exits of retained roosts from construction areas.</p>

Receptor	Issue	Standard control measure/s
	<p>The Scheme will result in the loss of and disruption to bat foraging areas and commuting routes.</p>	<p>Suitable protection zones should be demarcated on site for retained foraging and commuting routes with suitable fencing and/or signage.</p> <p>Where loss will occur, this should be kept to a minimum. Retain as much of the key habitat for as long as possible and establish new areas as quickly as possible to reduce the effects to foraging and commuting bats. Temporary mitigation measures, such as flight lines, should be implemented until new areas, such as planting, become established.</p> <p>Where practicable, undertake activities causing loss or disruption during seasonal periods when bats are likely to be less active.</p> <p>Ensure lighting is designed, positions and directed away from foraging areas and commuting routes.</p> <p>Minimise night- time working in close proximity to foraging areas and commuting routes. Where unavoidable ensure lighting is designed, positions and directed away from foraging areas and commuting routes.</p> <p>Screening should be erected for in-situ foraging and commuting routes to prevent disturbance such as that from light spill.</p>
Breeding birds	<p>All wild birds, their nests (whilst being built or in use) and eggs are legally protected against being damaged, destroyed or taken.</p> <p>Some species are also afforded additional protection against disturbance whilst nesting.</p> <p>The Scheme will result in the loss of nesting bird habitat, including vegetation, buildings and structures.</p>	<p>Habitat clearance, demolition of buildings or structures should where possible be conducted outside of the core bird nesting season (Typically, March to August inclusive) where practicable.</p> <p>If habitat clearance, demolition of buildings or structures is carried out during the core bird nesting season then an appropriate nesting bird check and Working Method Statement shall be implemented in advance of works commencing.</p>

Receptor	Issue	Standard control measure/s
Great crested newt	<p>Great crested newts and their habitats are fully protected under both UK and European legislation.</p> <p>The Scheme will result in the loss of water bodies and terrestrial habitat used by great crested newts.</p>	<p>Adhere to requirements and conditions of HS2 great crested newt organisational licence, relevant Method Statements, and Ecology Site Management Plans.</p>
Common amphibians	<p>The Scheme will result in the loss of water bodies supporting common amphibians. Clearance during peak periods of occupation could result in the loss of these populations.</p>	<p>Drain down of water bodies suitable for amphibians, such as ponds, should be conducted outside of the main active period for amphibians (March to November) where practicable.</p> <p>If drain down of water bodies is carried out during the main breeding period for amphibians, then an appropriate Working Method Statement shall be completed in advance of drain down works commencing.</p>
Common reptiles	<p>Common species of reptile (grass snake, adder, common lizard and slow worm) are protected from intentional killing or injury.</p> <p>Common reptiles are widespread, and the Scheme will result in the loss of confirmed and potential reptile habitat.</p>	<p>Where works have the potential to kill or injure reptiles, but there is suitable habitat immediately adjacent to the work site that could support a viable population (with enhancements where necessary) the Habitat Manipulation and Displacement approach should be followed. A Working Method Statement should be produced in advance of works commencing.</p> <p>Where there is no suitable habitat immediately adjacent to the work site, the Reptile Translocation approach should be followed. A Working Method Statement should be produced in advance of works commencing. This will include details of the approach, any exclusion fencing required, and details of the receptor site.</p> <p>Destructive searches of features suitable of rest, refugia, shelter or egg laying should only be conducted outside of hibernation and egg laying periods.</p>

Receptor	Issue	Standard control measure/s
Badger	<p>Badgers and their setts are protected under the Protection of Badger Act 1992.</p> <p>Badgers are widespread, and the Scheme will result in the loss of badger habitat, including setts.</p>	<p>Every effort should be made to avoid impacting habitat suitable for badgers where possible.</p> <p>Adhere to the requirements of the HS2 badger organisational licence, method statements, and Ecology Site Management Plans.</p> <p>Suitable protection buffers should be demarcated around retained setts (including artificial setts) to minimise disturbance or other impacts to badgers.</p> <p>Ensure lighting is designed, positions and directed away from foraging areas and commuting routes.</p> <p>Excavations, trenches and other earth works should be backfilled at the end of each working day or given suitable ramp as means of escape to prevent badgers becoming trapped.</p> <p>Badgers are a highly mobile species; therefore, a pre-commencement check for badger activity such as setts should be conducted prior to works commencing. Contractors should also be aware of the potential for badger setts to be present within or adjacent to work sites and procedure for unexpected finds.</p>
Hazel dormouse	<p>Hazel dormice and their habitats are fully protected under both UK and European legislation.</p> <p>The Scheme will result in the loss of habitats that are suitable for hazel dormouse, although this species has not been recorded along the Scheme to date.</p>	<p>Where relevant adhere to requirements of licences and Ecology Site Management Plans.</p>

Receptor	Issue	Standard control measure/s
Otter	<p>Otters are fully protected under both UK and European legislation.</p> <p>All major watercourses crossed by the Scheme have otters present or are potentially suitable to support them. It is not expected that there will be any fragmentation of otter movement routes, however, there is the potential for disturbance during construction along some parts of the Scheme.</p>	<p>Adhere to requirements of licences and, where relevant, Ecology Site Management Plans.</p> <p>Ensure that route of safe passage for otters is maintained throughout construction at crossing points.</p> <p>Use fencing as required to prevent otters being forced over existing road crossings.</p> <p>Minimise light spill onto watercourses.</p>
Water vole	<p>Water voles are fully protected under UK legislation.</p> <p>The Scheme will result in the loss of confirmed and potential water vole habitat.</p>	<p>An appropriate Working Method Statement should be produced in advance of works commencing, where relevant.</p> <p>Adhere to requirements of translocation licence, where relevant.</p> <p>Contractors to be aware of the potential for water voles to be present within or adjacent to work sites – works to be stopped if water vole evidence is identified and an ecologist contacted for advice.</p>
Aquatic wildlife (such as fish, eels, invertebrates)	<p>There are watercourses within the vicinity of the works, some of which have been identified as supporting aquatic wildlife which could be at risk of direct impacts during channel works or indirectly from contamination.</p>	<p>Part of the monitoring strategy for watercourses, informed by work carried out for the Environmental Statements and for Water Framework Directive assessments, is to include a plan for monitoring pre, during and post construction where aquatic species are identified as sensitive receptors. These monitoring plans will be agreed by the Environment Agency. Local control measures will include protection of aquatic species, where necessary.</p> <p>Moving fish will be undertaken in accordance with the HS2 organisational fish permit.</p>

Receptor	Issue	Standard control measure/s
Invasive plants	<p>There is a risk of work sites and adjacent land supporting invasive non-native species (INNS), as defined in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), in particular Japanese knotweed.</p> <p>INNS have been already recorded along some parts of the Scheme through previous survey work.</p>	<p>All land required for the works and immediately adjacent land (where practicable) shall be surveyed for the presence of INNS, with a focus on high-risk species.</p> <p>A Biosecurity Management Plan shall be produced in advance of works commencing, where required.</p>
General	Unexpected discovery of legally protected species during works.	<p>There will be a procedure to follow in the unexpected event that protected species are identified during construction. This will include seeking appropriate licences and consulting with Natural England.</p> <p>Unexpected finds of great crested newts or badgers are covered by the organisational licences and works must be in accordance with those licences.</p>

- 9.3.2 Further information on the control of ecological impacts is provided in HS2 Information Paper E2: Ecological Impact, Section 9 of the CoCP, in Technical Note: Ecological principles of mitigation are set out in Volume 5 of the SES2 and AP3 ES (Scope and methodology report addendum (CT-001-000/2)).
- 9.3.3 Where work is to be undertaken under European protected species licences, applications and method statements are prepared by qualified ecologists who are specialists in their particular field. The works are subject to approval by Natural England and all works are monitored by a Named Ecologist or Accredited Agent. Some licences will be subject to ongoing monitoring and record submission to Natural England. Copies of applications and records submitted in support of licences are maintained by Natural England.
- 9.3.4 Ecological Site Management Plans (ESMP) will be prepared prior to any works commencing on site for each statutory and non-statutory site of nature conservation importance and ancient woodland affected by construction, including measures to avoid or minimise adverse effects. Drafts of these management plans will be discussed with relevant environmental bodies, including for instance; Natural England, the Wildlife Trusts, the Environment Agency and the Woodland Trust who hold copies.
- 9.3.5 Some Ecological Mitigation Sites have already been constructed ahead of works commencing. These sites are also subject to an ESMP which sets out the design objectives and long-term maintenance of the sites. These ESMP documents are consulted with Wildlife Groups, Woodland Trust and Local Authorities who hold copies.

9.4 Monitoring

- 9.4.1 Contractors will be required to undertake appropriate monitoring of the consequences of construction works on ecological resources and of the effectiveness of the management measures designed to control ecological effects, as detailed within Section 9.3 of the CoCP.
- 9.4.2 Some European protected species licences will be subject to ongoing monitoring and record submission to Natural England. Copies of applications and records submitted in support of licences is maintained by Natural England.
- 9.4.3 ESMPs detail ongoing maintenance and monitoring requirements for non-designated sites or ecological mitigation sites. Updates will be shared with the bodies consulted on the development of the ESMP.

10 Ground settlement

- 10.1.1 General control measures relating to ground settlement are provided in Section 10 of the CoCP. Specific measures to reduce and repair settlement and requirements with regard to assessment, surveys and monitoring are contained in the Settlement Policy / HS2 Information Paper C3: Ground Settlement.
- 10.1.2 Requirements for monitoring will be confirmed by the settlement report prepared during the detailed design stage. Where determined as necessary, monitoring will be undertaken on selected adjacent buildings, structures, and the conventional railway tracks. Baseline readings will be taken prior to the commencement of excavation.
- 10.1.3 The monitoring strategy, methodology and programme, including the choice and location of monitoring equipment, will be discussed and agreed with the local authorities and land/building owners prior to commencement of construction.
- 10.1.4 Where significant building movement is predicted to be caused by excavation induced ground movements, ground treatment/improvement techniques might be required to ensure that if ground movement occurs, it stays within agreed and acceptable limits thereby limiting the impacts on buildings.
- 10.1.5 Monitoring may be required where existing sensitive buildings/structures/utilities are in close proximity to the planned excavation works. An assessment of the sensitivity of each building/structure/utility in close proximity to the excavation works will be carried out at the detailed design stage. This will then inform the design/specification of the monitoring system for that building/structure/utility and will also inform the design of any movement mitigation works if these are deemed necessary by the designer.
- 10.1.6 The monitoring of ground settlement will be undertaken in the areas where the route passes beneath the River Misbourne and Shardeloes Lake, and for a suitable distance up and downstream, in order to underpin prompt decision making in relation to further mitigation.

10.1.7 Prior to the commencement of construction, structural surveys and condition/defect surveys will be commissioned where structures are within the predicted zone of influence.

11 Land quality

11.1 Introduction

11.1.1 Further land quality study work including intrusive ground investigation (where needed) and analysis will be conducted by HS2 Ltd. prior to construction in order to confirm areas of suspected land contamination within the Scheme for the area. Contaminated sites beyond the Scheme will be considered only in terms of its potential impact on the Scheme. For the purposes of this LEMP it is assumed that no new land quality constraints will be identified during these pre-construction surveys. If new constraints are identified, then the LEMP would be updated accordingly. No contaminated sites (in accordance with the meaning defined in Part IIa of the Environmental Protection Act, 1990) have been formally identified by the Regulator (in accordance with and the Contaminated Land (England) Regulations 2000) within the Scheme.

11.1.2 General control measures relating to land quality are provided in Section 11 of the CoCP.

11.2 Potential contamination sources and sensitive receptors

11.2.1 The following land with potentially contaminative existing or historical uses has been identified as a possible contaminative risk to HS2 works (and can be seen in Volume 5 mapbook of the main ES):

- Small individual works such as car workshops north-west of Chalfont St Giles and unspecified works and workshops at Chalfont Common and at Chalfont St Giles;
- Warren Farm historical landfill complex (four sites);
- Froghall Brickworks historical landfill;
- Round Dell Wood historical landfill;
- infilled historical gravel and chalk workings along the route at Mantle's Farm, Hyde Farm, Cudsdens Court, Chalkdell Wood, Bury Farm, Havenfield Wood and Leather Lane;
- A partially infilled pond at Hunt's Green Farm;
- Existing Marylebone to Aylesbury Line;
- Existing Princes Risborough to Aylesbury Line;
- Existing Aylesbury Link railway line;
- Disused railway spurs to the north-east of Oak Tree Farm and east of Upper South Farm;
- Historical railway lines;
- Barton Hartshorn Airfield (former RAF Finmere);
- Turweston Aerodrome (formerly RAF Turweston);

- Two petrol stations on London Road and at the southern end of Wendover;
- Historical Hartwell clay, brick and tile works;
- Historical clay pits at Calvert Landfill;
- Historical brickworks immediately to the north-west of Calvert Landfill no.4 and 5 pits;
- Historical sewage works near Lower Hartwell;
- Sewage works east of Twyford;
- Former Waddesdon Sewage Treatment Works at Glebe Farm;
- Inert historical landfill at Bacombe Lane (south of Wendover);
- Historical Hartwell Landfill;
- Planning permission for the landfilling of the former clay pits (Calvert Landfill pit 6) associated with the planning permission for Greatmoor Energy from Waste facility;
- Planning permission for the excavation and landfilling of Calvert Landfill pits 7 and 8 to the east and south of pit 6;
- Calvert Landfill no.4 and 5 pits;
- Calvert Pit 1 Historical Landfill;
- Historical Aylesbury Borough Council Refuse Tip;
- Historical Buckingham Rural District Council Refuse Tip; and
- Potential historically infilled ponds.

11.2.2 With regard to the above identified contaminative risks, the Contractor will have due regard to the following sensitive receptors:

- People, including residents in existing properties, local employees (e.g. at farms, industrial facilities, Calvert Landfill or the existing railway) and construction and/or maintenance workers;
- Controlled waters, including groundwaters in The Chalk and The White Chalk, Portland Stone Formation, the White Limestone, Taynton and Blisworth Limestone Formations (Principal aquifers) and various Secondary A aquifers;
- The River Misbourne, Shardeloes Lake, Stoke Brook, Bear Brook, River Thames and tributaries, the River Ray and tributaries, Muxwell Brook, Grebe Lake and Calvert Jubilee lake, Padbury Brook and its tributaries, the River Great Ouse and other minor watercourses and ponds within 1km of the sources of contamination;
- Ecological receptors of Froghall Brickworks SSSI, Bacombe Hill SSSI, Sheephouse Wood SSSI and Tingewick Meadows SSSI;
- The built environment, including buildings, property and underground structures and services; and
- The natural environment, including mineral resources of sand, gravel and chalk.

11.3 Local control measures

- 11.3.1 Ground Investigations are to be undertaken to confirm areas of potential contamination within the Scheme. Following development of a conceptual site model, a risk assessment and a remedial strategy will be prepared, as needed. Consultation with Buckinghamshire Council and the Environment Agency will take place during the formulation of the remedial strategy, which will include measures to be taken if unexpected contamination is encountered as outlined in Section 11 of the CoCP.
- 11.3.2 Contaminated soils or groundwater excavated from the site are to be separated from other materials and, wherever reasonably practicable, will be treated as necessary to remove or render any contamination inactive, and reused within the Scheme where needed and suitable for use. Treatment techniques could include stabilisation methods, soil washing, appropriately permitted bio-remediation to remove oil contaminants and disposal off site. Contaminated soil disposed off-site will be taken to a soil treatment facility, another construction site (for licensed treatment, as necessary, and reuse) or an appropriately permitted landfill site.
- 11.3.3 Excavation through the inert historical landfill at Bacombe Lane, historical Hartwell Landfill, Calvert Landfill no.4 and 5 pits, Calvert Pit 1 Historical Landfill, historical Aylesbury Borough Council Refuse Tip, historical Buckingham Rural District Council Refuse Tip will be required. Should the ground investigation discover contaminated materials within the area required to construct the cutting in these locations, it will be excavated then treated and re-used, or removed as appropriate. In addition ground (landfill) gas and/or leachate control systems will be constructed where necessary to manage ingress to the Scheme or control migration pathways external to the works where pathways have been affected adversely by the construction.
- 11.3.4 Similar measures will be undertaken as needed at other sites where contaminated soils or groundwater are identified during the investigation and/or construction processes.

11.4 Minerals

- 11.4.1 The Scheme does cross a Mineral Safeguarding Areas in the Buckinghamshire Council area.
- 11.4.2 Mitigation of potential impact on these mineral resources can include prior extraction of the resource for use within the project or elsewhere. Extraction may be limited to areas of environmental mitigation earthworks within the Scheme adjacent to rather than beneath the trackbed, which will require good founding conditions. A plan will be discussed in advance of the construction works with the landowner and/or mineral owner, the mineral planning department at Buckinghamshire Council and any other interested parties to assist in achieving an effective management of minerals within the location of the affected Mineral Safeguarding Areas as well as Preferred Areas and Areas of Search.

12 Landscape and visual

12.1 Introduction

12.1.1 General control measures relating to land quality are provided in Section 12 of the CoCP.

12.2 Sensitive receptors

12.2.1 With reference to the set-up and location of temporary works, the Contractor will have due regard to limiting impacts of the character of the following landscape character areas (LCAs) (ES 3.5.1.7.2):

- Chilterns Area of Outstanding Natural Beauty (AONB);
- Maple Cross Slopes North LCA;
- Chalfont St Peter North LCA;
- Misbourne Upper South LCA;
- Penn South LCA;
- Misbourne Upper North LCA;
- Hyde Heath North LCA;
- Lee and Buckland Common Farmland LCA;
- Risborough Foothills LCA;
- Chiltern Scarp (Coombe Hill) LCA;
- Longwick Vale LCA;
- The Lee Undulating Valley Slopes LCA;
- Wendover Gap LCA;
- Settlement (Wendover) LCA;
- Chiltern Scarp (Wendover West) LCA;
- Chiltern Scarp (Coombe Hill) LCA;
- Wendover Foothills (West) LCA;
- Southern Vale LCA;
- Stoke Mandeville Vale LCA;
- Haddenham Vale LCA;
- Hartwell House and Golf Course LCA;
- Fleet Marston Vale LCA;
- Westcott Clay lands LCA;
- Quainton Hill LCA;
- Kingswood Wooded Farmland LCA;
- Finemere Hill LCA;
- Upper Thames Clay Vales LCA
- Midvale Ridge LCA
- Claydon Bowl LCA;
- Twyford Vale LCA;
- Preston Bissett Plateau Edge LCA;
- The Great Ouse Valley Farmlands LCA;
- Shelswell and Turweston Wooded Estatelands and Farmland Plateau LCA; and
- Brill-Winchendon Hills AAL.

12.2.2 Construction will partly take place in the Chilterns Area of Outstanding Natural Beauty and its setting.

12.2.3 The Contractor will also have due regard to limiting visual intrusion on the following visual receptors:

- Residents in the area, particularly located to the north of Chalfont St Peter, north and east of Chalfont St Giles, west of the M25 in areas such as Horn Hill, at dispersed properties on Bottom House Farm Lane, to the southern periphery of Amersham Old Town, at the perimeter of Hyde Heath and South Heath, along Potter Row, in Kingsash, Wendover, Dunsmore, Kingsash, Stoke Mandeville, Aylesbury, Berryfields, Hartwell, Calvert, Steeple Claydon, Twyford and Chetwode, as well as at smaller dispersed settlements throughout the area and farmsteads throughout the study area and groupings of properties in the vale landscape between Wendover and Halton and at Fleet Marston, and isolated groups of residences interspersed throughout the landscape;
- Recreational users on public rights of way (PRoW) throughout the study area, including users of PRoW near the eastern periphery of Chalfont St Giles, users of the South Bucks Way long distance PRoW near the north side of Hodgemoor Woods and within Shardeloes Grade II* registered park and garden, and users of Chiltern Link long distance PRoW, the South Buckinghamshire Way, the Chiltern Link, the Chiltern Way, the Icknield Way Trail, Ridgeway National Trail, the Aylesbury Ring, the North Buckinghamshire Way, the Midshires Way, the Swan's Way, the Thame Valley Walk, the Bernwood Jubilee Way and the Cross Bucks Way; and
- People travelling through the area along numerous 'scenic' rural roads within the study and on main roads, including Whielden Lane, Chesham Lane, Hyde Heath Road and Keepers Lane, on main roads, including the A413, School Hill, Main Street, West Street, from public highways around Chetwode, Quainton Road, Station Road and Edgcott Road.

12.2.4 The Contractors will be made aware of the location of the following sensitive sites:

- Sibley's Coppice and adjacent areas (though loss of woodland is removed by AP4, and no works will be undertaken within the area falling in the land required for construction);
- Jones' Hill Wood (loss of ancient woodland);
- In the area of the green tunnel and portal and the Ellesborough Road and B4009 realignment sites (loss of hedgerows);
- in the area of the Stoke Grove autotransformer station, the B4009 Nash Lee Road, the maintenance loop and the A4010 Stoke Mandeville bypass (loss of hedgerows);
- Sheephouse Wood (loss of ancient woodland adjacent to the wood);
- in the area of the Infrastructure Maintenance Depot (IMD) and temporary railhead south of Steeple Claydon, along the line east of Calvert and at the waste transfer sidings near Decoypond Wood (loss of the existing strong hedgerow pattern);

- North and east of Twyford (loss of the existing strong hedgerow pattern);
- The conservation area at Chetwode (Chetwode cutting); and
- Manthorn Farm and the dismantled railway line between Barton Hill Farm and Newton Purcell Loss severance of hedgerow strong hedgerow pattern).

12.2.5 The Contractor shall also discuss the possibility of advance planting off-site with landowners, Buckinghamshire Council to further screen the locations listed above.

12.3 Local control measures

12.3.1 Measures that have been incorporated into the CoCP to avoid or reduce landscape and visual effects during construction include the following (see Volume 5):

- Maximising the retention and protection of existing trees and vegetation where possible;
- Use of well-maintained hoardings and fencing;
- Designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses;
- Replacement of any trees intended to be retained which may be unintentionally felled or die as a consequence of construction works;
- Appropriate implementation, establishment and maintenance of planting and seeding works and implementation of landscape management measures, to continue through the construction period as landscape works are completed;
- Temporary bunds to be positioned to screen views to the route construction;
- Consideration of the specific location of construction compound layouts and site access in relation to existing vegetation to reduce visual impacts where practicable; and
- The specific location of temporary material stockpiles to reduce visual impacts.

12.4 Trees

12.4.1 The Contractor will give consideration to where trees and other planting can be established early in the construction programme. For example, where trees require removal due to utility works early in the programme, replacement trees will be provided at the earliest possible opportunity, where reasonably practicable. The Nominated Undertaker will ensure any early planting during construction is maintained to promote healthy growth.

12.4.2 Where practicable, the Contractor will carry out surveys and agree the details of tree retention and protection measures, in accordance with BS5837:2012 Trees in relation to design, demolition and construction - Recommendations, with Buckinghamshire Council, in advance of any works in the vicinity of trees.

12.5 Site Buildings for Office and Welfare

12.5.1 Buildings will generally be of a temporary modular type; they will typically be multi-storey to maximise construction space and limit land take.

13 Noise and vibration

13.1 Introduction

13.1.1 General control measures relating to noise and vibration are provided in Section 13 of the CoCP and additional information is provided in Information Paper E23: Control of construction noise and vibration.

13.2 Sensitive receptors

13.2.1 Noise and vibration construction assessment locations, at sensitive residential and non-residential properties, are identified within Noise and Vibration Volume 5- map book (ref. ES. 3.5.4, ES 3.5.1.9.2).

13.2.2 The avoidance and mitigation measures in this area will avoid airborne construction noise adverse effects on the majority of residential receptors and communities.

13.2.3 Noise insulation is being offered for qualifying buildings as defined in the noise insulation and temporary rehousing policy within HS2 Information Paper E23. Noise insulation or temporary rehousing will mitigate residents being significantly affected by levels of construction noise inside their dwellings.

13.2.4 Qualification for noise insulation and temporary re-housing will be identified. Qualifying buildings are being identified in the Buckinghamshire Council area early enough so that noise insulation can be installed, or temporary rehousing provided, before the start of the works predicted to exceed noise insulation or temporary rehousing criteria.

13.2.5 The following residential buildings have been reported in the ES as likely to qualify for noise insulation measures. Further detailed assessment would be required to confirm this:

- Three residential buildings on Bacombe Lane; and
- Approximately 10 residential buildings on Ellesborough Road.

13.2.6 Residential sensitive receptors at which the ES has reported adverse impacts from construction noise and/or vibration are mainly located at residential communities at:

- Approximately five dwellings on Bacombe Lane; and
- 20 dwellings on Ellesborough Road.

13.2.7 Significant residual effects from construction traffic have been identified at the following residential and non-residential properties:

- Residential properties along King's Lane where it passes through South Heath;
- Approximately 40 dwellings located immediately adjacent to Grendon Road/Buckingham Road where they pass through Edgcott;

- Approximately 10 dwellings located close to Perry Hill (south of School Hill);
- The buildings at Great Moor Sailing Club due to construction traffic on Perry Hill (north of School Hill) where it passes Grebe Lake;
- Approximately 15 dwellings located immediately adjacent to School Hill (west of Perry Hill) to the west of Calvert;
- Approximately 10 dwellings located immediately adjacent to School End where it passes to the north of Chetwode;
- St Leonard's Church due to construction traffic on The Broadway in Grendon Underwood; and
- Edgcott Village Hall due to construction traffic on Grendon Road/Buckingham Road where it passes through Edgcott.

13.2.8 Significant residual effects at non-residential properties have been identified at:

- Wendover House School / Chiltern Way Federation, Wendover Campus, Wendover;
- St Mary's Church, Wendover;
- Community Hall, Witchell Road, Wendover;
- Freemantle Court care home; and
- Church of the Assumption of the Blessed Virgin Mary, Church Street, Twyford.

13.3 Local control measures

13.3.1 Site specific best practicable means measures to control noise and vibration have been identified through the parliamentary process and discussions with Buckinghamshire Council. These are reflected in this document. Furthermore, site specific measures will be identified by the Contractor on a site-by-site and activity-by-activity basis and agreed with Buckinghamshire Council through the Section 61 process. As identified in the ES, examples of best practicable means measures that may be employed by the Contractor to control noise and vibration include:

- Additional height hoardings which may, on occasion, be used to control construction noise. These will be subject to approval in accordance with the requirements of Schedule 17 Part 1 to the Act;
- Arranging the layout of compounds to reduce noise impacts where construction compounds are in close proximity to noise sensitive receptors. This may include placing any stacked portacabins between noisy works and sensitive receptors;
- Taller screening as described in the CoCP has been assumed along the edge of the construction site boundaries adjacent to Old Risborough Road, the residential communities to the south-west of Wendover, Ellesborough Road, Bacombe Lane, along B4009 Nash Lee Road, Moat Farm, properties on the A418 Oxford Road adjacent to the works (Park Villa, Hartwell Cottage and the Oaks), Hartwell House, the Putlowes and at Calvert and Chetwode. Temporary screening has also been assumed along the edge of the works associated with realigning the Princes Risborough to Aylesbury Line adjacent residential property on the south-western

edge of Aylesbury (in the vicinity of Westfield and Batt Furlong) and Booker Park School; and

- Controlling noise and vibration at source - for example the selection of quiet and low vibration equipment, review of construction programme and methodology to consider quieter methods.

13.3.2 Local control measures will be periodically reviewed, including following any material changes in the proposed construction method and appointment of the Contractor.

13.4 Monitoring

13.4.1 The Nominated Undertaker requires its Contractors to undertake and report such monitoring, including real time noise and vibration monitoring, as is necessary to ensure and demonstrate compliance with all noise and vibration commitments and the requirements of the CoCP.

13.4.2 Pre-construction baseline monitoring at specific locations will be undertaken where there is no existing baseline information. This will be discussed with Buckinghamshire Council as part of noise and vibration discussions and any consents that require to be obtained.

13.4.3 Monthly monitoring reports will be made publicly available throughout construction. These can be found on the HS2 website at this address: <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>.

13.4.4 As set out in Section 4.3.10 of the CoCP, where the Nominated Undertaker's Contractors are monitoring noise, dust and air quality with equipment capable of streaming data in real time, this will be made available to Buckinghamshire Council. In addition, monthly noise monitoring reports will be made publicly available throughout construction. The monthly reports will include information such as measurement methodology and monitoring locations. The reports will be available on the HS2 website: <https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

13.4.5 All noise and vibration monitoring equipment should hold a valid calibration certificate issued by either a United Kingdom Accreditation Service (UKAS) accredited calibration laboratory or equipment manufacturer.

14 Traffic and transport

14.1 Introduction

14.1.1 Route-wide, local area and site specific traffic management measures will be implemented during the construction of the project on or adjacent to public roads, bridleways, footpaths and other Public rights of way (PRoW) affected by the Scheme as necessary. These measures are guided by Section 14 the CoCP.

14.1.2 The CoCP sets out a number of measures to ensure the impacts from construction traffic on the local community are minimised by its Contractors where reasonably practicable:

- A Route-wide Traffic Management Plan (RTMP) setting out generic traffic management measures to be implemented during the construction of the project;
- Local Traffic Management Plans (LTMPs) will set out specific traffic management measures for each work site within particular areas along the route. Information on how the local impacts of construction will be mitigated, in particular those associated with materials delivery and redistribution, offices and workers' accommodation will be included within the LTMP or on a site-specific basis;
- Contractors will prepare site specific traffic management measures, which will be subject to consultation and, as necessary, consent;
- Contractors will prepare construction workforce travel plans with the aim of encouraging the use of sustainable modes of transport to reduce the impact of workforce travel on local residents and businesses;
- For road cleanliness Contractors will be required to use all reasonably practicable measures to avoid/limit and mitigate the deposition of mud and other debris on the highway; and
- HS2 will require its contractors to undertake such monitoring as is necessary to ensure compliance with the requirements of the CoCP, and this will include the maintenance of records of traffic management measures installed.

14.1.3 Information relating to construction traffic is also provided in Information papers:

- D11: Maintaining access to residential and commercial property during construction;
- E13: Management of traffic during construction;
- E14: Highways and traffic during construction – legislative provisions; and
- E30: Vehicle flow management and safety requirements during construction.

14.2 Local control measures

Sensitive Receptors

14.2.1 In relation to traffic and transport, key sensitive receptors will need to be considered when the Contractor develops the overall programme within the LTMP and the site specific traffic management schemes.

14.2.2 These requirements will be addressed appropriately through the development of the LTMPs or site specific measures and discussed at the Local Traffic Liaison Group meeting, established in accordance with the Code of Construction Practice and the Route-wide Traffic Management Plan.

14.2.3 In Buckinghamshire Council the key sensitive receptors that will be affected by the Scheme are communities within Wendover, Stoke Mandeville, Aylesbury, Waddesdon, Quinton, Grendon Underwood, Steeple Claydon and Calvert.

Site access

- 14.2.4 A number of vehicle access points to the construction sites will be required and so the construction vehicle movements will be spread over a number of roads within the area of the works. Highway access notifications and/or approvals will be undertaken in accordance with Schedule 4 to the Act.
- 14.2.5 Routes for construction traffic will be subject to approval of the relevant planning authority in accordance with the Schedule 17 to the Act when large construction vehicle movements exceed 24 single movements (12 two way movements) per day to and/ or from a site.
- 14.2.6 Any permanent highway works outside the limits of deviation as outlined in the Act will be subject to normal Highways legislation and Highway Authority powers.

14.3 Works to the Highway and Access Measures

- 14.3.1 Temporary and permanent road closures and diversions of the following roads will likely be required:
- Temporary closure and realignment of Bowood Lane will be required with alternative route via the A413 London Road, Rocky Lane/Chesham Lane and King's Lane, for a period of nine months to one year;
 - Permanent realignment of Rocky Lane, 50m to the west, under the railway in an underbridge;
 - Temporary realignment of approximately 140m of the A413 London Road for a period of 18 months to 2 years;
 - Temporary closure of Small Dean Lane, diversion via A413 London Road and Dunsmore Road for a period of six to nine months;
 - Permanent realignment of Small Dean Lane;
 - Temporary closure of Bacombe Lane, realigned via a temporary link road from Ellesborough Road for a period of one year;
 - An alternative temporary route for Ellesborough Road realigned via a temporary link road to the north of the current alignment, for a period of one year and nine months to two years;
 - Permanent realignment of B4009 Nash Lee Road, 50m to the north across new offline B4009 Nash Lee Road overbridge;
 - Temporary realignment of B4009 Nash Lee Road for a period of 18 months to 2 years;
 - Permanent realignment of Nash Lee Lane junction with B4009 Nash Lee Road, 200m to the east of original alignment;
 - Stopping up of A4010 Risborough Road and diversion via A4010 Stoke Mandeville bypass relief road and B4443 Lower Road;
 - Stopping up of Old Risborough Road and diversion via A4010 Risborough Road, A4010 Stoke Mandeville bypass relief road and B4443 Lower Road;

- Stopping up of Marsh Lane either side of the Scheme, with existing road retained in part to maintain access to the existing properties, and diversion via A4010 Stoke Mandeville bypass relief road and B4443 Lower Road from the west;
- Permanent realignment of A418 Oxford Road during construction of an overbridge for a period of nine months to one year;
- Permanent diversion the A41 Bicester Road, passing westwards across the new A41 Bicester Road over bridge adjacent to existing Blackgrove Road;
- Permanent closure of a length of Blackgrove Road to the west of the route
- Permanent reinstatement of Needles Farm accommodation access, approximately 50m to the west, across the new Needles Farm accommodation overbridge;
- Permanent reinstatement of Station Road, approximately 450m to the west, across the new Station Road overbridge;
- Permanent reinstatement of Edgcott Road Shipton Lee, 50m to the east, across new Edgcott Road overbridge;
- Temporary closure of School Hill Calvert Road, which will be re-routed via Addison Road, West Street and Perry Hill Gawcott Road for a period of between one year and six months and two years;
- Permanent realignment of Addison Road/Pond Lane during construction of overbridge;
- Permanent diversion of Perry Hill Gawcott Road to new Charndon Lodge underbridge to the west to pass under East West Railway and over HS2 via Perry Hill overbridge;
- Temporary closure of West Street Steeple Claydon to Twyford during which there will be diversions via Perry Hill Gawcott Road or School Hill Calvert Road; a temporary closure of School End which will be re-routed via the A4421, for a period of between one year and one year and six months;
- A temporary realignment of A422 Brackley Road for a period of approximately a year to one and a half years; and
- A temporary road closure of Turweston Public Road, diversion via field boundary to the north for period of between ten months to one year.

14.3.2 Alternative routes for the following PRow's will be required, namely:

- Footpath BD8;
- Bridleways BD7 and BD10;
- Bridleway AX16;
- Bridleway AX14;
- Footpath AN22;
- Footpath AN19;
- Footpath AN28;
- Footpath AN14;
- Footpath AN13;
- Footpath AN4;
- Footpath AN40;

- Footpath AN42;
- Footpath AN39;
- Footpath AN6;
- Footpath AY12;
- Footpaths AE12,
- AE20 and AE21;
- Footpath BB3;
- Banbury Lane footpath;
- Bridleway AG9;
- Bridleway AG10;
- Footpath AE5;
- Footpath AE16;
- Footpath AE17;
- Footpath AA8;
- Footpath AC2;
- Footpath AC;
- Footpath TLE/2;
- Footpath TLE/3;
- Footpath TLE/5;
- Footpath WEN/36;
- Footpath WEN/39;
- Bridleway (unknown reference) along the old link road between Small Dean Lane and A413 London Road;
- Footpath WEN/57;
- Bridleway WEN/57;
- Bridleway WEN/14 ;
- Footpath WEN/13A;
- Ridgeway trail;
- Footpath WEN/6;
- Footpath WEN/11;
- Footpath WEN/55;
- Footpath ELL/25;
- Footpath SMA/5 and SMA/5A;
- Footpath ELL/25;
- Footpath ELL/20;
- Footpath ELL/2;
- Footpath ELL/8;
- Marsh Lane footpath;
- Footpath SMA/8;
- Footpath SMA/9;
- Footpath SMA/11;
- Footpath SMA/16;
- Footpath SBH/19;

- Footpath SBH/27;
- Footpath SBH/34;
- Footpath SBH/32;
- Footpath SBH/2;
- Footpath FMA/2;
- Footpath WAD/5/112;
- Footpath WAD/5/2;
- Footpath WAD/4;
- Footpath WAD/4A;
- Footpath WAD/3;
- Footpath QUA/31;
- Bridleway QUA/28A;
- Bridleway QUA/36;
- Bridleway GUN/25;
- Bridleway GUN/28;
- School Hill footpath;
- Footpath SCL/7; Footpath SCL/8;
- Footpath SCL/9;
- Footpath TWY/4;
- Footpath SCL/6;
- West Street footpath;
- Footpath TWY/18;
- Footpath TWY/19;
- Footpaths PBI/6/3 and PBI/6/2;
- Footpath PBI/5A;
- Footpath PBI/9;
- Footpath CHW/225;
- Bridleway CHW/24;
- Footpath CHW/18;
- Footpath CHW/11;
- Footpath 308/31/10;
- Footpath CHW/225/4;
- Footpath CHW/24;
- Footpath SCL/13;
- Bridleway SCL/18;
- Footpath BHA/3/1;
- Footpath TUW/3;
- Footpath TUW/5;
- Bridleway TUW/9;
- Bridleway TUW/4;
- Footpath LMI/17;
- Footpath LMI/21;
- Footpath GMI/23/611;

- Footpath GMI/33/4;
- Footpath GMI/33/5;
- Footpath GMI/13;
- Footpath GMI/12;
- Footpath GMI/2.
- Footpath CSP/16;
- Footpath CSP/10;
- Footpath and cycleway (between A404 Whielden Lane and A413);
- Footpath LMI/17;
- Footpath LMI/21;
- Footpath GMI/23/611;
- Footpath GMI/33/4;
- Footpath GMI/33/5;
- Footpath GMI/13;
- Footpath GMI/12;
- Footpath GMI/2;
- Footpath TLE/2;
- Footpath TLE/; and
- Footpath ELL/25.

14.3.3 Since completion of the Environmental Statement in 2012, the construction methodology and programme has been reviewed and, as a result, it has been necessary to alter the plans proposed in the ES.

14.3.4 All reasonable endeavours will be made to ensure connectivity across the line of route for as long as is reasonably practicable and safe. Where this is not possible, a number of alternatives will be assessed for feasibility, such as diversions and weekend/evening closures. Only if it is deemed unsafe for a PRoW to remain open and there are no reasonable alternatives will the PRoW be closed. Closures will be kept to the minimum practicable duration and construction of the associated permanent work(s) is currently under review, with a view to accelerate the completion of PRoW permanent diversions.

14.3.5 All closures and diversions will be assessed in full for EMR compliance, and any works must have an associated Schedule 4 submission, which will be communicated with the Local Authorities through the due processes outlined in the HS2 Act.

14.3.6 The following temporary private access diversions will be required:

- To Park Farm will be required during the construction of Footpath GMI/12 during the construction of Footpath GMI/12 overbridge via a temporary diversion along diverted Footpath GMI/12;
- To Havenfield Wood will be required during the construction of Footpath GMI/2 accommodation overbridge via a temporary diversion along diverted Footpath GMI/2;
- To Whaddon Hill Farm will be required during the upgrading of the access track and construction of Bridleway SBH/2 overbridge;

- To Lower Blackgrove Farm and Lower Blackgrove Farm cottages during construction of the A41 Bicester Road realignment;
- A temporary closure of The Green access road to Manthorn Farm and diversion via School End for period of approximately nine months to one year; and
- To Waddesdon waste treatment works during construction of Footpath WAD/3 accommodation underbridge.

14.3.7 Civil engineering works to construct the Scheme will necessitate temporary track possessions:

- On Princes Risborough to Aylesbury Line and Marylebone to Aylesbury Line which will affect some users of passenger services stopping at Wendover;
- On Princes Risborough to Aylesbury Line in the area that will affect some users of passenger services stopping at Stoke Mandeville, Aylesbury and Aylesbury Vale Parkway;
- In CFA12 that will affect some users of passenger services stopping at Quainton Road during special events at Buckinghamshire Railway Centre; and
- In the area around Calvert due to the re-alignment of various lines including the Bicester to Bletchley Line and Aylesbury Link railway line.

14.3.8 The possessions will be short-term and generally take place during mid-week nights or weekends.

14.3.9 All temporary closures and diversions will be subject to submissions and notifications to the relevant highway authority.

14.4 Monitoring procedures

14.4.1 Each Contractor will be responsible for monitoring to ensure compliance with the RTMP, LTMP, the requirements of the provisions of the Act, assurances and undertakings, site specific drawings and site specific traffic requirements and conditions.

15 Waste and materials

15.1 Introduction

15.1.1 All waste will be managed in accordance with the waste hierarchy which aims to reduce waste at source and to reduce the quantity that requires final disposal to landfill. This applies to excavated material arising on-site, which will be reused within the Scheme as far as reasonably practicable, as well as material from demolition and construction activities. This approach is described in greater detail in HS2 Phase One Information Paper E3: Excavated Material and Waste Management and in Section 15 of the CoCP.

15.2 Local control measures

Testing and classification of materials

15.2.1 Characterisation of materials will be determined by the Contractor to ascertain suitability for reuse, recycling, recovery or disposal to inert, non-hazardous or hazardous landfill.

15.2.2 A Materials Management Plan will be developed in accordance with the Definition of Waste: Development Industry Code of Practice⁸ to set out the processes to be adopted in respect of the reuse of excavated materials either on the Scheme or transferred to another development site.

15.2.3 In the event that excavated material is to be sent for disposal, which shall be the option of last resort, testing and classification will be undertaken by the Contractor in line with the Environment Agency's guidance. This includes:

- Technical Guidance WM3: Waste Classification – Guidance on the Classification and Assessment of Waste (July 2015)⁹;
- Waste Sampling and Testing for Disposal¹⁰; and
- Technical Guidance WM3 – Guidance on the classification and assessment of waste (1st edition 2015)¹¹.

15.3 Transport of waste and materials

15.3.1 Opportunities for the off-site re-use of surplus excavated material will be identified and utilised where reasonably practicable. Surplus excavated material will only be sent to landfill as an option of last resort. Further information on the management of material and waste is provided in HS2 Information Paper E3: Excavated Material and Waste Management.

16 Water resources and flood risk

16.1 Introduction

16.1.1 General control measures relating to water resources and flood risk are provided in Section 16 of the CoCP.

16.2 Sensitive receptors

16.2.1 The Contractor will have due regard to the following sensitive local water resource receptors:

- Local aquifers: Including Gerrards Cross Gravel (Secondary A aquifer); Beaconsfield Gravel (Secondary A aquifer); Alluvium (Secondary A aquifer); Head deposits (Secondary A aquifer); Lambeth Group (Unproductive (top)/Secondary A (base)); Newhaven Chalk Formation (Principal aquifer); Seaford Chalk Formation (Principal aquifer); Lewes Nodular Chalk Formation

⁸ CL:AIRE Definition of Waste: Development Industry Code of Practice, version 2, March 2011

⁹ NRA, SEPA, EA (2015), Technical Guidance WM3: Waste Classification – Guidance on the Classification and Assessment of Waste, Version 1.1.GB

¹⁰ Environment Agency (2015), *Technical Guidance WM3- Guidance on the classification and assessment of waste (1st edition 2015)*.

(Principal aquifer); Chalk Rock Member (Principal aquifer); New Pit Chalk Formation (Principal aquifer); Holywell Nodular Chalk Formation (Principal aquifer); Upper Greensand Formation (Secondary A aquifer); the Chalk, Upper and Lower Greensand, Purbeck Group (composed of formations designated as unproductive strata or Secondary aquifers), Great Oolite Group (composed of formations designated as Principal and Secondary aquifers) and any other formations or deposits classified as being Principal or Secondary Aquifers or containing groundwater that is connected to Primary or Secondary Aquifers or other sensitive receptors, such as; Diamicton (unproductive strata); Alluvium (Secondary A aquifer); Head (Secondary undifferentiated aquifer) Head Deposits (Secondary A aquifer); Glaciofluvial deposits (Secondary A aquifer); River Terrace Deposits (Secondary A aquifer); Whitby Mudstone Formation (unproductive strata); Ancholme Group (composed of formations designated as unproductive strata or Secondary aquifers); Selbourne Group (composed of formations designated as unproductive strata); and Wealden Group (Secondary A aquifer);

- Several groundwater abstractions for public water supply (PWS) with groundwater Source Protection Zones (SPZ) located within the study area where the route passes through;
- Ten licensed groundwater abstractions and five reported unlicensed groundwater abstractions present within the study area;
- Surface water features: River Misbourne, Shardeloes Lake and Brentford Grange Moat; drain at Church Lane, Wendover; Grand Union Canal (Wendover Arm); Castle Park Stream; Wendover Brook; Stoke Brook; Chalkshire Stream; Stoke Brook and tributaries; Sedrup Ditch; Hartwell Ditch; Lower Hartwell Ditch and drain; tributary of River Thames south of Bear Brook; River Thames; Bear Brook; tributary of Fleet; Marston Brook (field drain from Coney Hill and Fleet Marston Spinney); drain from Upper and Lower Cranwell Farms (tributary of Fleet Marston Brook); tributary of Fleet Marston Brook (near Lower Blackgrove Farm north of the route); headwater of Fleet Marston Brook; headwaters of the Tetchwick Brook and tributaries; River Ray; tributary of the River Ray (Finemere Wood); unnamed lake (Finemere Wood); Muxwell Brook; unnamed lakes at landfill site south-west of Sheepphouse Wood; Internal Drainage Board (IDB) drains M24 and M23 south and south-west of Steeple Claydon at Calvert Infrastructure Maintenance Depot (IMD) and tributaries; Calvert Jubilee Nature Reserve LWS; Grebe Lake; IDB drains S75 and S76; Padbury Brook and tributaries; River Great Ouse and numerous small ponds and unnamed drains within 1km radius of the Scheme; and
- Water dependent habitats: River Misbourne, which is a local BAP habitat; Shardeloes Lake Local Wildlife Site (LWS); Weston Turville Reservoir SSSI; Finemere Wood SSSI; Grendon and Doddershall Woods SSSI; Sheepphouse Wood SSSI; Grendon and Doddershall Meadows LWS; Calvert Jubilee Nature

Reserve LWS; Calvert Brick Pits LWS; Barton Hartshorn Railway Wood LWS; Calvert Railway Station LWS; Decoypond Wood LWS; Field A Cowley Farm LWS and Turweston Manor Grassland LWS.

16.2.2 The Contractor's Pollution Incident Control Plan will have due regard to the local flood risk sources (i.e. surface, artificial, groundwater and sewers) and key receptors and take into account any proposed risk management or mitigation measures.

16.2.3 The Contractor will have due regard to the following areas within Environment Agency Flood Zones 2 and 3 and therefore at risk of river flooding:

- River Misbourne;
- Chalkshire Stream;
- Stoke Brook;
- Bear Brook;
- Sedrup Ditch;
- Lower Hartwell Ditches;
- River Thames;
- Fleet Marston Brook;
- River Ray;
- Muxwell Brook;
- IDB Ditch M24;
- Padbury Brook;
- River Great Ouse;
- The Contractor will have due regard to the following local flood water receptors and their respective flood histories:
 - Access roads to Woodlands Farm, Upper Greatmoor Farm and Lower Greatmoor Farm are crossed by flood zones;
 - Residential properties The Paddock, Brook Farm and Moat Farm in the vicinity of Stoke Brook; the village of Fairford Leys in the vicinity of Bear Brook; Three Bridge Mill and Twyford Mill in the vicinity of Padbury Brook; and the village of Westbury in the vicinity of the River Great Ouse;
 - Aylesbury Park Golf Club, located in the vicinity of Lower Hartwell Ditches; and
 - Areas at risk of surface water flooding, as shown on the Environment Agency's Flood Maps for Surface Water. These are mostly associated with watercourses or dry valleys.

16.2.4 There are two satellite construction compounds within this area that are located in areas at risk from river flooding including the Thame Valley viaduct satellite compound and Westbury viaduct satellite compound.

16.3 Potential sources of contamination

16.3.1 Potential sources of contamination are detailed within Section 11 of this LEMP.

16.4 Local control measures

- 16.4.1 Measures identified in Section 16 of the CoCP, including detailed method statements, will aim to reduce potential adverse effects on surface water or groundwater quality or flows associated with construction; this will include release to groundwater, watercourses of surface water sewers in the surrounding receptors.
- 16.4.2 As outlined in the CoCP, best practice measures will be used (e.g. through the use of silt traps and appropriate attenuation, if required) prior to the discharge of water to watercourses, groundwater or surface water sewers, subject to obtaining the required permits or consents. As noted in Section 5.12 of this document, a pollution incident control plan will be produced which will incorporate procedures for alerting relevant water supply companies and reducing impacts to public supply SPZ's and local private abstractions in this area.
- 16.4.3 Where there is the possibility that work may affect aquifers, a groundwater monitoring plan will be implemented, as outlined in Section 16 of the CoCP.
- 16.4.4 A programme of groundwater and surface water monitoring will be undertaken prior to, during and following completion of the construction works. This will include at risk WFD elements as identified in the ES route wide WFD assessment. This is required to enable further scheme design and for the protection of public water supply and other abstractions with a legal right to abstract water. The monitoring programme scope and duration will be developed and agreed with the Environment Agency in consultation with water bodies, and where required Affinity Water and Buckinghamshire Council and any other relevant Stakeholders. A management strategy will also be agreed with the Environment Agency in consultation with water bodies that will cover any physical mitigation required for the protection of public water supply.
- 16.4.5 If dewatering from excavations is required, it will be carried out in consultation with the Environment Agency and will take into consideration risks posed to water quality or quantity and not adversely affect those who have a protected right to abstract water.
- 16.4.6 Groundwater from dewatering at vent shafts will be discharged back into the groundwater via recharge wells within the vicinity of the vent shaft. In the event that a technical constraint is identified at the detailed design stage, provision has been made to transfer some discharge by pipeline into the River Misbourne near each shaft.
- 16.4.7 As outlined in the CoCP Section 16, site specific flood risk management plans will be produced to manage the flood risk at the satellite compounds and vent shaft sites. These will take account of the flood risk assessments produced for CFA8, CFA9 and CFA10 in the ES and include any proposed risk management or mitigation measures, if required.
- 16.4.8 If required, appropriate guidance will be adhered to, including the Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention¹². Groundwater and surface water monitoring plans will be prepared, where piling could affect below ground contamination.

¹² Environment Agency (2001), Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution

- 16.4.9 Temporary excavated material stockpiles, construction compounds and site offices will be located outside of areas at risk of flooding where reasonably practicable, to avoid having an impact on the risk of flooding. Site specific flood risk management plans will be prepared prior to works within flood plains to manage the potential risks. These plans will take account of the flood risk assessments produced for the ES and include any proposed risk management or mitigation measures, if required.
- 16.4.10 The route will pass beneath the River Misbourne and Shardeloes Lake in twin-bore tunnel. Baseline monitoring of river flows and monitoring during construction will take place upstream and downstream of crossing points. Monitoring locations and appropriate trigger levels will be developed with the Environment Agency to ensure an appropriate action plan is in place to cover any mitigation, should it be required. Additionally, monitoring of groundwater levels close to the River Misbourne crossings, will be undertaken before and during construction. This will also assist in providing a better indication of the magnitude of any impact due to tunnelling.
- 16.4.11 The monitoring of ground settlement will be undertaken in the areas where the route passes beneath the River Misbourne and Shardeloes Lake, and for a suitable distance up and downstream, in order to underpin prompt decision making in relation to further mitigation.
- 16.4.12 Drainage from the works will be attenuated and discharged to watercourses or sewers under agreement at a controlled rate and where required, with approval of the Environment Agency and where appropriate, the drainage authority in accordance with Schedule 33 Part 5 to the Act.
- 16.4.13 In certain instances, the excavated retained cut is at a level below the natural ground water table. Mitigation, where necessary with continuous piles or grouting, will ensure that any changes to local groundwater levels and flow are minimised through the use of cut-offs and applying relatively short timescales for dewatering. A hydrogeological risk assessment will be produced for all construction earthworks activities to support the Schedule 33.5 applications, where required. In addition, the permanent design solution for cuttings and green tunnels shall be assessed in line with the Water Framework Directive and U&A49.
- 16.4.14 Additional information, such as how the Scheme complies with the Water Framework Directive, as well as further provisions for engagement with Stakeholders, monitoring and protection of local water resources are outlined in HS2 Information Paper E1: Control of Environmental Impacts and HS2 Information Paper E4: Water resources and flood risk.

Appendix 1: Glossary of Terms

AP	Additional Provision
CFA	Community Forum Area
CoCP	Code of Construction Practice
Contractor	The Contractor on a construction site is responsible for planning, managing and co-ordinating themselves and/or the works and all other Subcontractors working on their site, or any other Contractor directly employed by the Nominated Undertaker to undertake key construction works on site.
CoPA	Control of Pollution Act 1974
ES	Environmental Statement
HGVs	Heavy Goods vehicles
HS2	High Speed 2
HS2 Ltd	High Speed Two Limited - is a company wholly owned by the Department for Transport, established in 2009 to develop plans for a new high speed network and present a route connecting London - West Midlands.
IAQM	Institute of Air Quality Management
IP	Information Paper
LCAs	Landscape character areas
LEMP	Local Environmental Management Plan
LTMP	Local Traffic Management Plan
LWS	Local Wildlife Site
Nominated Undertaker	The body or bodies appointed to implement the powers of the HS2 Act 2017 to construct and maintain the railway.

PRoW	Public rights of way
RRVs	Road Rail Vehicles. A vehicle which can operate both on rail tracks and road, often used for railway maintenance.
RTMP	Route-wide Traffic Management Plan
SBI	Site of Biological Importance
Scheme	The Scheme to which this CoCP relates is the high-speed railway between London - West Midlands. This is a high speed railway between London - West Midlands with a connection via the West Coast Main Line at conventional speeds to the North West and Scotland and to the Channel Tunnel via HS1. It includes four high speed rail stations at London Euston, Old Oak Common (West London), Birmingham Airport (Birmingham Interchange) and Birmingham (Curzon Street).
Section 61	Section 61 of the Control of Pollution Act 1974 (which sets out procedures seeking and obtaining Local Authority consent to measures for the control of noise and vibration on construction sites).
SES	Supplementary Environmental Statement
SFRA	Strategic Flood Risk Assessment
SLI	Site of Local Importance
SMI	Site of Metropolitan Importance
SPZ	Source Protection Zone
SRP	Soil Resources Plan
SSMP	Site Specific Management Plan
SSSI	Site of Special Scientific Interest
TMP	Traffic Management Plan

Appendix 2: Non-exhaustive list of Community Groups in Buckinghamshire

Political / Councils	HS2 Community Groups
MP for Aylesbury	Wendover HS2
MP for Buckingham	Chiltern Ridges HS2 Action Group (CRAG)
Buckinghamshire Council	The Chiltern Society
Amersham Town Council	Resident Associations
Aylesbury Town Council	Buckinghamshire Community Boards
Berryfields Parish Council	Great Missenden Village Association
Barton Hartshorn Parish Council	Amersham & District Residents' Association
Calvert Green Parish Council	London Road Residents Association
Charndon Parish Council	Schools
Chetwode Parish Council	Chiltern Way Federation School
Coldharbour Parish Council	John Hampden School (Wendover Infant)
East Claydon Parish Council	Wendover Church of England (CE) Junior School
Ellesborough Parish Council	John Colet School (Wendover)
Fleet Marston Parish Council	Missenden Abbey Adult Education College
Great and Little Kimble cum Marsh Parish Council	Stoke Mandeville Combined School
Great Missenden Parish Council	The Gateway School (Great Missenden)
Little Missenden Parish Council	Little Missenden CE Infant School
Grendon Underwood Parish Council	The Misbourne (school)
Lea Parish Council	Great Missenden C of E Primary School
Preston Bissett Parish Council Parish Council	Sir Henry Floyd Grammar School (Aylesbury)
Quainton Parish Council	Mandeville School (Aylesbury)
Steeple Claydon Parish Council	Halton Combined Primary School
Stoke Mandeville Parish Council	Lee Common CofE School
Stone with Bishopston and Hartwell Parish Council	Booker Park School (Aylesbury)
Turweston Parish Council	Waddesdon Church of England School

Political / Councils	HS2 Community Groups
Twyford Parish Council	Quainton CofE Combined School
Waddesdon Parish Council	Twyford CofE Primary School
Wendover Parish Council	Steeple Claydon School
Westbury Parish Council	Beachborough School (Westbury , Private)
Places of Worship	The Buckingham School
St Mary's Church, Wendover	Aylesbury College
St Augustine's Church, Westbury	Bucks New University
Fleet Marston Church	Buckingham University
Church of St Mary and St Nicholas, Chetwode	Bucks Construction Academy (Quainton)
Twyford Church	U3A - University of the Third Age
St Mary's the Virgin, Stoke Mandeville	Roundhouse Primary School, Gawcott
St Mary's the Virgin, Hartwell	Businesses (incl groups & Org)
Aylesbury Mosque	Buckingham Business First
Holy Cross and St Mary Church (Quainton)	Chiltern Chamber of Commerce
Turweston Assumption of Blessed Virgin Mary	Aylesbury Chamber of Commerce
Other Sensitive Receptors	FCC Waste Services
Stoke Mandeville Hospital	Bucks Railways Centre
The Leonard Pulham Nursing Home	Bucks Goat Centre (range of businesses)
Lime Tree Court Care Home, Twyford	The Fremantle Trust
Cherry Tree House	Hartwell House Hotel & Restaurant
Roadbarn Farm Country Ways, Great Missenden	The Weatherhead Group Ltd
Fremantle Court	Tingewick Pottery at Chetwode Ltd
Chiltern Court Care Home	Antiques at Wendover
Sport and Receptions	Springfield Farming Ltd
Aylesbury Park Golf Club Limited	Chiltern Brewery
Great Moor Sailing Club	The Flower Gallery, Wendover
Wendover Cricket Club	The Berryfields Consortium
Wendover Air Rifle Club	Twyford Village Stores
Ballabeg Stables	Twyford Mill Equestrian Centre
The Ridgeway Trust	Skirmish Paintball, Bucks

Political / Councils	HS2 Community Groups
Get Wendover Cycling	Westbury Village Hall
Aylesbury Cycling Club	Turweston Flying School
Twyford Cricket Club	Nail's Scaffolders
Environmental, Conservation and Charities	Delivery Partners
Ramblers Association (Bucks, MK & West Middlesex)	Network Rail
Berks Bucks & Oxon Wildlife Trust	East West Rail
Ernest Cook Trust	Chiltern Railways
Waddeson Estate / The Rothschild Foundation	Thames Water
The Claydon Estate	National Grid
Chilterns AONB Review Group	UK Power Networks
The Chilterns Conservation Board	Southern Gas
Chiltern Society	British Telecom
Natural England	Virgin Media
Bucks Disability Services BuDS	Severn Trent Water
Carers Bucks	Anglian Water
The Wendover Society	Veolia Water
The Lionel Abel Trust	Canal and Rivers Trust
The Dunsmore Society	Highways England
The Rennie Grove Trust	SES
North Buckinghamshire Bat Group	Western Power Distribution
Bernwood Bat Group	
Bat Conservation Trust	
Bucks Archaeological Society	
Forestry Commission	
Woodlands Trust	
Hyde Heath Village Society	
The National Trust	
Aylesbury Dementia Friends	

(NB: This list is indicative and will be subject to change as more information becomes available).



EKFB

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partnership with

HS2

Bernwood Forest – Key Environmentally Sensitive Worksite Management Plan

Document Number: 1MC12-EKF-EV-PLN-CS08-000004

Contents

1	Introduction	1
1.1	Background	1
1.2	Bernwood Forest in the Context of HS2	1
1.3	Purpose of the Management Plan	5
1.4	Process of developing the management plan	6
1.5	Consultation	7
2	Overview of works within Bernwood Forest	7
2.1	General	8
2.2	Works outlined in the Environmental Statement and Enabling Works Undertaken to Date	8
2.3	Main Works	11
2.4	Overview of other ecological works within Bernwood Forest	15
2.5	Landscape and Visual	16
2.6	Summary	19
	Appendix A Landscape Planting Figures*	20
	List of tables	
	Table 1 Qualifying species for the SSSI designation of the woodlands	4

1 Introduction

Background

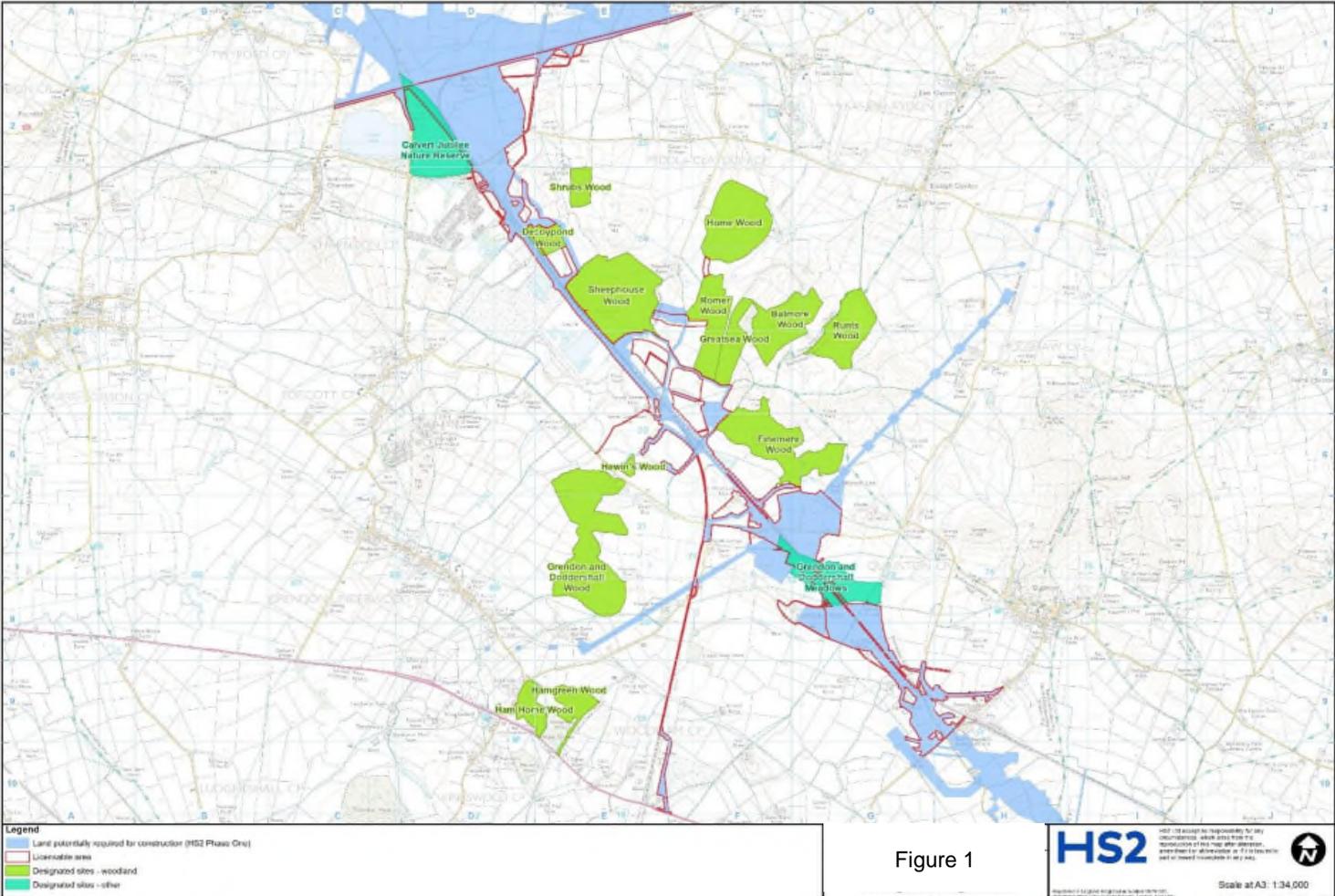
- 1.1.1 The HS2 Environmental Memorandum identifies key worksites along the Phase One route that are environmentally sensitive. These sites are considered sensitive in relation to the following environmental topics: nature conservation, terrestrial ecology, water resources, geomorphology, recreation and amenity, landscape, public open space, and agricultural land. The criteria for their selection are set out in the HS2 Environmental Memorandum.
- 1.1.2 As part of the Local Environmental Management Plans (LEMP) the Environmental Memorandum requires the preparation of site-specific management plans for 'Key Environmentally Sensitive Worksites' focusing on mitigation, compensation, and monitoring requirements and opportunities for enhancement. National Environmental Forum (NEF) members along with relevant planning authorities will be consulted on the LEMP for these key environmentally sensitive worksites in accordance with the HS2 Code of Construction Practice (CoCP).
- 1.1.3 The key environmentally sensitive worksites across Phase One of HS2, from south to north, are:
- Colne Valley;
 - Chilterns Area of Outstanding Natural Beauty (AONB);
 - Bernwood Forest;
 - Radstone and Helmdon Disused Railway; and
 - Berkswell Marsh
- 1.1.4 This management plan is for the Bernwood Forest.

Bernwood Forest in the Context of HS2

- 1.1.1 The Bernwood Forest falls within the boundaries of Buckinghamshire Council (BC), Calvert Green Parish Council and Charndon Parish Council. It is within the scope of the Phase One Environmental Statement (ES) Community Forum Area (CFA) Boundaries: CFA12 and CFA 13 within the Phase One High Speed Rail (London - West Midlands) Act 2017: <https://www.gov.uk/government/organisations/high-speed-two-limited>.

- 1.1.2 The Bernwood Forest is identified in the HS2 Environmental Memorandum as being a key environmentally sensitive worksite in relation to the following environmental topic areas: nature conservation, terrestrial ecology, and landscape. The key drivers in the identification of the area as an KESWMP however, is the presence of the rare Bechstein's bat, as well as landscape sensitivity.
- 1.1.3 The Bernwood Forest stretches from Edgcott Road, north west of Quainton, to the intersection with the Bicester to Bletchley railway line (East West Rail). The length of the HS2 route that passes through the forest is approximately 8km.
- 1.1.4 The woodland areas within Bernwood Forest (Figure 1), all located within 3km of HS2 Phase One centerline, total approximately 24.5ha and includes the following woodland areas:
- Decoypond Wood;
 - Sheephouse Wood;
 - Romer Wood;
 - Greatsea Wood;
 - Finemere Wood;
 - Hewins Wood;
 - Home Wood;
 - Balmore Wood;
 - Runts Wood; and
 - Grendon and Doddershall Wood.

Figure 1 Extent and component woodlands of the Bernwood Forest



- 1.1.5 All of the forested areas listed above consist of ancient woodlands, however, some of these are also classified as Sites of Special Scientific Interest (SSSI) (Finemere Wood, Sheephouse Wood, Grendon and Doddershall Woods).
- 1.1.6 Three of the SSSI (Finemere Wood, Grendon and Doddershall Woods, Sheephouse Wood) also provide important habitat for the nationally important Bechstein’s bat (*Myotis bechsteinii*), which is considered very rare and near threatened at a European level. Within the Bernwood Forest this bat species is at the northern most limit of its range and is of national value. Other key foraging areas for Bechstein’s bats are located at Balmore Wood, Runts Wood, Home Wood, Greatsea Wood and Romer Wood.
- 1.1.7 Other woodland bat species within the woodland SSSI include breeding roosts of Brandt’s (*Myotis brandtii*), natterer’s (*Myotis nattereri*), brown long-eared (*Plecotus auritus*), Daubenton’s (*Myotis daubentonii*) and whiskered (*Myotis mystacinus*) bats. Bat surveys undertaken in the Bernwood forest have identified flight lines and roosts of these bat species.
- 1.1.8 Each of the woodlands within Bernwood Forest also support a diverse mix of ecological features including native plant species, butterflies, wet woodland rides, ancient woodland, protected bird species, ancient semi-natural woodland, and bats. Table 1 details the woodland and the qualifying species for its designation.

Table 1 Qualifying species for the SSSI designation of the woodlands

Fauna Species	Woodland
Purple emperor butterfly (<i>Apatura iris</i>)	Sheephouse Wood and Grendon & Doddershall Woods
Black hairstreak butterfly (<i>Strymonidia pruni</i>)	Finemere Wood, Sheephouse Wood and Grendon & Doddershall Wood
Brown hairstreak butterfly (<i>Thecla betulae</i>)	Grendon and Doddershall Wood
Wood White butterfly (<i>Leptidea sinapis</i>)	Finemere Wood and Grendon & Doddershall Woods
5 species of fritillary butterfly: the silver washed (<i>Argynnis paphia</i>), high brown (<i>A. adippe</i>), marsh (<i>Euphydryas aurina</i>), pearl-bordered (<i>Boloria euphrosyne</i>) and small pearly- bordered (<i>B. selene</i>)	Grendon and Doddershall Wood
White admiral butterfly (<i>Limenitis Camilla</i>)	Sheephouse Wood and Finemere Wood
Purple hairstreak butterfly (<i>Thecla quercus</i>)	Sheephouse Wood
Slender ground-hopper (<i>Tetrix subulate</i>)	Sheephouse Wood
Breeding bird species including woodpecker species	Sheephouse Wood Finemere Wood
Woodcock (<i>Scolopax rusticola</i>)	Sheephouse Wood

Nightingale (<i>Luscinia megarhynchos</i>)	Finemere Wood, Sheephouse Wood and Grendon & Doddershall Wood
Flora Species	
Wood sedge (<i>Carex sylvatica</i>)	Sheephouse Wood
Bluebell (<i>Hyacinthoides non-scripta</i>)	Grendon & Doddershall Woods, Sheephouse Wood
Sneezewort (<i>Achillea ptarmica</i>) and fen bedstraw (<i>Galium uliginosum</i>)	
Wood millet (<i>Milium effusum</i>)	
Butterfly orchid (<i>Platanthera chlorantha</i>)	Grendon & Doddershall Woods

Purpose of the Management Plan

1.1.9 The purpose of this management plan is to;

- identify future works potentially affecting Bernwood Forest undertaken by Contractors and third parties in relation to HS2
- focus on mitigation, compensation and monitoring requirements and opportunities for enhancement in relation to specific environmental topics
- identify synergies between different stakeholder organisations in terms of opportunities

1.1.10 This KESWMP aims to satisfy the commitments set out within the HS2 Environmental Memorandum and to support the Buckinghamshire Council LEMP. The KESWMP is part of a suite of documents which identify environmental issues, controls, and opportunities in relation to the Bernwood Forest including:

- the Environmental Minimum Requirements which contain the Code of Construction Practice (CoCP) and the HS2 Environmental Memorandum.
- Schedule 17 controls under the High-Speed Rail (London – West Midlands) Act 2017 (the Act). KESWMP's will support Schedule 17 (S17) submissions and Town and Country Planning (TCP) Applications within Bernwood Forest and where appropriate, heritage applications under Schedules 18, 19 and 20.
- HS2 Design Policy (see Information Paper D1: Design Policy).
- Ecology Site Management Plans (ESMP). The site-specific ESMP provide the maintenance and management requirements for ecological mitigation sites.
- Landscape Maintenance, Management, Monitoring Plans (LMMMP); site-specific LMMMP provide the maintenance and management requirements for landscape planting sites.
- Protective provisions; the Act also contains provisions which give protection to bodies affected by the scheme, including Highway Authorities, Utility

Undertakers, the Environment Agency and the Canal and River Trust. Typically, these provisions enable HS2 Contractors to undertake works affecting their infrastructure but require approval of the details to be obtained.

- A legally binding consenting and licensing process. HS2 Limited has obtained Organisational Bat Licence WML-OR32 from Natural England to carry out works that impact bats within the Bernwood Forest and other consents will be arranged via the HS2 consenting system.
- Environmental Management Systems implemented by HS2 Contractors (as defined in the CoCP) including contract level and site level environmental management plans. Environmental Management Plans (EMP) will be produced by subcontractors per individual site and therefore boundaries and locations of site level EMP will differ accordingly. The EMP will subsequently be reviewed and accepted by the MWCC and HS2.

1.1.11 Greatmoor Sidings (see para 2.2.2) falls within the Bernwood Forest area so this KESWMP accounts for additional impacts and mitigation highlighted within the Transport & Works Act Order (TWAO) Environmental Statement (August 2016). Specific control measures set out in the Greatmoor Railway Sidings TWAO planning conditions and recommendations are included.

Process of developing the management plan

1.1.12 On 16 November 2016, contracts were awarded to three Enabling Works Contractors (EWC) working across Phase One of HS2. Fusion were the EWC for Area Central. Area Central covers an area of the Phase One route from east of Harvil Road in the London Borough of Hillingdon to Southam in Warwickshire.

1.1.13 On 17 July 2017 contracts for Design and Construction were awarded for HS2's Main Works Civils Contractors (MWCC). The MWCC covering the Bernwood Area is EKFB which is a joint venture between Eiffage, Kier, Ferrovial and BAM. Notice to proceed into Stage 2 (the construction stage) was issued in April 2020. The MWCC have updated this document as part of the transition of responsibility for the site and works from the EWC to the MWCC.

1.1.14 HS2 Contractors are working collaboratively, along with relevant third parties, such as utilities companies, in relation to works within Bernwood Forest.

Consultation

- 1.1.15 The MWCC have updated this KESWMP in line with design development, progress on site and the Main Works construction programme. The plan is a 'live document' and will be reviewed every 6 months and updated accordingly by the EKFB Calvert Environment Manager in line with revision of the Buckinghamshire Council LEMP.
- 1.1.16 National Environment Forum (NEF) members and the planning authority, Buckinghamshire Council, will be consulted on the KESWMP following requirements within the HS2 Environmental Memorandum. Copies of the updated plan will be made available for consultees electronically. Comments from the consultees will be collated for consideration of further updates and amendments.
- 1.1.17 The MWCC and sub-contractors are in consultation with Natural England, Woodland Trust, Bernwood ERG sub-group, Environment Agency, BC, FCC Ltd, Claydon Estate, National Trust, East West Rail Alliance and Network Rail - communicating and consulting as appropriate on ecological mitigation and works in the Bernwood Forest area.
- 1.1.18 Monthly meetings led by the Bernwood Bat Licence Named Ecologist, (or delegate) are held with Natural England to discuss progress in managing the requirements of the Bernwood Bat Licence, these meetings include discussion of compliance, monitoring, works progress and detailed design changes.
- 1.1.19 The Bernwood Ecology sub-group (part of the HS2 Ecology Review Group) meets annually to discuss the outcomes of the monitoring findings and progress of mitigation and compensation within the Bernwood Area.
- 1.1.20 Natural England are proposing to renotify the existing SSSI woodlands and include new woodlands, hedgerows and foraging habitat for Bechstein and other bats which aren't currently notified into a larger single SSSI. The implications of this widened designation are any works required within the new area of designation, including management, will need to be undertaken via the Natural England SSSI assent process. Works adjacent to SSSI sites will need careful management to ensure no direct / indirect impacts are caused which could impact the Favourable Conservation Status (FCS) of the species. This issue, along with the implications for the project are discussed at regular meetings with Natural England.

2 Overview of works within Bernwood Forest

General

- 2.1.1 Fusion undertook a range of survey and investigation works within the vicinity of the Chiltern AONB which commenced in early 2017 and was completed in 2022, Works included:
- 2.1.2 HS2 has been carrying out ecological surveys within the Bernwood Forest since 2012. As part of the Bernwood Bat Licence (WML-OR32), a detailed Monitoring Strategy for bats has been agreed with Natural England. The EWC (Fusion) have undertaken the baseline surveys prior to MWCC commencing. As MWCC, EKFB have continued with the programme of monitoring from 2021, which will inform the management plans and any remediation works required.
- 2.1.3 In addition to the mitigation above, required as part of the Bernwood bat licence, landscape planting and enhancements will be delivered by the MWCC. This will include hedgerow planting, woodland planting and pond creation. The current proposed designs are shown in the figures at the end of the document.

Works outlined in the Environmental Statement and Enabling Works Undertaken to Date

- 2.1.4 Without mitigation or compensation, the construction of the HS2 railway would have significant permanent adverse effects on a variety of ecological receptors up to national level. Effects would include the destruction / fragmentation of a variety of habitat types and direct / indirect effects on fauna species including bats, great crested newts and butterflies. Below outlines the mitigation and compensation measures proposed from the HS2 Phase One ES and the works already carried out by the Enabling Works Contractor
- Within the Bernwood area, elements of a number of ancient woodlands soils and vegetation have been translocated. The loss of ancient woodland has the potential to impact bat populations and has been compensated through a range of measures. Details can be found in High Speed Two, Phase One: London-West Midlands Ancient Woodland Strategy August 2017 and the Ancient Woodland Summary Reports <https://www.gov.uk/government/publications/hs2-ancient-woodland-reports>. To secure the long-term viability of the receptor sites, HS2 will implement 50-year management plans - **This has all been completed under the EWC contract**
 - To further reduce the fragmentation of the mosaic of ancient woodland a program of new planting has been designed that will not only help compensate for the loss of trees associated with the HS2 route but also provide connectivity across the area and help guide bats to green bridges to be constructed by the

MWCC - Planting has been undertaken by the EWC, with the exception of Decoypond Wood D, on green bridges and landscape integration planting along the railway (see Figures 2 – 5 at the end of the document). The planting sites will be a key factor in ensuring that the planned green bridges will become part of the surrounding landscape and are integrated into the mosaic of existing woodlands and hedgerows. Green bridges have been located so existing bat flight lines across HS2 are maintained. Planting of green bridges and areas linking to underpasses can only be undertaken by the MWCC after the completion of the structures.

- In total, 29 km of new hedges will have been planted and the species composition of the new hedgerow has been tailored to match that of those in the surrounding area.
- Within the area of the Greatmoor sidings, the EWC have undertaken planting to encourage bat species away from HS2 and towards ancient woodland at Finemere Wood and Greatsea Wood. An ancient woodland soils receptor site has been implemented to compensate for the loss of ancient woodland at Decoypond Wood. **This receptor site, Decoypond Wood B, was planted in the 2020-2021 planting season** and will be maintained by the MWCC.
- A network of planted areas on either side of the railway will guide bats to crossing points and link existing woodlands. This includes linear planting to link Sheephouse Wood, Decoypond Wood as well as providing links between Calvert Jubilee Nature Reserve Local Wildlife Site (LWS) and ancient woodlands to the north-east of the proposed railway. Vegetation Management Zones will be implemented alongside the operational railway to manage bat flight, these include Bernwood South (A vegetation management zone along the eastern side of the Aylesbury Link railway line from the River Ray to the Footpath CAG/2 underbridge south of Sheephouse Wood, and along the western side of the route from just south of Bridleway GUN/28 accommodation green overbridge to beyond the Waddesdon to Quanton area boundary) and Bernwood North (A vegetation management zone along sections of the eastern side of the Aylesbury Link railway line and on the western side of HS2). For Bechstein's bats and other species, the proposed mitigation described above will mitigate the fragmentation of hedges and tree lines that currently link woodland either side of HS2 north of the Edgecott Road to School Hill Road and thus enable bats to reach habitat required for breeding and foraging.
- The loss of colonies of black hairstreak butterfly will be mitigated by planting blackthorn on green bridges and in the habitat creation areas described above in relation to mitigation of habitat fragmentation for bats.
- Compensatory habitat to address impacts on great crested newt (GCN AMP 30 Woodlands Farm) metapopulation has been mitigated by **4.4ha of linear planting linking Decoypond Wood and Sheephouse Wood**.

- Habitat loss from Grendon and Doddershall Meadows LWS will be mitigated by restoration of damp, neutral grassland on areas affected during construction and creation of drier grassland on the landscape earthworks, measures in design by the MWCC. Approximately 30ha of additional species-rich grassland is being created on adjacent fields. These fields have similar topography and are likely to have similar soils to the LWS. Therefore, they are deemed to be suitable for replicating the damp species-rich neutral grassland for which the site is designated. Due to the extent of habitat creation and measures such as the translocation of grassland at the Grendon and Doddershall Meadows LWS, which ensures there will be no significant effect on the conservation status of lowland meadow.

2.1.5 The HS2 Phase One ES included proposals to relocate a railway siding that serves Calvert landfill site and Greatmoor Energy from Waste (EfW) facility. The sidings relocation was originally to be at the east side of the Aylesbury Link railway line and the proposed HS2 alignment, north of Decoypond Wood. FCC Waste Services UK Ltd (operator of Calvert landfill site and EfW), Buckinghamshire Council (BC), Calvert Green Parish Council, Charndon Parish Council and local residents petitioned against HS2 Ltd during the House of Commons Select Committee on the original sidings location. Following the recommendations from the Select Committee, HS2 Ltd has applied for a Transport and Works Act Order (TWAO) to relocate the sidings to the south of Sheephouse Wood. From hereafter the new sidings location is referred to as Greatmoor Sidings.

2.1.6 Enabling Works were completed in 2022, with areas handed over to the MWCC. As of Summer 2022, much of the EW scope had been delivered, this has included:

- tree and hedgerow clearance in the Bernwood licenced area
- building demolitions where there was the potential for bat roosts
- habitat manipulation and fencing as part of reptile and amphibian mitigation
- woodland compensation planting and translocation of ancient woodland soils
- planting of grassland habitat mitigation areas at Doddershall and Woodlands Farm
- installation of temporary bat flight lines, consisting of temporary tree planters and fencing
- hedgerow translocation including an area adjacent to Finemere Wood SSSI

2.1.7 Details of advanced mitigation for bat flight lines completed to date:

- School Hill (Decoy Pond Wood D) temporary bat flight line – Double row of Heras fencing secured by water barriers with camouflage netting

- Hewins Wood temporary flightline – Heras fencing / camouflage netting to connect Bridleway to Megaditch approx. 100m
- Megaditch – South from GUN/28 green overbridge to CAG/2 underpass bat flight line – Willow fencing & tree planters to supplement existing patchy vegetation on western side as the vegetation on eastern side has been removed
- QUA/36 overbridge – tree planters to supplement and bolster planting by EWC to the west, connecting to Greatmoor Road, 2 rows of tree planters will extend across either side of the new green bridge (around the construction zone) which will connect to willow fencing, which in turn connects onto the EWC woodland planting adjacent to Finemere Wood, to be supplemented by Heras fencing with camouflage netting
- Adams Accommodation underbridge. Container tree planting across the trace at two locations, either side of River Ray, supplementing the existing hedgerow planting along River Ray outside the construction zone

2.1.8 National Grid have modified an overhead line adjacent to the Bernwood Forest area at approximate chainage 74,000. These works did not directly affect any of the wooded areas.

Main Works

2.1.9 Main works began in 2020 and will continue for approximately seven years with some works to be completed in 2027. Planting and landscaping works are expected to be completed towards the back end of the program (by 2027). Main works consist of vegetation clearance, site preparation works, earthworks and the construction of various structures; the following assets are planned near and within the Bernwood Forest KESWMP area:

- East West Rail Overbridge alignment
- Charndon Lodge Underbridge
- Shepherds Furze Culvert
- Calvert Cutting North
- OXD Embankment
- East West Rail Culvert
- IMD West Culvert
- IMD East OXD embankment amendments for signalling and track
- IMD East Culvert
- Perry Hill Overbridge
- West Street Overbridge
- Portway Culvert
- IMD West and Twyford
- Addison Road Overbridge
- Greatmoor Road
- Grendon Underwood Embankment
- GUN/28 Overbridge

- Woodland Cutting
- Station Road Network
Rail Overbridge and
Highways
- Edgcott Road Overbridge
- Footbridge SCL/8
- FCC Greatmoor Sidings
- Finemere Wood Culvert
- Finemere Wood Retaining
Wall
- Adams Accommodation
Underbridge
- River Ray Culvert
- QUA/36 Green
Overbridge
- Greatmoor No.2 Culvert
- Sheephouse Wood North
Culvert
- Sheephouse Wood South
Culvert
- Greatmoor No.3 Culvert
- Woodlands Culvert
- Greatmoor No.4 Culvert
- Doddershall No.6 Culvert
- Doddershall No.7 Culvert
- Doddershall
Embankment
- Quainton Cutting
- Doddershall No.1 Culvert
- Calvert Cutting South
- Calvert Green Overbridge
- Calvert Retaining Wall
- School Hill Culvert
- QUA/26 Overbridge
- Doddershall No.4 Culvert
- Woods Drop Inlet Culvert
- CAG/2 Underbridge
- Muxwell Brook Culvert
- Station Road Overbridge
- School Hill Overbridge
- QUA/28A Overbridge
- SCL/13 Green Overbridge
- Sheephouse Wood Bat
Mitigation Structure

2.1.10 Works will be managed according to the HS2 Code of Construction Practice, EKFB Construction Environmental Management Plans, requirements of the Bernwood Organisational Bat Licence and best practice.

2.1.11 Measures to minimise the impact on bats will include monitoring and management of light, temperature and noise & vibration levels, including ultrasound frequencies, phased management of vegetation clearance, including temporary bat flightline demarcation and avoidance of nighttime working.

2.1.12 There are five green overbridges proposed in the Bernwood Forest area two of these bridges fall outside the HS2 Act Limits instead falling within TWAO limits but HS2 are constructing those assets. All five of the bridges are Type 1 due to the presence of

Bechstein's bat. The green over bridges are proposed to help maintain the 'Favourable Conservation Status' (FCS) of this species as well as other bat species of conservation value within Bernwood Forest (see section 1.2 above for further details on these species). The green over bridges will help maintain habitat connectivity between woodland areas, while also helping avoid direct collision between bats and trains. Underbridges, such as Adams Accommodation underbridge are also included in mitigation design, as the bridge allows bats to pass under the railway, whilst commuting along the route of the River Ray. Type 1 green bridges use the following design features to avoid significant impacts to the FCS of Bechstein's bat

- As a minimum, a vegetated width of 30m shall be required for type 1 green bridges. This shall comprise a 12m double hedgerow and grassland core vegetated zone, with an additional 9m of vegetated surface on either side.
- The core vegetated zone of type 1 green bridges shall be maintained as a wide double hedgerow (with each hedgerow individually measuring at least 3m wide, plus a gap of at least 3m between the two hedgerows). On the outside of both hedgerows, a minimum provision of 1.5m of meadow grassland shall be made as a further habitat buffer for the hedgerows. The base of the hedgerows and gap area in between shall be sown with an appropriate grassland mix, locally sourced where possible.
- This is with the exception of School Hill Overbridge, where there were changes made in Detailed Design following consultation with Buckinghamshire council on the Schedule 17 submission. In order to reduce adverse visual and landscape impact, the 9m vegetated surface on either side was reduced to 7.75m on the south side and 7.5m on the north side.

2.1.13 The key mitigation features for bats and mitigation sites providing habitats for other protected and notable species within this area are:

- Adams Accommodation Underbridge and the River Ray culvert at approximate chainage 74+500
- Bridleway QUA/36 Accommodation Green Overbridge at approximate 75+400
- Bridleway GUN/28 Accommodation Green Overbridge at 75+900
- Sheephouse Wood Bat Mitigation Structure (SWBMS), chainage 76+668 – 77+558
- Footpath CAG/2 Underbridge at 76+700
- Greatmoor No. 4 Culvert at 76+720
- Footpath SCL/13 Green Overbridge at 77+600
- Calvert Green Overbridge at 78+300

- School Hill Green Overbridge at 79+080
- Vegetation management zones within 20m of HS2 in certain areas, where tall vegetation is to be managed to deter bats from flying near trains
- Quainton, Woodlands Farm and Doddershall Ecological Mitigation Sites
- Bat flight line mitigation planting - covered under the relevant Landscape Management and Maintenance Plan (LMMP)

2.1.14 Ecology Site Management Plans (ESMP) and Landscape Maintenance, Management & Monitoring Plans (LMMMP) have been developed by the EWC and discussed with Natural England, outlining the specific maintenance, management and monitoring requirements for the constructed habitat creation and mitigation planting sites. The monitoring and maintenance of which will be completed by the MWCC. The ESMPs/LMMMPs include:

- Ecology Site Management Plan for Quainton
- Ecology Site Management Plan for Woodlands Farm
- Ecology Site Management Plan for Doddershall
- Bernwood Area planting (see figures in Appendix A) Landscape Maintenance Management & Monitoring Plan

2.1.15 The Bernwood bat licence (WML-OR32) held by HS2 Ltd was first issued on the 12th April 2019¹. The licensable works are detailed in Phases of work which corresponds with works undertaken and programmed for each calendar year. The licence is modified on an annual basis by reviewing construction and mitigation works undertaken in the previous year and works planned by the construction delivery team. The purpose of phasing the licence is to ensure that mitigation and compensation measures are in place prior to the commencement of each phase to ensure the impacts of fragmentation of flightlines and foraging habitats in conjunction with construction activities are appropriately mitigated throughout the construction phase. Greatmoor Sidings and associated civils and drainage works are also within the Bernwood Forest area and will be constructed along with other civils assets.

2.1.16 The MWCC completed Phase 3 of the licensable works in 2021 and is currently working on completing the Phase 4 licensable works, with the Phase 5 masterplan submitted to NE 15th Feb 2023.

2.1.17 Design is ongoing and many of the structures relevant to this document are still at Scheme design stage, including Sheepphouse Wood Bat Mitigation Structure (SWBMS). As structures and earthworks approach construction, further design and

¹ <http://publications.naturalengland.org.uk/publication/6099207338590208>

construction information will be provided in future updates of this KESWMP . However, the environmental and ecological constraints of this area are well known and opportunities to improve and enhance Bernwood Forest will be identified and considered throughout the design processes.

Overview of other ecological works within Bernwood Forest

- 2.1.18 Mitigation measures to address the potential killing, injury and disturbance of badgers include sett closures where no alternative is available, the provision of badger proof fencing and replacement setts where necessary. New planting within the ecological mitigation areas will benefit badgers present in those areas by improving foraging habitat and providing new opportunities for sett creation. Monitoring of badger activity has been passed from the EWC to the MWCC.
- 2.1.19 HS2 have obtained route wide licences for badger (Licence ref WML-OR24) and great crested newt (Licence ref WML-OR25) which outline a series of conditions/ activities that can be carried out, which will minimise impacts on these species provided the correct procedures are followed. Great Crested Newt (GCN) Amphibian Metapopulation (AMP) areas are managed, generally fenced, areas where GCN are excluded from, or directed to, managed habitat.
- 2.1.20 Opportunities for enhancement will be identified during detailed design and through discussion with consultees including Natural England and BC, such as those relating to SSSI Assent for works affecting Sheeppouse Wood. This will form part of our Green Corridor initiative and ideas for enhancement will be recorded in our Green Corridor register and presented to HS2 with cost and benefit analysis of the proposals on a quarterly basis from Summer 2023.

Landscape and Visual

- 2.1.21 The landscape planting proposals for the Bernwood Forest area are being developed with regard to the requirements of the Bernwood Bat Licence and some of this planting has already been installed by the ECW as described above.
- 2.1.22 The design of the MWCC landscape planting for the Bernwood Forest area is presently under discussion with BC as part of the HS2 Phase One Schedule 17 (S17) application process. The MWCC planting has been split into three separate S17 applications, which are P11 Quainton to Grendon Underwood, P12 Sheephouse Wood Bat Mitigation Structure and P13a Calvert South and are at various stages of submission. The planting design submitted as part of the S17 application is for information only. The formal submission for getting consent from the local planning authority for the planting will be Bringing into Use, post MW construction.
- 2.1.23 The planting associated with the Greatmoor Sidings TWAO will form a separate application. Included in this application will be an Ecology and Landscape Environmental Masterplan being prepared by the MWCC (Document reference 1MC06-CEK-TP-REP-CS05-000003). This document is in preparation. There are also three other ELMP documents to cover the TWAO area.
- 2.1.24 The key objective of the new woodland and hedgerow planting in this area is for habitat connectivity and in particular the creation of bat flight lines between the various blocks of woodland and directing the bats to the proposed green bridges over the HS2 / Network Rail corridor within this area. This planting will also act to strengthen the overall wooded appearance of the landscape and create a greater sense of enclosure and help reinforce the Bernwood Forest sense of place.
- 2.1.25 There is a dense network of Public Rights of Way (PRoW) which traverse the landscape, particularly in the farmland landscape to the south of Sheephouse Wood in the environs of the Greatmoor Energy from Waste Facility (EfWF). At many locations the new hedgerows and woodland belts will act as a visual buffer to the new railway corridor, and in particular the Greatmoor Sidings and the south portal of the Sheephouse Wood Mitigation Structure, which will be notable intrusive features within the Kingswood Wooded Farmland LCA. The planting will also help to break up the scale and mass of the existing Greatmoor Energy from Waste facility, which dominates this local landscape.
- 2.1.26 A key piece of infrastructure to aid bats safely across HS2 are the five green bridges at Bridleway QUA/36 to the north-west of Finmere Wood, Bridleway GUN/28 to the south of the Greatmoor EfWF, Footpath SCL/13 at the north-west corner of Sheephouse Wood, Calvert at the north-east corner of Decoypond Wood and School

Hill at the south-east corner of the Calvert Jubilee Nature Reserve. All these structures are based on the HS2 Type 1 green bridge and their design and overall appearance as new features in the landscape are presently being developed in collaboration with the local planning authority and bat specialists. The objectives of the architectural and landscape design for these structures are to create well integrated infrastructure which complement their wooded setting as well as meet the requirements of the Bernwood bat licence.

- 2.1.27 The two northerly structures at Calvert and School Hill have been affected by the Calvert area track uplift. The landscape and visual implications of the uplift have been considered and reported in the Schedule 17 Calvert South written statement. Additional mitigation has been proposed which includes a new landscape earthwork and associated woodland within the LLAU in the triangular area of land defined by HS2, East West Rail and spur to the north-east of the Calvert Jubilee Nature Reserve. There is also an additional tree belt proposed outside the LLAU on the adjacent Plot 52a that will be implemented and managed under an agreement between HS2 and the landowner. It is considered that the landscape and visual effects of the uplift comply with the effects reported in the Environmental Statement.
- 2.1.28 The landscape planting proposals associated with the Greatmoor Sidings TWAO are intertwined with the S17 landscape design and as such are not differentiated between in the S17 pre application discussions with BC. A key element of the discussions is to maximize integration and screening of the sidings and the adjacent HS2 infrastructure in views from the adjacent PRoW. To achieve this a key development of the planting proposals in this area is the creation of a new tree belt to the east of the sidings. This provides a new northerly connection from the east of GUN/28 green bridge to Sheephouse Wood. This new element has been discussed and agreed with Natural England.
- 2.1.29 Other additional planting in this area which has been discussed with BC for landscape and visual reasons as part of the P13a Calvert South application. This includes a new belt of trees on the east side of the rail corridor running parallel with the tracks, which will result in a continuous belt of trees running between Sheephouse Wood and Decoypond Wood creating a similar scenario to the present-day views from SCL/13 to the east of the railway corridor. Similarly, on the west side of the railway corridor between SCL/13 and Calvert green bridges a strip of native species shrub planting is proposed immediately behind the 1.8m high retaining wall parapet. This planting will be in the form of a managed, thickened hedge. It has been introduced for landscape and visual reasons to help integrate and screen the concrete parapet in views from the adjacent parallel cycle path. This planting will be discussed and agreed with Natural England.

- 2.1.30 Bat hop overs have also been discussed with Natural England, particularly regarding the access road to the Greatmoor EfWF and FCC landfill in the vicinity of the GUN/28 bridge and mega ditch. The latter being an existing engineered drainage ditch which runs immediately to the east and then south of the Greatmoor EfWF. At this location a 4m high vehicle light barrier is required between two parallel running roads which will require bats to pass over. In order to aid bats over the barrier the designs will specify that large semi mature trees are introduced as part of the planting proposals and is presently part of the ongoing discussion with Natural England.
- 2.1.31 However other areas of potential new planting discussed with BC as part of the P11 Quainton to Grendon Underwood application (which includes the Greatmoor Sidings TWAO), have not been accepted by Natural England. This is on the grounds that this new planting will be in locations which will interfere with the bat flight lines linking with green bridges, and in particular, QUA/36. This includes linear planting running parallel to the HS2 / Network Rail corridor on the east side between QUA/36 and GUN/28, even within areas outside the prescribed 20m vegetation management zone. It is noted that on the Reference Design drawings the full extent of the LLAU at this location is identified as a vegetation management zone.
- 2.1.32 The vegetation management zones will comprise a sterile grassland sward which will require regular grass cuts throughout the growing season to discourage the area establishing as bat foraging habitat. As such these areas will offer nothing by way of visual amenity and visual screening of the HS2 infrastructure, particularly in views from the footpath network on the approaches to GUN28 and QUA/36 from the east.
- 2.1.33 The Sheephouse Wood Bat Mitigation Structure (SWBMS) which forms a separate S17 application (P12 Sheephouse Wood) is at scheme design. The structure is a large-scale intervention in the landscape, albeit one in the context of a working landfill. Therefore, its design and setting and how it will be seen by users of the future cycleway which will run parallel and close-by on its west side, and by users of the future PRoW within the restored FCC landfill landscape, also to the west are important considerations for BC. In preparing the landscape design for the strip of land on the west side of the structure there has been an agreed relaxation of the vegetation management zone corridor which will allow the planting to be in closer proximity to the structure than previously envisaged. The design and appearance of the Bebo arch structure and the associated landscape design is being progressed in discussion with both Natural England and BC.
- 2.1.34 The early works planting will take time to establish and therefore it is unlikely in the first five years of growth it will provide effective visual screening from the adjacent PRoW to the construction activities which will be taking place.

- 2.1.35 The MW contract detail design landscape planting plans are being developed in parallel with the S17 process. The landscape planting plans will be submitted for consent by the local planning authority post construction at the Bringing into Use stage. The planting plans will be accompanied by a specification and Landscape, Maintenance, Management and Monitoring Plan.
- 2.1.36 There will need to be continued discussion during the construction phase with consultees including Natural England and BC to discuss any design development or design changes which may affect this document and the Bringing into Use application.
- 2.1.37 Discussion will be carried out with Natural England to agree the additional planting which is proposed within the vegetation management zones for the Schedule 17 P13a Calvert South application.

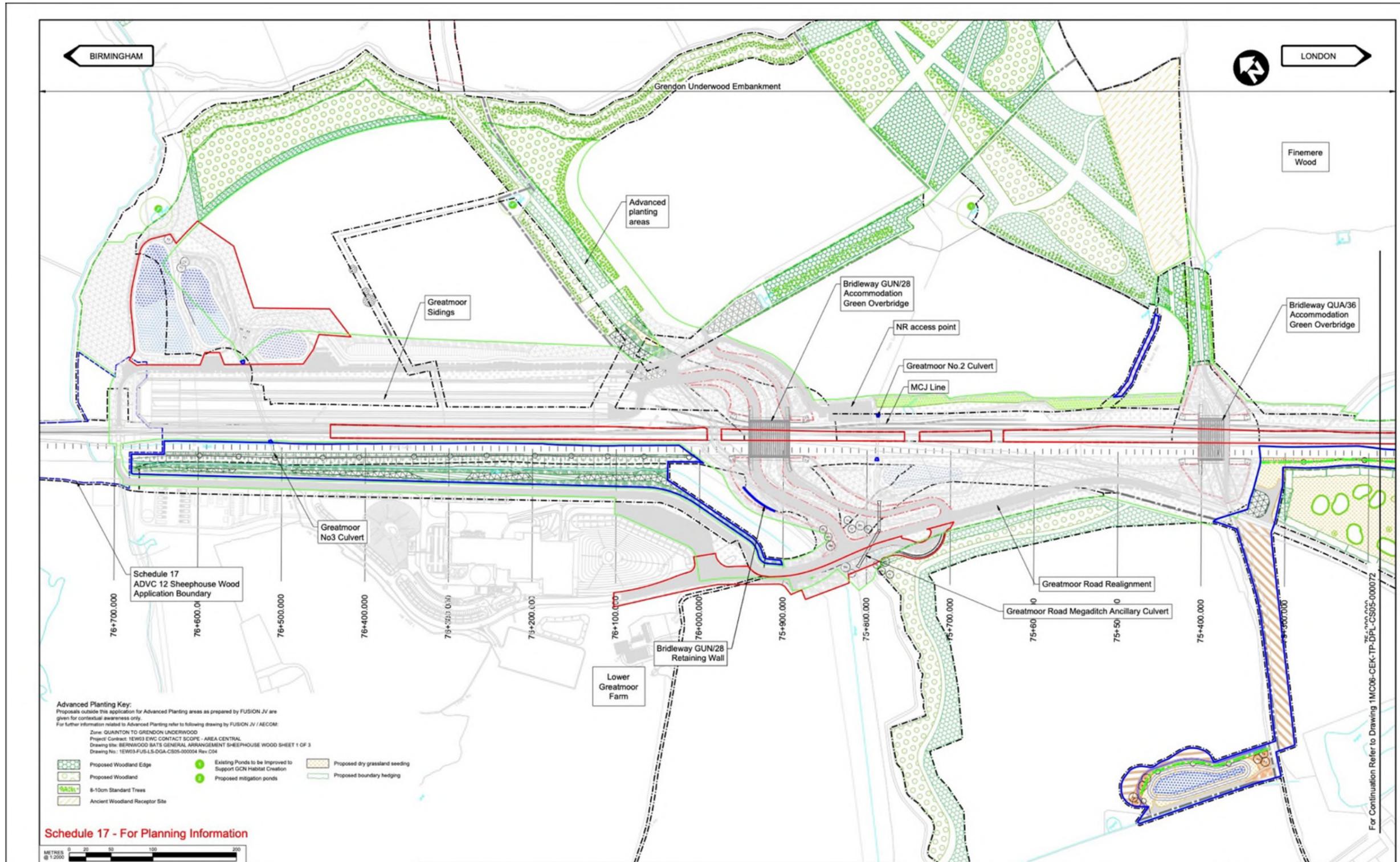
Summary

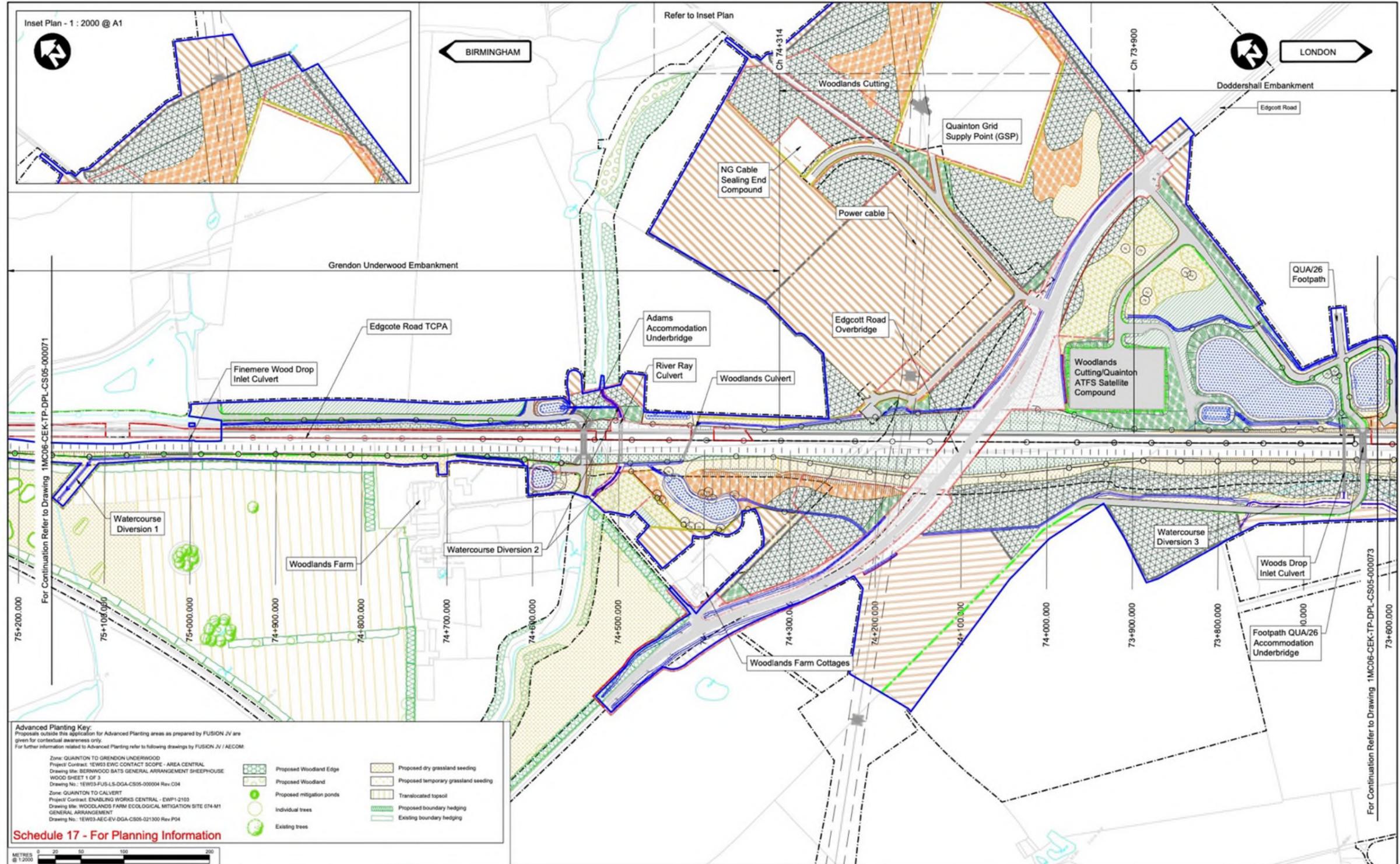
- 2.1.38 This management plan addresses the impacts and mitigation associated with HS2 works on the Bernwood Forest in relation to its value and designation as bat habitat as well as other characteristics such as flora and fauna. The nature conservation, terrestrial ecology and landscape impacts have been assessed and opportunities for enhancement within Bernwood Forest will continue to be identified throughout design stages and as the works programme progresses.
- 2.1.39 The KESWMP will be reviewed on a six-monthly basis by HS2 and its Contractors.

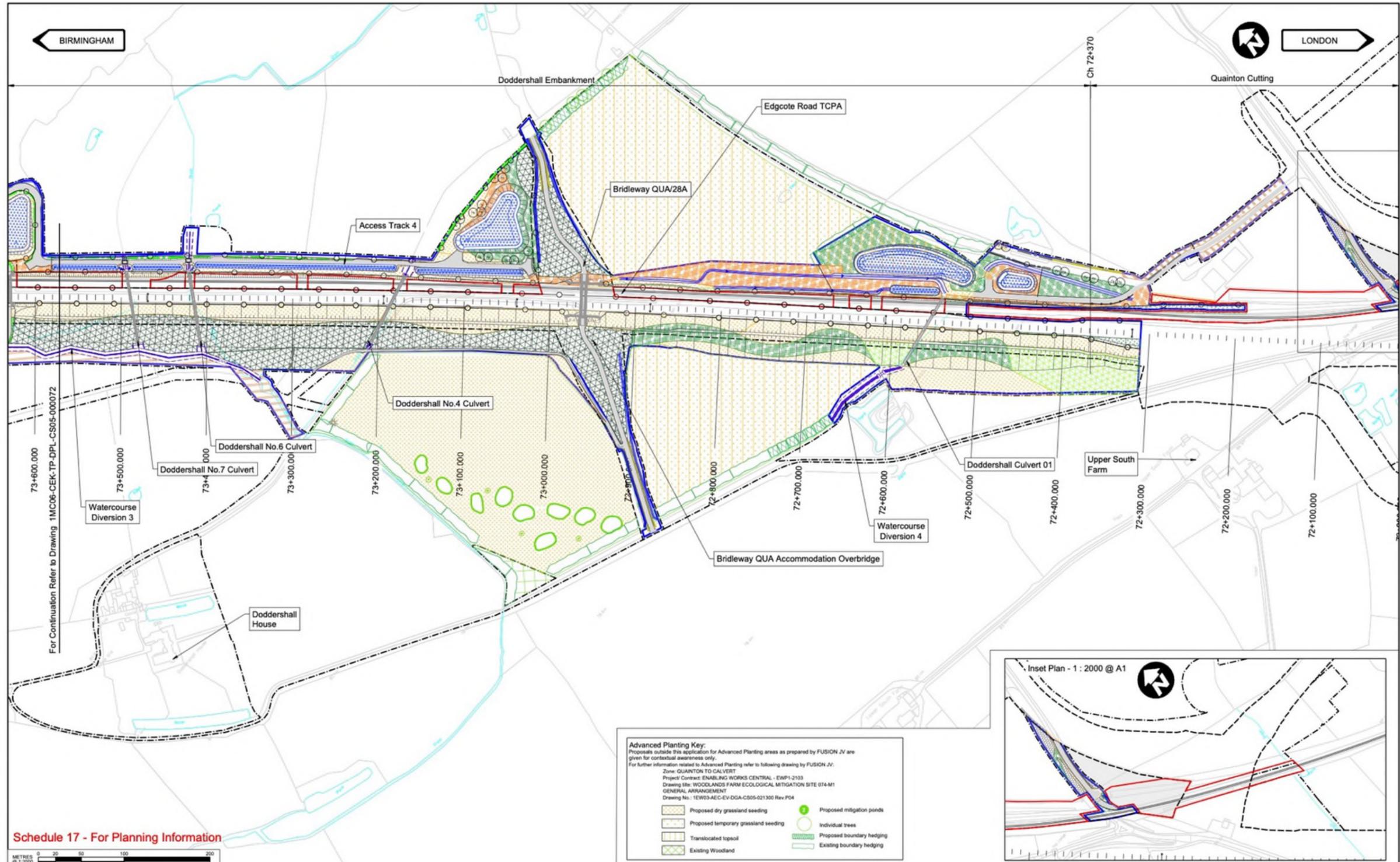
Appendix A Landscape Planting Figures*

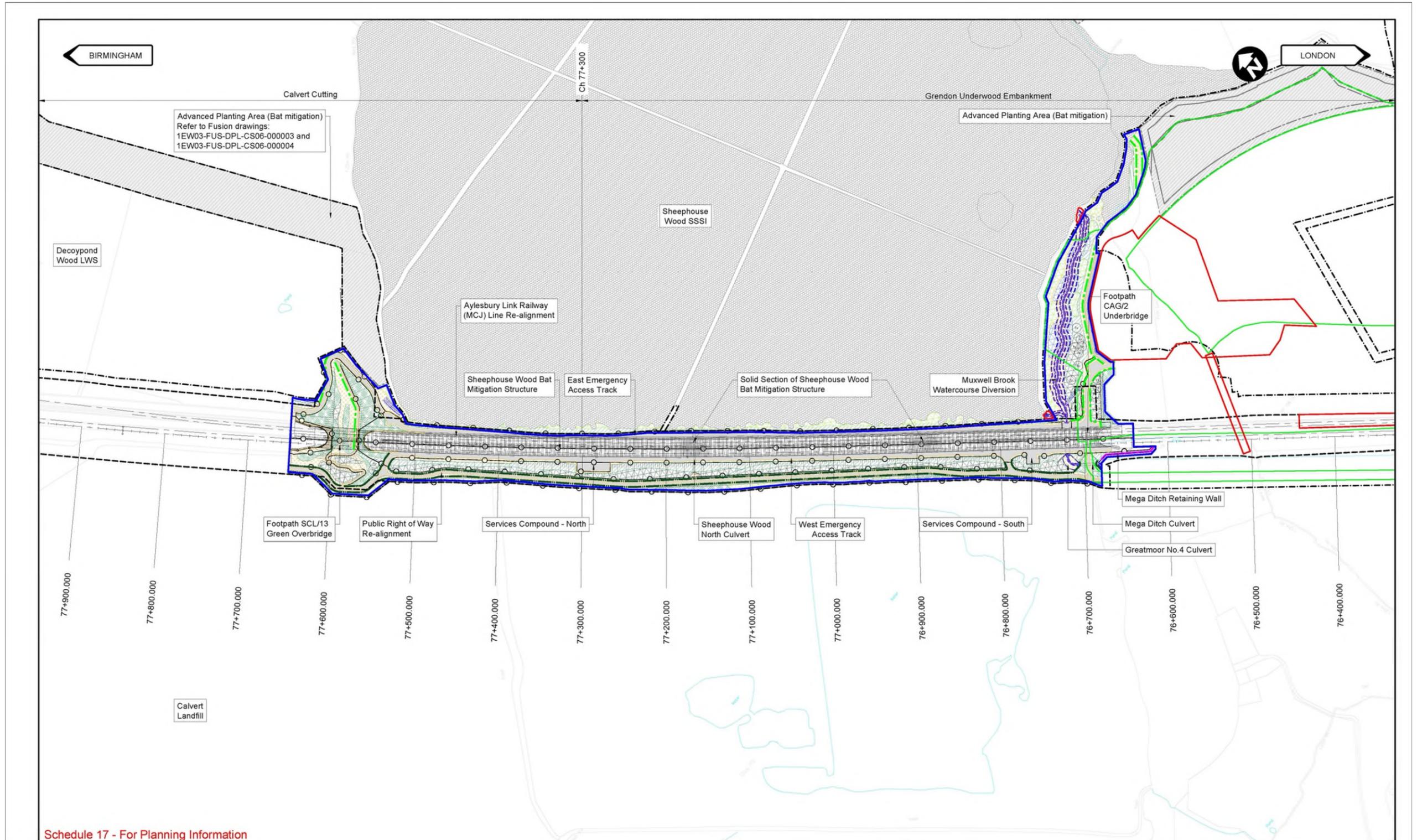
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*The landscape plans are indicative and are subject to change.









Schedule 17 - For Planning Information



EKFB

Working in
partnership with

HS2

Chilterns Area of Outstanding Natural Beauty (AONB) – Key Environmentally Sensitive Worksite Management Plan

P1C-HS2-EV-PLN-C000-000011

Security classification: OFFICIAL

Contents

1	Introduction	2
1.1	Background	2
1.2	The Chilterns AONB in the Context of HS2	2
1.3	Purpose of the Management Plan	5
1.4	Process of developing the management plan	6
1.5	Consultation	8
2	Overview of upcoming works within the Chilterns AONB	9
2.1	General	9
2.2	Enabling works	9
2.3	Ground Investigation	12
2.4	Third Party (Utilities)	12
3	Topic areas	13
3.1	Nature Conversation, Terrestrial Ecology	13
3.2	Water Resources and Flood Risk	15
3.3	Recreation and Amenity Impacts and Public Open Space	16
3.4	Landscape and Visual	23
3.5	Agriculture	28
4	Summary	29
List of tables		
	Table 1: Impacts to Public Rights of Way by MWCC	17
List of figures		
	Figure 1: Site Location	4
	Figure 2: Proposed design (Wendover Link)	23

1 Introduction

1.1 Background

1.1.1 The HS2 Environmental Memorandum identifies key worksites along the Phase One route that are environmentally sensitive. These sites are considered particularly environmentally sensitive in relation to the following environmental topics: nature conservation, terrestrial ecology, water resources, geomorphology, recreation and amenity, landscape, public open space, and agricultural land. The criteria for their selection is set out in the HS2 Environmental Memorandum.

1.1.2 The key environmentally sensitive worksites across Phase One of HS2, from south to north, are:

- Colne Valley;
- Chilterns Area of Outstanding Natural Beauty (AONB);
- Bernwood Forest;
- Radstone and Helmdon Disused Railway; and,
- Berkswell Marsh.

1.1.3 The management plans for these key environmentally sensitive worksites (KESWMPs) have been prepared and published prior to the commencement of works which may affect them. The preparation and publication of these plans is, therefore, determined by the Phase One construction programme. These plans will be reviewed and updated as HS2 Contractors develop their designs and programme.

1.1.4 This management plan is for the Chilterns AONB.

1.2 The Chilterns AONB in the Context of HS2

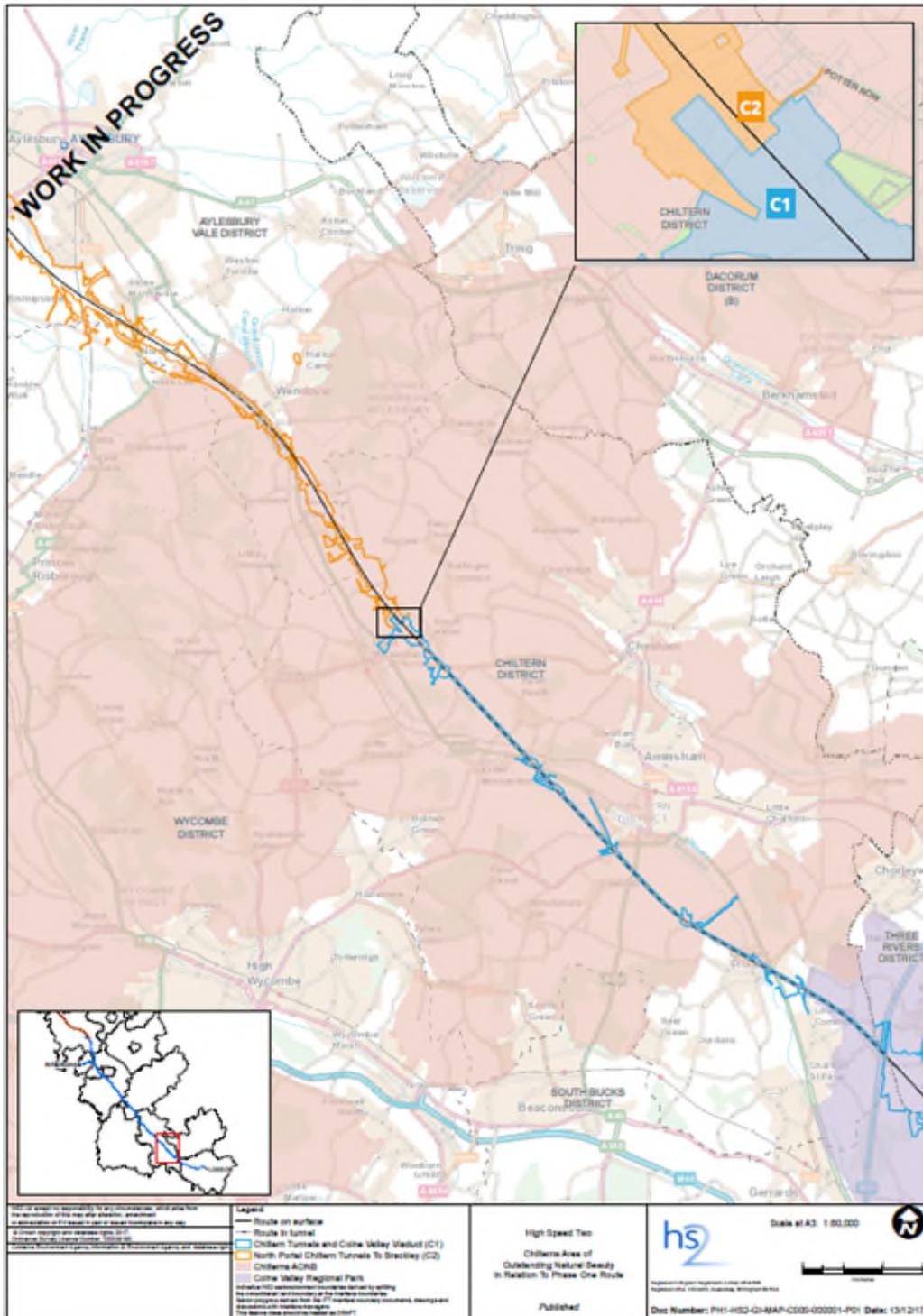
1.2.1 The Chilterns AONB stretches from the River Thames in Oxfordshire to Hitchin in Hertfordshire, covering approximately 833km² in area. The AONB is nationally protected and was designated in 1965, under the National Parks and Access to the Countryside Act 1949, for its outstanding natural beauty. All relevant Authorities must have regard to the purpose of conserving and enhancing its natural beauty when performing their functions, as required under Countryside and Rights of Way Act 2000.

- 1.2.2 The Phase One HS2 route is in a tunnel through the Chilterns AONB from Chalfont St Giles to South Heath; the HS2 route then passes overland through the AONB from South Heath to just north of Wendover. A map of the Chiltern AONB in relation to the Phase One route is shown below:

Chilterns Area of Outstanding Natural Beauty (AONB) – Key Environmentally Sensitive Worksite Management Plan

P1C-HS2-EV-PLN-C000-000011 C03

Figure 1: Site Location



1.2.3 The Chilterns AONB falls within the scope of three Environmental Statement (ES) Community Forum Area (CFA) Boundaries: CFA 8 Chalfonts and Amersham; CFA 9 Central Chilterns and CFA 10 Dunsmore, Wendover and Halton. These documents

provide detail of the assessment of the route, outline of the work and sensitive receptors.

1.2.4 The Chilterns AONB falls within the Buckinghamshire area. It is identified in the HS2 Environmental Memorandum as being a key environmentally sensitive worksite in relation to the following key environmental topic areas:

- Nature conservation and terrestrial and aquatic ecology.
- Water resources and flood risk.
- Recreation and amenity impacts and public open space.
- Landscape and visual; and,
- Agricultural land.

1.3 Purpose of the Management Plan

1.3.1 The purpose of this KESWMP is to:

- Identify future works potentially affecting the Chilterns AONB undertaken by Contractors and third parties in relation to HS2.
- Focus on mitigation, compensation and monitoring requirements and opportunities for enhancement in relation to specific environmental topics; and
- Identify synergies between different stakeholder organisations in terms of opportunities.

1.3.2 This KESWMP has been prepared to satisfy the commitments set out within the HS2 Environmental Memorandum and to support the Local Environmental Management Plan (LEMP) for Buckinghamshire Council. This management plan is part of a suite of documents which identify environmental issues, controls, and opportunities in relation to the Chilterns AONB including:

- The Environmental Minimum Requirements, which contains the Code of Construction Practice (CoCP) and the HS2 Environmental Memorandum.
- Schedule 17 controls under the HS2 Act 2017 (the Act). KESWMP's will support Schedule 17 submissions and Town and Country Planning Applications within the Chilterns AONB and where appropriate, heritage applications under Schedule 18, 19 and 20.
- HS2 design policy. This management plan supports the Detailed Design Principles developed by the Chilterns AONB review group as set out in the HS2 Chilterns Integration and Enhancement Plan, Part 1 (November 2017).
- Ecology Site Management Plans (ESMP). The site-specific ESMPs provide the maintenance and management requirements for ecological mitigation sites;

three of which are proposed within the AONB: Park Hill, Bury Farm and Chalfont St Peter (located 500m from the AONB boundary).

- Protective provisions. The Act also contains provisions which give protection to bodies affected by the scheme. These include Highway Authorities, Utility undertakers, the Environment Agency, the Canal and Rivers Trust, and harbour and airport authorities. Typically, these provisions enable HS2 Contractors to undertake works affecting their infrastructure but require approval of the details to be obtained. Paragraph 12 of Schedule 31, Part 1 of the Act requires the nominated undertaker not to deposit soil or material, or store any plant, or erect scaffolding or other structures, in or over a Highway without the consent of the Highway Authority.
- Legally binding consenting and licensing process. HS2 Limited will be submitting licenses and consents in accordance with the Schedules of the Act; and,
- The Environmental Management Systems implemented by HS2 Contractors (as defined in the CoCP) including contract level and site level environmental management plans.

1.3.3 There is a commitment in the document The Chilterns AONB Management Plan 2019-2024: A Framework for Action, (<http://www.chilternsaonb.org/conservation-board/management-plan.html>) to: conserve and enhance the natural beauty; increase understanding and enjoyment of the area; foster social and economic well-being; preserve the natural beauty; and increase visitors' understanding and enjoyment of the landscape. HS2 and its Contractors support these principles and aim to seek opportunities for shared delivery.

1.4 Process of developing the management plan

1.4.1 On 16 November 2016 contracts were awarded to three Enabling Works Contractors (EWC) working across Phase One of HS2. The EWC contracts ran until October 2022, with the principle responsibility of mitigating the ecological constraints and vegetation. Main Works Civils Contractors (MWCC) took over with an overlap between April 2020 and October 2022. The MWCC are completing the structural requirements of the railway including the tunnels, viaducts and cuttings ahead of the rail systems contractor due to take over around 2027.

1.4.2 EKFB are a joint venture between Eiffage, Ferrovia, Kier and BAM. Fusion was a joint venture between Morgan Sindall Infrastructure Services, BAM Nuttall Ltd and Ferrovia Agroman who were the EWC for Area Central of the Phase One route.

- 1.4.3 The approximate boundaries of the Area Central sectors relevant to the AONB are shown on drawing reference: PH1-HS2-GI-MAP-C000-000001. This drawing is shown above as part of paragraph 1.2.2 (Figure 1).
- 1.4.4 The EWC undertook a range of survey and investigation works which commenced in early 2017. The EWC also carried out some construction work including the provision of early ecological mitigation sites and tree planting, utilities diversions and road works. Fusion produced the original KESWMP as they were the first Contractor to carry out works within the vicinity of the Chilterns AONB but this Plan provides more up-to-date information.
- 1.4.5 On 17 July 2017 contracts were awarded for HS2's Main Works Civils Contractors (MWCC), with a Notice to Proceed issued in April 2020. The MWCC covering the Chiltern AONB area was originally EK, a joint venture between Eiffage and Kier but which is now EKFB which is a joint venture between Eiffage, Kier, Ferrovial Construction and BAM Nuttall (for sectors C2 and C3) and ALIGN (for sector C1). ALIGN is a joint venture between Sir Robert McAlpine, Bouygues TP, and Volker Fitzpatrick (for sector C1).
- 1.4.6 **EKFB started ground investigation within the Chiltern AONB 2018.** ALIGN started work in the Chilterns AONB at the Chalfont St Giles vent shaft site, in 2020. ALIGN undertook ground investigation (GI) works throughout the summer of 2019 and this included sites through the AONB on the line of the Chiltern Tunnel. This had included pump tests at the proposed shaft locations in 2019-2020. The GI is supported by a temporary compound at the Chalfont St. Peter shaft location. This is outside of the AONB designation.
- 1.4.7 ALIGN are responsible for the delivery of the Chilterns Tunnel and the 5no. Tunnel Shafts. The ALIGN sites that are within or within proximity of the AONB are:
- Chalfont St Peter Vent Shaft (outside of AONB)
 - Chalfont St Giles Vent Shaft
 - Amersham Vent Shaft
 - Little Missenden Vent Shaft
 - Chesham Road Intervention Shaft
 - Chiltern Tunnel North Portal
 - 16km Chiltern Tunnel (13km within AONB)
- Main works construction is underway at all of the ALIGN sites.

- 1.4.8 The MWCC are continuing to develop the detailed design and the programme for the main civils construction works as the scheme progresses. This management plan is based on current timescales.
- 1.4.9 EKFB will be responsible for reviewing and updating this KESWMP as of 2019 in line with the scheme design and construction works programme. This management plan is a 'live document' and will be reviewed at least every 6 months and updated accordingly or whenever there is a significant change to works proposed in line with the revision of the Local Environmental Management Plans (LEMPs).
- 1.4.10 All HS2 Contractors are working collaboratively, along with relevant third parties such as utilities companies, in relation to works within the Chiltern AONB, such as National Grid.

1.5 Consultation

- 1.5.1 National Environment Forum (NEF) members and relevant Planning Authorities will be consulted on the KESWMP following requirements within the HS2 Environmental Memorandum. In addition, the Chiltern AONB Review Group and the Chilterns Conservation Board will be consulted on this plan.
- 1.5.2 Copies of the updated plan will be made available for consultees by e-mail following revision. Comments from the consultees will be collated for consideration of further updates and amendments. Comments and discussions from attendance by HS2 and its Contractors at the Chiltern AONB Review Group Panel will also be considered for updates and amendments.
- 1.5.3 Following the Environmental Memorandum commitments, the management plan will be submitted with relevant Schedule 17 submissions to local Planning Authorities and, where appropriate, heritage applications. A link to the HS2 Ltd website area containing the LEMP and KESWMP will be provided for Schedule 17 submissions.
- 1.5.4 HS2 Contractors will work closely with the Chilterns AONB Review Group, communicating and consulting as appropriate on works within the area. The Review Group provides recommendations on design and mitigation proposals for their section of the HS2 route. Regular representation at the AONB Review Group by the HS2 Contractor leading on production and updates of the KESMP is beneficial to all parties to identify areas of concern, possible mitigation and compensation planting or alternatives that can be incorporated into design.

2 Overview of upcoming works within the Chilterns AONB

2.1 General

2.1.1 Fusion undertook a range of survey and investigation works within the vicinity of the Chiltern AONB which commenced in early 2017 and 2018 and was completed in 2022. Works include:

Environmental surveys such as ecological surveys, groundwater monitoring and surveys to support hydrological modelling. Monitoring plans and groundwater impacts are currently under review with the relevant regulators and further information will be made available on conclusion of these discussions. There will also be surveys to identify Invasive Non-Native Species, such as Japanese knotweed, to support plans for future treatment and control; and,

- Engineering surveys, including soil surveys.
- Construction of ecological mitigation sites.
- Design and construction of advanced planting sites.
- Haul road and minor road works.
- Utility diversions; and,
- Archaeological investigations.

2.1.2 Further Surveys will be carried out by EKFB and ALIGN as required throughout the main works construction.

2.2 Enabling works

2.2.1 The first construction works by the EWC in the AONB was the creation of the Bury Farm ecological mitigation site, at South Heath, in mid-2018. The Bury Farm ecological mitigation site will provide suitable habitat for Great Crested Newts and Reptiles as well as compensation to replace loss of grassland and woodland in the AONB. Bury Farm ecological mitigation site is the result of an Undertaking and Assurance and is not shown on ES plans. The site contains woodland, scrub and hedgerow planting and will include artificial bat roosts. The site forms part of the creation of a mosaic of grassland and wetland habitat to the west of the new high-speed railway to compensate for similar habitat lost.

2.2.2 Park Hill ecological mitigation site, at South Heath, is also in the AONB and construction was completed in May 2018. The site has similar objectives as Bury

Farm ecological mitigation site though this site will also include a bat barn to mitigate for the loss of a bat roost at Park Hill Manor House. The new roost will be constructed and completed prior to the commencement of the demolition works. The location of the Park Hill ecological habitat creation site is shown in Supplementary Environmental Statement (SES) and Additional Provision (AP) 4 maps (CFA9 Volume 2 Map Books CT-06 033).

2.2.3 Chalfont St Peter mitigation site is located 500m from the AONB and information on this can be found within the Environmental Statement (CFA8 Volume 2 Map Books CT-06 024). Construction of the mitigation site was completed in mid-2018. There is ongoing maintenance works which includes grass cutting and pond maintenance.

2.2.4 Planting of both Park Farm, Bury Farm and Chalfont St Peter ecological mitigation sites will contribute to HS2's aim of "no net loss" in relation to biodiversity.

2.2.5 Advance landscape planting by EWC commenced in late 2020. The designs for these planting sites have not been finalised; they will take account of the Detailed Design Principles developed by the Chilterns AONB review group as set out in the HS2 Chilterns Integration and Enhancement Plan, Part 1 (November 2017). In the Chiltern AONB the proposed advanced landscape planting sites are:

- Jones Hill Wood – planting outside Wendover Dean to allow for compensation for loss of ancient woodland and connectivity between fragmented woodland. The Jones Hill Wood planting site will also act as an ancient woodland soil's receptor site from the ancient woodland to be affected by MWCC works at Jones Hill Wood.

2.2.6 The MWCC will undertake work on the following in regard to advance planting;

- Leather Lane – planting along the lane adjacent to the embankments of proposed overbridges to integrate the linear alignment into the landscape;
- Leather Lane – planting adjacent to the Park Hill ecological mitigation site to diminish the impacts of the re-aligned Leather Lane

2.2.7 A utility connection at South Heath was completed in February 2019. An additional utility diversion (400kV diversion) was completed in September 2019. This work was carried out by National Grid Electricity Transmission (NGET) at the north and south of Wendover and Great Missenden and involved the construction of temporary towers, the installation of new towers and commissioning the line. The temporary and existing towers were then be removed at diversion location.

- 2.2.8 Ecological mitigation, vegetation clearance and archaeological investigation work was undertaken prior to utility diversion works.
- 2.2.9 The MWCC commenced with utility diversions along the Chiltern AONB in 2020, this includes the provision of mains water and electricity. There were 21 cables (9 fibre and 12 copper) for BT Openreach that ran in a duct network through the centre of the Amersham Shaft site. In October of 2020 ALIGN installed 400m of new ducting and Chambers. This was done in two routes. One runs down the middle of Whieldon lane and the other has been put under a new footpath on the side of Whieldon Lane. In Jan/Feb of 2021 Openreach pulled in new cables and jointed them into the network so that the old system could be removed. Affinity Water has a 150mm water main that ran through the centre of the Amersham Vent Shaft Site. In December 2020 and January 2021, a 280m long section of water main was diverted into a new footpath that runs around the side of Whieldon lane. The utility diversion works is ongoing, part of which will require a temporary weekend road closure on the A413 dual carriageway.
- 2.2.10 The EWC widened Bottom House Farm Lane and have constructed a haul road which will connect with the A413. This has been completed and will remain in-situ through the duration of shaft construction by ALIGN.
- 2.2.11 Archaeological investigations including geophysical (non-intrusive) surveys and trial trenching commenced in early 2018 at several sites in the AONB. The geophysical surveys were completed February 2019 of the site along the AONB. Trial trenching is ongoing within the AONB along the HS2 route however, works have moved from the evaluation Trial Trenching phase to the mitigation Archaeological Recording phase. The mitigation works are targeted based on the results of the evaluation trenches and aim to investigate archaeological remains in those areas. It is typical that mitigation is the final phase of archaeological investigation with only some instances requiring further work in the form of Construction Integrated Recording monitoring.
- 2.2.12 The evaluation trenches at Grimm’s Ditch monument are continuing with some areas of Archaeological Recording being undertaken concurrently in the surrounding landscape. Fusion-JV are working closely with HS2, Historic England and EKFB to coordinate the Schedule 19 procedure required for the works on the Scheduled Monument. Once the evaluation trenches on the monument are complete it is likely that the second phase of mitigation will be required given the highly sensitive nature of the site.

- 2.2.13 Vegetation clearance and species translocation by the EWC commenced in the Chiltern AONB in 2020, and vegetation clearance will continue as part of EKFB works programme.
- 2.2.14 There have been no in-combination impacts or multiple consenting process impacts identified from the EWC scope of work prior to MWCC mobilising on site. There have been no other development projects identified which are considered to lead to in-combination impacts on the Chiltern AONB with the proposed HS2 works.
- 2.2.15 There are other survey works being carried out by the MWCC such as monitoring of GCN populations across a number of Amphibian Metapopulations (AMPs).
- 2.2.16 The following sections focus on the purpose of this KESWMP in relation to the technical topics identified in section 1.2.

2.3 Ground Investigation

- 2.3.1 ALIGN have completed its main GI phase of work and is now into main works construction. Any proposals for boreholes and pump testing are discussed with Affinity Water and the Environment Agency.
- 2.3.2 The GI works carried out by EKFB are completed using a number of methods depending on what is appropriate including rotary and cable percussive boreholes up to 40m deep, and trial pits (1m wide, 5m long and 4m deep). The locations of each point are also assessed against potential for ecology and archaeology with walkovers using a licensed Ecological Clerk of Works (ECoW) and watching briefs undertaken where required.

2.4 Main works

- 2.4.1 ALIGN is responsible for construction of the Chilterns Tunnel, shafts and North Portal within the AONB.
- 2.4.2 The work being undertaken includes tunnel boring, cross passage construction, diaphragm wall construction, shaft excavation, secant piling, and head house excavation and construction.
- 2.4.3 ALIGN have produced Environmental Management Plans for each of its worksites. Risk assessments are undertaken and ecological surveys conducted as required.

2.5 Third Party (Utilities)

- 2.5.1 There are 118 utility works recognised within the Chiltern AONB. All of which will be undertaken by a utility contractor or by MWCC. The works include examples such as communication connections, sewer connections, low pressure mains and high-pressure gas mains. The work has been identified in various locations ranging from fields and footpaths to access tracks and roads. EKFB is carrying out utility trial holes across the Chiltern AONB with an eco-check carried prior to the works starting and ECoW attendance on site.

3 Topic areas

3.1 Nature Conversation, Terrestrial Ecology

Mitigation, Compensation and Monitoring Requirements

- 3.1.1 The Park Hill and Bury Farm ecological mitigation sites are mitigation for the loss of habitat due to the construction of HS2. The ecological mitigation sites have been designed with the intention of maximising the potential quality of the available habitat on each site. Both sites have a bespoke maintenance, management, and monitoring requirements to achieve the ecological objectives of that site.
- 3.1.2 Standard construction control measures specific to the locality have been outlined in Table 1 of the Local Environmental Management Plan Buckinghamshire Unitary Authorities (Document Ref: 1MC12-EKF-EV-PLN-C000-000011) and support the ecological mitigation as specified in the Environmental Statement (ES). EKFB will use method statements and construction management plans to ensure the environmental effects associated with construction are identified, planned for and managed in addition to those identified in the consents and licenses. EKFB and HS2 assure that these controls are being implemented through regular site visits, inspections, and audits.
- 3.1.3 Whilst there have been protected species identified near the ecology mitigation sites there are no identified adverse impacts on them due to the scale and timing of the EWC construction works. Planning shall reduce risk for EKFB work during construction.
- 3.1.4 New packages of work will be reviewed and assessed for any impacts on the nature conservation, terrestrial or aquatic ecology and appropriate mitigation and compensation requirements implemented. The translocation of protected species will be carried out in accordance with the respective licences and method statements produced by EKFB.

- 3.1.5 Monitoring requirements for protected and other species, and habitats, are determined through the licence application processes and through the ESMP for ecological mitigation sites. Monitoring of mitigation measures is required in the EMR's (para 6.5). EKFB will continue monitoring as required under the HS2 route-wide licence from an agreed handover point with the EWC.
- 3.1.6 Site-specific ESMPs will be consistent with the requirements of the Environmental Minimum Requirements Annex 4: Environmental Memorandum on management and monitoring (section 4.8). Section 4.8.6 states:

“Monitoring of the ecology mitigation and compensation measures is necessary to measure the extent to which the ecological objectives of the proposals are being met. The approach to monitoring will vary depending upon which management option is adopted for a particular area of habitat and will be agreed on a site-specific basis. Broad generic indications of the likely durations of monitoring, maintenance, and management during the establishment period for those habitats affected by the project are set out in HS2 Information Paper E26: Indicative Periods for the Management and Monitoring of Habitats”.

Opportunities for Enhancement

- 3.1.7 Opportunities for enhancement will be identified during design and through discussion with consultees including the AONB Review Group and local authorities.
- 3.1.8 The Chiltern AONB review group have two projects which commenced in summer 2019. The first project is in relation to is a landscape and Biodiversity project looking at landscape improvements along the line being delivered by Chilterns Conservation Board. The work to be ongoing for the next 5 years.
- 3.1.9 The second project the AONB review group are starting is improvements to the Ridgeway to improve accessibility and also open it up to new riding users by new paths and rights of way. This project is being led by the Ridgeway Partnership.
- 3.1.10 Toothwort *Lathraea spp.*, a locally scarce saprophytic plant, was discovered at Amersham by ALIGN ecologists during a routine survey. The plant had not been identified during the original surveys used to inform the ES as the plant is only visible during March to May. The plant is saprophytic on roots of beech and in this case hazel. The discovery of the plant led to redesign of the accommodation and car parking areas, so that the plant could be left undisturbed by ALIGN's work.

3.2 Water Resources and Flood Risk

Mitigation and Compensation

- 3.2.1 Following CoCP measures, there are no anticipated impacts within the AONB on water resources and flood risk from the construction works.
- 3.2.2 All design within the flood plain will incorporate a Flood Risk Assessment. The Flood Risk Zone is defined by areas located in areas of flood risk (Flood Zone 2 or Flood Zone 3) or greater than 1ha in area and where required in support of a consent and/or approval application. For HS2 works the Environment Agency grant the consent and the Local Authority are consulted.
- 3.2.3 The Park Hill and Bury Farm ecological mitigation sites to be constructed within the AONB are in Flood Zone 1 (fluvial flooding). The siting of the ponds has been designed outside the flood zone to prevent incursion by flood waters increasing the likelihood of introducing non-desirable species.
- 3.2.4 The advanced landscape planting sites and other EWC and third party works sites has been fully assessed for flood risk as part of the scheme design stage.
- 3.2.5 The works at Wendover consist of the construction of the Wendover Green Tunnel which is a cut and cover tunnel. Small Dean Viaduct will be built to ensure the route crosses the Aylesbury to Marylebone Railway safely and will be constructed through piling.

Monitoring Requirements

- 3.2.6 Monitoring requirements will be agreed as part of scheme design dependent on the locality and severity of the flood risk in discussion with HS2 Limited, the Environment Agency and the Local Authority as appropriate. The consenting process will ensure appropriate monitoring is agreed and implemented.
- 3.2.7 Monitoring of the sites for flood incursion will be undertaken as part of the ongoing monitoring of all the sites.
- 3.2.8 Ahead of the construction of the Wendover Green Tunnel surface water and ground water monitoring will be carried out in the Wendover area. In addition to this, the pump test was carried out between February to April 2021 to measure the hydrological impact in the area. Prior to these works, eco-checks were conducted to assess for ecological constraints. Ahead of the main works piling at Small Dean, a test pile will be carried out.

Opportunities for Enhancement

3.2.9 Enhancement opportunities have been considered within the design and construction process and include such opportunities as additional swales for the habitat mitigation sites and placement of reptile banks and hibernacula outside the floodplain or areas at risk.

3.2.10 Opportunities for further enhancement will be identified through consultation with consultees including the AONB Review Group and Lead Local Authorities Forum (LLAF) will continue to identify opportunities to reduce areas traditionally known to flood throughout the project.

3.3 Recreation and Amenity Impacts and Public Open Space

Mitigation and Compensation

3.3.1 Main works civils construction of HS2 within the AONB will result in the loss of woodland, ancient woodland, grassland and impacts on landscape views. These impacts will be considered in more detail when the KESWMP is updated in relation to the development of the MWCC design and programme

3.3.2 Woodland and ancient woodland loss will be minimised through the exploration of alternative options. There will be no woodland removed until it has been confirmed there are no design alternatives that are acceptable. Areas of amenity lost permanently through the scheme are being mitigated through design supported by the EWC, the MWCC and through HS2's support of the AONB Additional Projects being developed by the AONB Panel.

3.3.3 Public Rights of Way will be affected by the construction of HS2. The EWC and MWCC will work with the community and interest groups to mitigate for these disruptions through the provision of additional routes where possible linking sections of curtailed path and by enhancing PRoW with additional planting if possible. The Ridgeway National Trail and regionally promoted routes will be affected by the MWCC (Table 1). It is understood, for example, that the route of the Ridgeway will need to be realigned to coincide with the Ellesborough Road diversion, consideration will be needed as to how this will be managed to minimise impacts on users of this National Trail.

Table 1: Impacts to Public Rights of Way (PRoW) by MWCC

PRoW – reference	Reason for disruption	Duration of closure or diversion
Footpath GMI/13/3	Since the completion of the ES, the construction phase programme in this area has changed significantly, and as a result the South Heath Cutting has moved to the early stages of the construction programme. Due to this, early in the programme this area will become unsafe for the public to cross due to the large cutting, earthworks equipment and the safety-critical nature of the working area. As a result of this, it has been deemed neither reasonable nor practicable to keep GMI/13/3 open during the construction phase on safety grounds. There is no reasonable or safe diversion route.	The closure is estimated to be approximately 54 months, until Summer 2025
Footpath GMI/12/1	Footpath GMI/12/1 is proposed to be closed during the construction phase, with a diversion onto GMI/2/1 and Potter Row. In the ES, GMI/12/1 was assumed to have a negligible diversion to the south of its existing alignment for the duration of the construction phase. Due to programme changes, early in the programme this area will become unsafe for the public to cross due to the large cutting, earthworks equipment and the safety-critical nature of the working area. As a result of this, it has been deemed neither reasonable nor practicable to keep GMI/12/1 open during the construction phase on safety grounds.	It is estimated the closure and diversion will be approximately 66 months, until Autumn 2026
Footpath GMI/2/1	Footpath GMI/2/1 is proposed to remain open during the construction phase. In the ES, GMI/2/1 was assumed to have a local diversion in place during the construction of GMI/2 Accommodation Overbridge. The ES reports 39 daily users of GMI/2/1. As EKFB plans to remain within the ES assumptions, it is not assumed this will create any new significant impact, in relation to both EMR compliance and community effects. Signage is proposed to be placed at the junction with GMI/12/1 and GMI/2/1, and at the junction of GMI/12/1 and Potter Row, and GMI/2/1 and Potter Row, to divert the public along GMI/2/1 during the construction phase.	During the construction programme, there may be short term closure(s), the closure will be kept to less than 28 days.
Footpath TLE/2 and WEN/38/1	Footpaths TLE/2 and WEN/38/1 are proposed to be closed during the construction phase. Since the completion of the ES, the construction phase and programme has changed significantly, and as a result, earthworks are due to commence in this area before the permanent structure has been completed. As a result of this, the area will become unsafe to allow vulnerable road users and members of the public to	It is estimated this closure will be in place for approximately 66 months, between April 2021 and Autumn 2026

PRoW – reference	Reason for disruption	Duration of closure or diversion
	<p>cross the line of route at this location. It has therefore been deemed neither reasonable nor practicable to allow crossing at Footpath TLE/2. It is proposed signage be placed on the A413 at its junction with WEN/38/1, and at the junction of Footpath TLE/2/2 and King's Lane. The exact location of any signage will be subject to all necessary consents, and the exact closure points will be discussed as part of any pre-applications with the Local Highways Authority, though EKFB has powers under the Act to close within Act Limits. Due to the location of this crossing, there are no reasonable nor practicable diversion routes that can be implemented for TLE/2. Any vehicular traffic that uses this route can be diverted onto WEN/37/Bowood Lane.</p>	
Footpath WEN/37	<p>Footpath WEN/37 is proposed to remain open during the construction phase. In the ES, WEN/37 was named "Bowood Lane Footpath" and was assumed to be diverted by approximately 550 metres to TLE/2/2 until the construction of Bowood Lane Overbridge. Since the completion of the ES, the construction phase and programme has changed significantly, and as a result it is feasible that an at-grade crossing can be maintained close to the Bowood Lane crossing of the line of route, until the completion of Bowood Lane Overbridge. As a result, Footpath WEN/37 is to remain open on a local diversion to the north of the existing Bowood Lane crossing. This is to be controlled by traffic marshals to avoid people/plant interface and ensure safe crossing for vulnerable road users.</p>	<p>Short-term (< 4 weeks) closures may be required. These will be kept to a minimum and Advance Warning Notices (AWN) will be provided</p>
Footpath WEN/36	<p>Footpath WEN/36 is proposed to be closed for the duration of the construction programme in the Wendover Dean Viaduct area. The ES assumed a temporary diversion between viaduct piers to the east side of the line of route. 25 daily users were reported in the ES and this PRoW forms part of the Chiltern Way Trails. Due to the complexity of the viaduct construction, as well as the fact an alternative route is available, it is proposed that a reasonable diversion route can be put in place for the public to cross the line of the route in a safer location</p>	<p>This closure and diversion is estimated to be in place for 64 months, between May 2021 and Autumn 2026.</p>
Footpath WEN/39	<p>Footpath WEN/39 is proposed to be closed for the duration of the construction programme in the Wendover Dean Viaduct area. The ES assumed a temporary diversion between viaduct piers to the east side of the line of route. 6 daily users were reported</p>	<p>This closure and diversion is estimated to be in place for 64 months, between May</p>

PRoW – reference	Reason for disruption	Duration of closure or diversion
	<p>in the ES. Due to the complexity of the viaduct construction, as well as the fact an alternative route is available, it is proposed that a reasonable diversion route can be put in place for the public to cross the line of route in a safer location. It is proposed that signage is placed on the wider network to direct walkers along the diverted route, crossing the line of route at WEN/37, and joining back to the westernmost edge of the PRoW route on Durham Farm Lane. It is noted that this may be required by landowners for access, and liaison with all relevant parties will be ensured.</p> <p>As a result of this, it is proposed to close WEN/39/1 and WEN/40/1, with signage proposed at the junctions of the PRoW and the Highways they intersect with to the east and west of the line of route, on Chesham Lane, King's Lane and Durham Farm Lane respectively.</p>	<p>2021 and Autumn 2026</p>
<p>Bridleway WEN/57</p>	<p>Bridleway WEN/57 is proposed to remain open for the majority of the construction programme, with periodic short-term closures at periods of peak activity. In the ES, Bridleway WEN/57 was proposed to be diverted by approximately 2.2km during the construction phase. EKFB's proposals for Bridleway WEN/57 provide an improvement based on the proposals set out in the ES, with a minimal local diversion route for the majority of the construction programme. During these periods, there will therefore be a benefit to the local users. During periods of peak activity in the near vicinity, it will be neither reasonable nor practicable to maintain a safe passage of the users across the construction boundary. During this period of time, It is proposed that during these periods of closure, a diversion route is implemented which may either use the crossing at Ellesborough Road, or create a separate link to the south of the tunnel excavation works. This will divert the Bridleway mostly using the existing network, bringing users back onto Small Dean Lane close to Smalldean Farm. Providing this diversion is implemented prior to any closures, it will ensure equestrian users are able to cross the line of route and access the wider Bridleway network in the area. This will ensure no significant community effects are realised and will satisfy the U&A which dictates EKFB</p>	<p>Temporary diversion</p>

Chilterns Area of Outstanding Natural Beauty (AONB) – Key Environmentally Sensitive Worksite Management Plan

P1C-HS2-EV-PLN-C000-000011 C03

PRoW – reference	Reason for disruption	Duration of closure or diversion
	must maintain access for the PRoW where reasonably practicable.	
Bridleway WEN/14/4	Bridleway WEN/14/4 is proposed to remain open on its existing alignment for the beginning of the construction phase, with a diversion onto Ellesborough Road upon commencement of the Green Tunnel excavation works. In the ES, it was assumed that Bridleway WEN/14/4 would remain on its existing alignment for the duration of the construction phase. The proposed diversion route will be implemented upon commencement of the Green Tunnel excavation works and will remain in place for the duration of the construction programme. This will utilise the newly created Bacombe Lane “Link Road” to the west of the line of route, bringing the public back onto WEN/14. There may be times where short-term closures are required for safety-critical works such as tie-ins, however these will be kept to the minimum practicable duration and, in any case, are not planned to remain in place for more than 28 consecutive days.	Temporary diversion
Bridleway WEN/14/4	Bridleway WEN/14/4 is proposed to remain open on its existing alignment for the beginning of the construction phase, with a diversion onto Ellesborough Road upon commencement of the Green Tunnel excavation works. In the ES, it was assumed that Bridleway WEN/14/4 would remain on its existing alignment for the duration of the construction phase. The proposed diversion route will be implemented upon commencement of the Green Tunnel excavation works and will remain in place for the duration of the construction programme. This will utilise the newly created Bacombe Lane “Link Road” to the west of the line of route, bringing the public back onto WEN/14. There may be times where short-term closures are required for safety-critical works such as tie-ins, however these will be kept to the minimum practicable duration and, in any case, are not planned to remain in place for more than 28 consecutive days.	Temporary diversion
Footpath WEN/13A	Footpath WEN/13A is proposed to be diverted onto Ellesborough Road and the Bacombe Lane Link Road during the construction phase. In the ES, it was assumed Footpath WEN/13A would be diverted locally to suit the construction of Wendover Green Tunnel. There may be times where short-term	Temporary diversion

Chilterns Area of Outstanding Natural Beauty (AONB) – Key Environmentally Sensitive Worksite Management Plan

P1C-HS2-EV-PLN-C000-000011 C03

PRoW – reference	Reason for disruption	Duration of closure or diversion
	<p>closures are required for safety-critical works such as tie-ins, however these will be kept to the minimum practicable duration and, in any case, are not planned to remain in place for more than 28 consecutive days.</p>	
Footpath WEN/11/1	<p>Footpath WEN/11/1 is proposed to be diverted onto Ellesborough Road for the duration of the construction phase. EKFB’s proposal is exactly the same as what was proposed in the ES, albeit for a longer duration due to the construction programme for the Green Tunnel construction works becoming elongated. However, due to the short length of additional distance, and the relatively low usage, it is not assumed that this will create a new or adverse significant effect to either the community or to additional severance. There may be times where short-term closures are required for safety-critical works such as tie-ins, however these will be kept to the minimum practicable duration and, in any case, are not planned to remain in place for more than 28 consecutive days</p>	<p>It is proposed this diversion route will be in place approximately 4 years.</p>
Footpath WEN/6	<p>Footpath WEN/6 is proposed to be diverted along Ellesborough Road and the existing network in Wendover during the construction phase. In the ES, it was proposed that WEN/6 would be diverted onto Ellesborough Road during the construction phase.. EKFB plans to utilise the Ellesborough Road diversion route which is proposed in the ES. This will remain open for the duration of the construction phase, with only short-term closures implemented for safety critical works (less than 28 consecutive days).</p>	<p>Temporary diversion</p>
Footpath WEN/55	<p>Footpath WEN/55 is proposed to be diverted along Ellesborough Road and the existing network in Wendover during the construction phase. In the ES, it was proposed that WEN/55 would be diverted locally during the construction of Wendover Green Tunnel. EKFB plans to utilise the Ellesborough Road diversion route which is being used for other PRoW in the area. Due to the complexity of the Green Tunnel construction, it has been deemed that it would be unsafe to allow vulnerable road users to cross in the vicinity of these major earthwork’s operations. As a result, this diversion route has been sought to enable passage across the line of route for the public. There may be times where short-term closures of the diversion route are required for safety-critical works such as tie-ins, however these will be kept to the</p>	<p>Temporary diversion – approximately 4 years.</p>

PRoW – reference	Reason for disruption	Duration of closure or diversion
	minimum practicable duration and, in any case, are not planned to remain in place for more than 28 consecutive days.	

Opportunities for Enhancement

3.3.4 Comments received during the design period from stakeholders such as the AONB Review Group, Local Authorities, Parish councils, community groups and interest groups during design will be explored with the AONB Panel, HS2 and local authorities. Opportunities will be documented and formally assessed through the Green Corridor process.

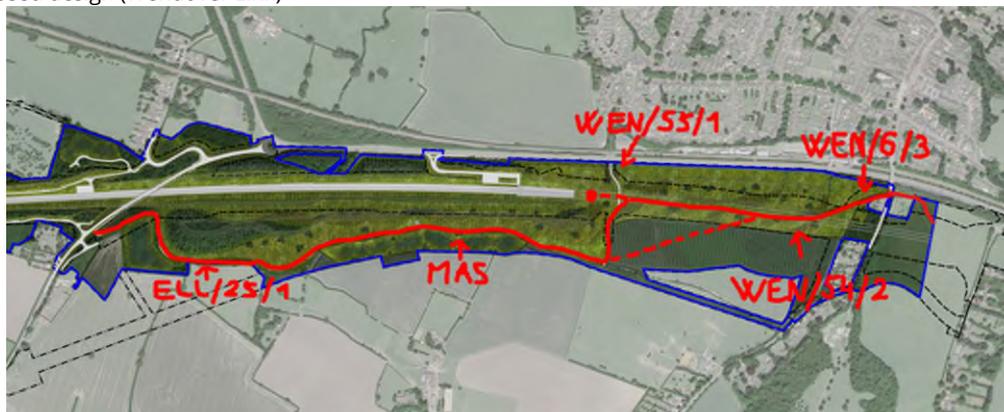
3.3.5 Interested parties can propose enhancement opportunities to the MWCC who will endeavour to work with these parties to develop and deliver the enhancements if practicable. All contractors are committed to providing community investment and the provision of PRoW and recreation and amenity improvements will be enthusiastically received to incorporate into the Contractor’s suggestions.

3.3.6 Within the Chilterns AONB HS2 Chiltern Enhancement and Integration Plan, Part 1 Detail Design Principles (DDP) a new connection opportunity has been identified, which is referred to as the Wendover Link. This link will follow the HS2 route from Frith Hill near the Chilterns North Tunnel Portal at South Heath and connect with the B4009 Nash Lee Road to the north.

3.3.7 The Wendover Link will be provided through reinstatement of WEN/6/3, WEN/54/2 connecting to WEN/55/1 with an extension to an informal viewing area at the north portal, connecting to the shared HS2 Maintenance Access strip which in turn will connect with ELL/25/1 and onwards to Nash Lee Road. See the plan below which is

NOTE: Drawing for reference purposes only, NOT OFFICIAL DESIGN

Figure 2 Proposed design (Wendover Link)



3.3.8 The drainage design is subject to ongoing discussion with the EA and their consent is being sought as appropriate.

3.4 Landscape and Visual

Advanced Works contract

3.4.1 Sensitive landscape and visual receptors are outlined in the relevant LEMP and ES. Screening planting has been included within the Proposed Scheme design and is planned for sensitive landscape locations. The advance landscape planting by the EWC is designed to provide early screening to local residents, businesses and for public amenity value in advance of the MWCC works. Further consultation will be undertaken as the advance landscape planting develops. Planting will occur as part of EKFB Undertakings and Assuring's (U&A's) such as during the construction of Small Dean Viaduct.

3.4.2 The AONB Review Group is working alongside HS2 and communicating with EKFB on additional integration and enhancement measures to reduce the landscape and visual effects of the scheme within the AONB and its setting.

Monitoring Requirements

3.4.3 The advanced landscape planting will be monitored in accordance with Landscape, Maintenance, Management and Monitoring Plans which will be produced at detailed design stage for these sites by Fusion.

Opportunities for Enhancement

3.4.4 Further opportunities for enhancement will also be highlighted and developed during design, especially when designing permanent infrastructure. The views of the AONB Review Group will be included as appropriate and consultation will be local

with authorities and other interested parties. Suggestions received from any party will be considered and discussed between the MWCC and HS2 for the practicality and impacts and adopted or incorporated wherever feasible. For example, the opportunity to open up part of a woodland mitigation site was agreed by the EWC in another area but until the consent of the landowners has been agreed the idea will not be implemented.

Main Works Contract

- 3.4.5 The landscape planting proposals for the Chilterns AONB, north of the Chilterns Tunnel within the Community Forum Areas CFA 9 and CFA 10, are being developed to reflect the Chilterns AONB Detailed Design Principles (DDP). This is a key document agreed between HS2 and Chilterns AONB Review Group. The design principles contained within the document have been provided for the purpose that they could reasonably be applied to HS2 works in the Chilterns AONB and its setting, which aim to achieve an exemplar landscape design for the project.
- 3.4.6 The design of the Main Works landscape planting for the Chilterns AONB area is presently under discussion with Buckinghamshire Council (formally Chilterns District Council and Aylesbury Vale District Council) as part of the HS2 Phase 1 Schedule 17 application process. The Main Works planting has been split into four separate S17 applications, which are P1 South Heath to Wendover Dean, P2 Wendover Dean, P3 Small Dean and P4 Nash Lee. The S17 application P2 Wendover Dean was approved by Buckinghamshire Council in June 2021, which includes the Viaduct, associated landscape earthworks, track and land drainage features and security fencing. The remaining three applications are at various stages of submission. It should be noted that the planting submitted as part of the Schedule 17 application is for information only. The formal submission for getting consent from the local planning authority for the planting will be Bringing into Use post Main Works contract construction.
- 3.4.7 The nationally important and highly sensitive landscape components of the Chilterns AONB through which HS2 traverses introduce significant design challenges. HS2 north of the Chilterns Tunnel traverses the chalk landscape of the Upper Missenden Valley between the settlements of Great Missenden and Wendover which is characterized by four local character areas. The landscape design approach for each of the four areas is considered in turn below.

Lee and Buckland Common Farmland Undulating Valley Slopes Local Character Area (LCA)

- 3.4.8 In the environs and north of the Chilterns Tunnel North Portal at South Heath, HS2 emerges in a deep cutting within a landscape defined by steep topography,

established vegetation included several blocks of ancient woodland and important historic features. This landscape has a strong visual relationship with the adjacent Upper Missenden valley floor to the west, and the settlement pattern to the east.

Mitigation

- 3.4.9 This section of HS2 falls within the S17 P1 application which was submitted to Buckinghamshire Council in February 2022. In summary the landscape design approach seeks to integrate the engineered South Heath cutting into the landscape and to screen the ancillary features. A key part of the approach is to retain or restore the important Holloways, to provide opportunities for the establishment of Beech and Holly woodland as well as opportunities for ecology enhancement and connectivity. To achieve this the landscape planting and landscape earthworks proposals are being designed to help integrate the engineered cutting and associated infrastructure, including the tunnel portal and service building, overbridges, and highway alignments into the landscape. Opportunities to retain the existing mature vegetation is recognized as being important particularly where it is associated with heritage features, but the practicalities of doing so must be seen in the context of the large-scale construction activity that is required to build HS2. Where vegetation is lost, particularly where it is associated with a heritage feature such as a Holloway, it will need to be replaced in some form. This is done overtime either by recreating the feature lost albeit in a slightly different spatial arrangement or to introduce a new feature which provides biodiversity connectivity and helps to integrate and or screen the railway infrastructure and at the same time retains the rural character and sense of place, such as Beech and Holly woodland.
- 3.4.10 Lineside vegetation, i.e., vegetation that sits within the HS2 security fence, is also being proposed on the upper slopes of the engineered cutting. This planting is considered essential as it will create a natural transition between the proposed tree and shrub blocks along the cutting crest outside the security fence with the inward facing slope of the cutting. In addition, the cutting slope will be maintained so that the upper slopes will be managed to allow some natural regeneration of woody species.
- 3.4.11 In regard to the overbridges which span South Heath cutting the landscape design is being developed closely with the architectural design and the current plan is to install Wendover Green Tunnel to mitigate the loss of habitat in this area.

Wendover Gap LCA

- 3.4.12 HS2 emerges from the South Heath cutting at Wendover Dean, located on the east side of the Upper Missenden Valley. At this location HS2 cuts across a side valley on

embankment and viaduct before disappearing back into a combination of cutting and false cutting. Northwards, HS2 then re-emerges to traverse the valley floor at Small Dean on embankment and viaduct, then traverses the west side of the valley before entering the Wendover Green Tunnel at Bacombe Lane, west of Wendover. This is a landscape defined by the undulating exposed and visible side slopes of the Upper Missenden Valley and the relatively well-contained infrastructure and settlement pattern of the lower slopes and valley floor. Both the viaducts and the Wendover Green Tunnel South Portal are Key Design Elements for the Project which means that the structures and their associated landscape design, as well as the S17 application are required to go through the HS2 Independent Design Panel Review process.

Mitigation

- 3.4.13 This section of HS2 falls within the S17 P2 and P3 applications. The former is now approved and the latter is currently in an ongoing discussion with Buckinghamshire Council. A summary of each application is provided below:

Wendover Dean

- 3.4.14 The viaduct, of approximately 450m in length and up to 17m in height, is the focus of HS2 at Wendover Dean. The landscape design adopts a simple approach of reinstatement, where the key landscape components such as field boundaries and lane side hedgerows follow as closely as possible the existing spatial arrangement of the historic field pattern and holloways, thereby re-establishing biodiversity connectivity and the creation of an ecological corridor. Where new landscape components have been introduced to help integrate the associated HS2 infrastructure such as the new landform, highway, and drainage assets, they have been designed to respect the nature and open character of the landscape context. This allows the landscape to flow beneath the viaduct.
- 3.4.15 To the northwest of the viaduct, the outward slopes of the Rocky Lane landscape earthworks is a notable new landscape feature within the lower slopes of the valley. As such, the landform modelling has had to consider the adjacent overhead powerline towers. To blend the earthworks with the existing landform the back slopes have been steepened to a gradient steeper than 1v to 8h which restricts the land being restored to arable farmland. The landscape proposals therefore show several of the new fields on the steeper section of the earthworks as an opportunity for biodiversity enhancement through the creation of a chalk wildflower grassland sward.

Small Dean

- 3.4.16 The 350m long viaduct crosses the Upper Missenden valley floor at a point where it is defined by the Chilterns Railway and A413 and its associated vegetation. The viaduct crosses over both the railway and road where they are in proximity to each other and sits low in the landscape. For the most part its mass and appearance will be contained by the local landform and existing vegetation, but it will form a prominent intervention when seen from the A413 and to a point where it acts as a gateway to Wendover in one direction and the AONB in the other. The landscape approach for the viaduct is to reinstate as far as possible a wooded landscape along the A413 to help contain the road and its traffic, as well as help to integrate the viaduct approach embankments. This wooded approach is managed as coppiced woodland to maximize establishment of woodland ground flora. At the structure the landscape becomes more formalised with terracing and flint being introduced beneath it.
- 3.4.17 North of the Viaduct, HS2 runs parallel and in proximity to the A413 on an engineered embankment leading up to the Wendover Green Tunnel south portal. The elevated position of HS2 to the settlement of Wendover to the east requires substantial noise barriers on the embankment which form prominent features in the view from both the A413, to the east where the barrier forms the skyline feature and elevated PRoW to the western AONB side. The landscape approach for this section is to look at measures to reduce the mass and appearance of the noise barrier, which includes widening the embankment and creating a low mound at the crest. Planting in the form of shrubs, scrub and grassland is also being looked at on the embankment to overtime help reduce the overall mass and appearance of the barriers.

Wendover Foothills LCA

- 3.4.18 HS2 passes through much of this character area within a green tunnel, emerging at its north end in cutting in the environs of Nash Lee. This LCA is defined by its undulations, openness, and large-scale arable fields. It is also publicly accessible with a good PRoW network. The LCA also has a strong visual relationship with the adjacent Chiltern Scarp LCAs to the south, where there are elevated views from key viewpoints at Bacombe Hill and Coombe Hill (National Trust) to the green tunnel area and Nash Lee. This landscape is also important in that it acts as the transition between the chalk downlands of the Chilterns and the low-lying clay vale of Aylesbury, and the changes between the two are experienced in the elevated views across this area.

Mitigation

- 3.4.19 North of Ellesborough Road the roof of the Wendover Green Tunnel sits above ground level, creating a false earthwork and ridgeline that runs parallel to the A413 to the east. Where HS2 emerges at the north portal, it sits in cutting with adjacent landscape earthworks. The design of the earthworks over the tunnel and adjacent to the cutting to the north is essential to integrate HS2 into the open landscape and to screen it, particularly in the elevated views to the southwest, within the adjacent Chiltern Scarp LCA. To aid integration of the tunnel landform, the earthworks modelling provides opportunities to restore some of the land back to agricultural use. This area is also seen as being important for wider biodiversity connectivity and public amenity.
- 3.4.20 The planting associated with this area is also very important as it needs to reflect the change in features and elements within this transitional landscape as well as help to integrate the north tunnel portal and service building and look to provide opportunities for recreational and ecology benefit. The planting therefore reflects a vegetation transition from a chalk downland yew / birch scrub and wildflower grassland over the tunnel and in the environs of the north portal to an oak / birch woodland in the environs of Nash Lee.

3.5 Agriculture

Mitigation and Compensation

- 3.5.1 Minimising the loss of any agricultural land, particularly the Best and Most Versatile agricultural land, i.e. grades 1, 2, 3a, as well as mitigation and compensation for any loss of Best and Most Versatile agricultural land will be principally within the MWCC scope.
- 3.5.2 The EWC work programme is not affecting high quality agricultural land; small junction improvements, habitat mitigation sites – generally sited on grazing land in the AONB. The areas of agricultural land to be lost or adversely affected are outlined in the relevant LEMPs and ES as are local control measures. The proposed scoping matrix accompanying additional revisions of this KESWMP will identify cross topic opportunities and mitigation requirements in more detail.

Monitoring Requirements

- 3.5.3 A Soil Resources Plan (SRP) has been prepared by the HS2 Contractors on sites where topsoil and subsoil are being stripped and returned to agriculture.

3.5.4 The SRP will identify the type and volume of soils affected and the reuse potential within the footprint of the works or suitable donor site for land restoration. For agricultural land the SRP will include a target specification for restoration.

3.5.5 Soil scientist have been employed by EKFB and soil surveys have undertaken by EWC.

Opportunities for Enhancement

3.5.6 Further opportunities for enhancement will also be highlighted and developed during design, especially when designing permanent infrastructure. The views of the AONB Review Group will be included as appropriate and consultation will be local authorities and other interested parties.

4 Summary

4.1.1 This document addresses the impacts associated with the Chilterns AONB. The recreation, nature conservation and terrestrial and aquatic ecology, water resources and flood risk and landscape and visual impacts have been assessed and opportunities for enhancement within the AONB area will be identified in future.

4.1.2 In-combination adverse impacts and the need for multiple consenting requirements during the EWC scope of works were avoided within the AONB through planning and communication with other EWC Contractors and third parties. Each consent has been reviewed, together with and the Environmental Statement and HS2 undertakings and assurances but with widely spaced and disparate requirements the holistic nature of the consenting requirements is being assessed and will be addressed through the incorporation of a scoping matrix integrating topics and cross cutting themes and opportunities.

4.1.3 MWCC to date have carried out utility trial holes across the Chilterns AONB and are now progressing with main works construction. De-vegetation works are being carried out ahead of the main works earthworks and the construction of the internal site access and haul roads. Demolition has been carried out at Durham Farm, and is due to happen at Road Barn Farm and Mulberry Park Hill. A test pile is to be carried out in Small Dean. The Wendover pump test has finished, and water monitoring continues in Wendover.

4.1.4 The EKFB main scope of works includes 2 No. launched viaducts, 8 No. overbridges, 3 No. underbridges, 11 No. large scale culverts (including micro-bored tunnels), 1.4km of cut and cover tunnels, bulk excavation and numerous road realignments and

utility diversions. Other works required to be carried out in the early stages include surveys of Hampden pond to assess whether the current assets can be incorporated into the scheme design, pump tests to understand how the works will affect springs in the local areas, ground investigation works throughout the entire section, both boreholes and trial pits, construction of a cement stabilised chalk embankment and installation of traffic monitoring loops. EKFB will produce the detailed design and construction.

4.1.5 The ALIGN main scope of works includes a 3.4km viaduct, 16km twin-bored tunnel and associated portals, and five shafts handling both intervention and tunnel ventilation facilities. Within the AONB works include approximately 13km of tunnel, North Portal construction and 4 no shafts.

4.1.6 The KESWMP will be reviewed and revised as appropriate and on a six-monthly basis by HS2 and its Contractors.