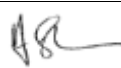
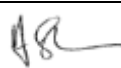


High Speed 2 - 1MC06 - Stage One C2 - MWCC – North Portal of Chiltern Tunnels to Brackley Twyford to Chetwode Written Statement

1MC06-CEK-TP-STA-CS06_CL10-000001

Rev	Date	Author	Checked by	Approved by	Revision Details	EKFB Reviewer
C01	1/7/21	Mark Alcock	Louise Plant	Andrew Barbour	First Issue	Mark Roberts
						
C02	3/9/21	Mark Alcock	Louise Plant	Andrew Barbour	First Issue	Mark Roberts
						

Stakeholder review required (SRR)	Purpose of SRR
☐ County / District / London Borough Council	☐ Acceptance
☐ LOV	☐ Approval
☐ LUL	☐ No Objection
☐ NRL	☐ Consent
☐ TFL	
☐ Utilities Company	
☐ Other (please specify)	



High Speed Rail (London – West Midlands) Act 2017

HS2 Ltd

Buckinghamshire Council

Package 14 - Twyford to Chetwode

Twyford Viaduct, Godington East and West Viaducts, Earthworks and Associated Works

Schedule 17 Plans and Specifications

Written Statement for Information

HS2 Submission Reference: BCL.PS.10011

Document Reference: 1MC06-CEK-TP-STA-CS06_CL10-000001 REV C02

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1 Introduction

1.1 Background Information

Table 1: Schedule 17 Address Details and Description of Works

Site	Details
Scheme	High Speed Two
Applicant	High Speed Two (HS2) Limited
Applicant Address	<i>c/o Agent:</i> EKFB, 5th Floor, Exchange House, 450 Midsummer Boulevard Milton Keynes MK9 2EA
Site Address	The site extends from the north-east of Twyford to the west of Chetwode. The site broadly follows the alignment of the former Great Central Main Line (GCML) disused railway. The works are centred on X (Easting): 465519 and Y (Northing): 227723 and between HS2 line chainages 82+180 to 84+900. The Twyford to Chetwode Site Location Plan (Drawing No. 1MC06-CEK-TP-DLO_CS06_CL10-000002) identifies the extent of the Schedule 17 application site boundary in blue.
Description	Plans and Specifications submission under Schedule 17 to the High Speed Rail (London – West Midlands) Act 2017 for works comprising of: • Twyford Embankment (Part of) • Twyford Viaduct • PBI/5A Accommodation Overbridge • Cowley Embankment • Twyford Cutting • Godington East Viaduct (Part of) • Godington West Viaduct (Part of) • Godington East Embankment • Chetwode Embankment (Part of) • Earthworks required to bridleway CHW/24/1 and Byway PBI/5A/3 and new maintenance access track off Byway PBI/5A/3 • Godington East Culvert (above ground elements only) • Godington West Culvert (above ground elements only) • Location of the Vehicle Restraint Barriers • Diversion of Padbury Brook and other watercourses (Part of) • 9 No. Drainage Ponds • Drainage Ditches • 2 No. Flood Compensation Areas • 1 No. Vehicle Restraint Bund

Site	Details
	- Noise Barriers, and - Location of the permanent (security) fencing.

1.2 Terms of Reference

- 1.2.1 This Written Statement is compiled in accordance with the High Speed Two (HS2) Phase 1 Planning Memorandum and Planning Forum Notes (PFNs) as required by the planning regime established under Schedule 17 of the High Speed Rail (London – West Midlands) Act 2017 ([Link to Planning Forum Notes for Local Authorities](#)).
- 1.2.2 This statement provides Buckinghamshire Council (BC) Unitary Authority with information to assist with the determination of the Plans and Specifications submission under Schedule 17, in relation to the above description of works.
- 1.2.3 The information in this Written Statement is provided for information to assist in determining the request for approval. It is not for approval.

1.3 Introduction to High Speed 2

- 1.3.1 HS2 is a new high speed railway network that will connect major cities in Britain. It will bring significant benefits for inter-urban rail travellers through increased capacity and improved connectivity between London, the Midlands and the North. It will release capacity on the existing rail network and so provide opportunities to improve existing commuter, regional passenger and freight services.
- 1.3.2 Phase One of HS2 will provide a dedicated high speed rail service between London, Birmingham and the West Midlands. It will extend for approximately 230km (143 miles). Just north of Lichfield, high speed trains will join the West Coast Main Line for journeys to and from Manchester, the North West and Scotland.
- 1.3.3 The application site (hereafter referred to as ‘the site’) lies entirely within the newly formed administrative area of BC. The site was formerly within the administrative area of Aylesbury Vale District Council (AVDC). Some of the works that form part of this package also fall within Cherwell District Council (CDC) Package 1 – Godington, AVDC Package 13b – Calvert North and AVDC Package 15 – Chetwode to Mixbury.
- 1.3.4 For further information on HS2 and the route through the former AVDC administrative area please refer to the Planning Context Report for AVDC (May 2017), deposited with the Council by HS2 Ltd ([Link to AVDC Planning Context Report](#)).

1.4 High Speed Rail (London – West Midlands) Act 2017

- 1.4.1 The High Speed Rail (London - West Midlands) Act 2017 (‘the Act’) provides powers for the construction and operation of Phase 1 of High Speed Two. HS2 Ltd is the

nominated undertaker in relation to the works subject to this Plans and Specifications submission ([Link to the Act](#)).

1.4.2 Section 20 to the Act grants deemed planning permission for the works authorised by it, subject to the conditions set out in Schedule 17. Schedule 17 includes conditions requiring the following matters to be approved or agreed by the relevant local planning authority (LPA).

- Construction arrangements (including large goods vehicle routes);
- Plans and Specifications;
- Bringing into use requests; and
- Site restoration schemes.

1.4.3 This is therefore a different planning regime to that which usually applies in England (i.e. the Town and Country Planning Act) and is different in terms of the nature of submissions and the issues that the LPAs can have regard to, in determining requests for approval.

1.4.4 Schedule 17 of the Act sets out the grounds on which the LPA may impose conditions on approvals or refuse requests for approval.

1.4.5 This Written Statement includes information supporting the Plans and Specifications submission in relation to the matters outlined in **Table 2** below.

Table 2: Schedule 17 Plans and Specifications Submission Details

Site	Details
Plans and Specifications (permanent works)	• Twyford Embankment (Part of) • Twyford Viaduct • PBI/5A Accommodation Overbridge • Cowley Embankment • Twyford Cutting • Godington East Viaduct (Part of) • Godington West Viaduct (Part of) • Godington East Embankment • Chetwode Embankment (Part of) • Earthworks required to bridleway CHW/24/1 and Byway PBI/5A/3 and new maintenance access track off Byway PBI/5A/3 • Godington East Culvert (above ground elements only) • Godington West Culvert (above ground elements only) • Location of the Vehicle Restraint Barriers • Diversion of Padbury Brook and other watercourses (Part of) • 9 No. Drainage Ponds • Drainage Ditches • 2 No. Flood Compensation Areas • 1 No. Vehicle Restraint Bund • Noise Barriers, and • Location of the permanent (security) fencing.

- 1.4.6 The works to which this application relates, and the cumulative impact of the works in conjunction with other HS2 development, have been assessed and are compliant with paragraph 1.1.3 (bullet point 2) of the HS2 Phase 1 Environmental Minimum Requirements General Principles¹.

1.5 High Speed Two: Code of Construction Practice

- 1.5.1 HS2 Ltd as the nominated undertaker is contractually bound to comply with the controls set out in the Environmental Minimum Requirements (EMRs). The EMRs include the HS2 Code of Construction Practice (CoCP) (London-West Midlands Environmental Statement - Environmental Minimum Requirements - Annex 1: Code of Construction Practice) (February 2017) ([Link to EMR CoCP](#)).
- 1.5.2 The works subject to this request for approval of Plans and Specifications will be undertaken in accordance with the CoCP, and with the Class Approval issued by the Secretary of State (March 2017)².

1.6 Schedule 17 Statutory Guidance

- 1.6.1 The Schedule 17 Statutory Guidance issued by the Secretary of State (April 2021)³ provides guidance to all planning authorities determining requests for approval under Schedule 17 to the Act. Paragraph 20 of the Statutory Guidance states that planning authorities should not through the exercise of Schedule 17 seek to modify controls already in place such as the Environmental Minimum Requirements, other controls in the Act such as those under Schedule 4 or 33, or existing legislation.
- 1.6.2 As set out in the Statutory Guidance, Local Planning Authorities may request additional information they consider necessary to make a decision on the application. Planning authorities must only address relevant considerations when making a determination under Schedule 17. Therefore, any information requested should be relevant to the limited specified grounds of refusal. Annex 1 to PFN 17, Information for Decision Making, sets out further guidance on what information could be required to make Schedule 17 decisions. The need for further information should be identified during the pre-application stage.
- 1.6.3 When making decisions, Local Planning Authorities should have regard to the grounds set out in paragraphs 2(5) and (6) of Schedule 17. LPAs should clearly identify both the planning matter and the specific ground if proposing a conditional approval, or refusal of an application. The planning authority should also explain and give reasons as to why and how the design or external appearance ought to be modified relevant to the grounds.

¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/618074/General_principles.pdf

² <https://www.gov.uk/government/publications/high-speed-rail-london-west-midlands-act-2017-class-approval>

³ <https://www.gov.uk/government/publications/high-speed-rail-london-to-west-midlands-act-2017-schedule-17-statutory-guidance/high-speed-rail-london-west-midlands-act-2017-schedule-17-statutory-guidance>

1.7 Structure of Written Statement

1.7.1 This Written Statement is structured as follows:

- A description of the location and main characteristics of the works area is provided in **Section 2**;
- **Section 3** describes the main works being undertaken in the area, as set out in Schedule 1 of the Act, and those that are the subject of this Schedule 17 Plans and Specifications submission;
- The design criteria and rationale for the works which are the subject of this Schedule 17 Plans and Specifications submission are described in **Section 4**;
- **Section 5** summarises the pre-submission engagement that was undertaken, including a list of the consultees, dates, attendees at meetings and a brief summary of the outcome of these discussions;
- A high level programme for the works and how they fit into the wider programme for other works in the area, as set out in Schedule 1 of the Act, is provided in **Section 6**; and
- **Section 7** identifies any other main consents, or known forthcoming consents associated with the works.

2 Site Location and Characteristics

2.1 Site Location

- 2.1.1 The site is located approximately 8km to the north-east of Bicester and extends from the north-east of Twyford village to the west of Chetwode village. The site broadly follows the alignment of the former Great Central Main Line (GCML) disused railway.
- 2.1.2 The site crosses the Padbury Brook three times and passes to the east of Godington village. Padbury Brook demarcates the administrative boundary between BC and CDC.
- 2.1.3 The site is centred on National Grid Reference X (Easting) 465519 and Y (Northing) 227723 and lies between HS2 line chainages 82+180 and 84+900. The Twyford to Chetwode Site Location Plan (Drawing No. 1MC06-CEK-TP-DLO_CS06_CL10-000002) shows the extent of the Schedule 17 application site boundary in blue and the site in relation to the surrounding area. The site area includes land to the east and west of the HS2 line.
- 2.1.4 The nearest residential properties to the site are the farmsteads that surround the site and the residential properties located in Twyford and Godington.
- 2.1.5 The Development Plan for the site comprises of the adopted Aylesbury Vale District Local Plan (AVDC LP 2004) and the Proposed Submission Vale of Aylesbury Local Plan (VALP 2018). These documents identify the entire site as falling outside of a defined settlement boundary and within the open countryside.
- 2.1.6 Policy T2 of the VALP states 'The Council will continue to work with High Speed 2 Ltd with the aim of influencing the design and construction of the route through Aylesbury Vale to minimise adverse impacts and maximise any benefits that arise from the proposal. Subject to being within the provisions of the Act, the implementation of HS2 will also be expected to:
- a. deliver high-quality design to protect local communities and the environment
 - b. prevent or reduce prejudicial effects on road safety or on the free flow of traffic and to preserve sites of archaeological or historic interest or nature conservation value
 - c. ensure that community and other benefits are fully realised'.
- 2.1.7 The site largely falls within the Northamptonshire Vale Estates Farmland Landscape Character Area (LCA). A small section of the site falls within the Preston Bissett Plateau Edge LCA. The LCAs are shown on the Twyford to Chetwode Landscape Context Plan (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000016).

2.2 Site Characteristics

Land Use

- 2.2.1 The site is predominantly rural in character, with agriculture being the main land use. The area outside of the site is also rural in character, predominantly comprising arable land with pockets of woodland. The area is interspersed with a scattering of isolated residential properties and farmsteads. The Padbury Brook flows in a north easterly direction, meandering between Twyford and Godington.

Ecological Assets

- 2.2.2 The main environmental features relevant to the site comprise of Twyford Biological Notification Site (BNS), Preston Bissett Local Wildlife Site (LWS) and Padbury Brook and tributaries. The LWS lies outside of the site. These sites are shown on the environmental baseline map for the area (Map CT-10-030 of the Community Forum Area 13 Map Book) ([Link to Community Forum Area 13 Map Book](#)).
- 2.2.3 The Twyford BNS is part of the former GCML disused railway and is designated for diverse grassland amongst Hawthorn scrub. A small area of the BNS lies within the site with the majority of it lying outside of the site but immediately adjacent.
- 2.2.4 Surveys undertaken prior to 2013 to inform the HS2 Phase 1 Environmental Statement (HS2 Phase 1 ES) (London-West Midlands ES Volume 2 Community Forum Area Report, CF13 Calvert, Steeple Claydon, Twyford and Chetwode, November 2013) ([Link to Vol 2](#)) found that the features for which the BNS was designated are now degraded or absent and the site mainly contains species-poor semi-improved grassland. The grassland is dominated by False Oat-grass and more species-rich grassland is declining due to lack of management by cutting or grazing. Although the BNS is valued at county / metropolitan level by virtue of its designation, its integrity is compromised, and the grassland lacks sufficient diversity to qualify as a habitat of principal importance and is instead valued at a local/parish level.

Heritage Assets

- 2.2.5 There are several designated heritage assets located within 1km of the site. These are shown on the environmental baseline map for the area (Map CT-10-030 of the Community Forum Area 13 Map Book) ([Link to Community Forum Area 13 Map Book](#)).
- 2.2.6 The Listed Buildings within Twyford include the following:
- Grade I - Church of St Mary
 - Grade II
 - Claydon Place
 - Cottages to North of Junction with Mill Lane
 - Cross in Churchyard
 - Old Post Cottage

- St Mary's House
- The Haven
- The Old Post Office
- The Red Lion
- Twyford Mill

2.2.7 There are medieval earthworks north, north-east and west of Twyford and several lengths of historic hedgerow near Godington.

2.2.8 The site is not within close proximity to any Scheduled Monuments or Conservation Areas.

2.2.9 Archaeological investigations have been undertaken by the Enabling Works Contractor (EWC) in advance of permanent works. Details of these investigations can be found at section 3.7 of this Written Statement.

Water and Flood Risk

2.2.10 The site is predominantly within Flood Zone 1. Part of the site falls within the Padbury Brook floodplain which is in Flood Zones 2 and 3.

2.2.11 Areas deemed to be in Flood Zone 1 have a low probability of flooding (land having a less than 1 in 1,000 annual probability of river or sea flooding).

2.2.12 Flood Zone 2 has a medium probability of flooding (Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding).

2.2.13 Flood Zone 3 has a high probability of flooding (Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding).

2.2.14 The site does not cross any Source Protection Zones (SPZ).

2.3 Surrounding Transport Infrastructure

2.3.1 The site runs broadly parallel to the M40 motorway, which is located approximately 11km to the west of the site at its nearest point.

2.3.2 The A421 runs broadly east to west to the north of the site connecting with the A4421 Tingewick Road at Finmere in the north-east. The A421 is located approximately 3km to the north of the site at its nearest point. The A4421 is located approximately 2.9km to the northwest of the site at its nearest point. The remainder of the local road network consists of minor roads.

2.3.3 There are several Public Rights of Ways (PRoWs) that bisect the site or are within the local vicinity of the site. All of these are shown on the Twyford to Chetwode Site Location Plan (Drawing No. 1MC06-CEK-TP-DLO_CS06_CL10-000002).

3 Description of the Works

3.1 Introduction

- 3.1.1 This Written Statement supports an application for a Schedule 17 Plans and Specifications submission for the proposed works between Twyford to Chetwode as outlined in Tables 1 and 2 of this Written Statement.
- 3.1.2 References to the 'Proposed Scheme' refer to all the works within the site unless otherwise specified.
- 3.1.3 The plans submitted for approval and for information are listed in the Proforma accompanying this application (Document Ref. 1MC06-CEK-TP-APP-CS06_CL10-000002).
- 3.1.4 The Scheduled Works under the Act associated with this submission are set out in Section 3.2. A description of the proposed works for approval are set out in Section 3.3.
- 3.1.5 Section 3.4 summarises the indicative mitigation relevant to the works being submitted in accordance with paragraph 7.5.2 of the Planning Memorandum. The information in Section 3.4 is not for approval under Schedule 17 Plans and Specifications.
- 3.1.6 Sections 3.5 – 3.7 provide information on other aspects of the works to assist in understanding the context of the works being submitted for approval. The information in Sections 3.5 - 3.7 is not for approval under Schedule 17 Plans and Specifications.
- 3.1.7 Information on the 'design rationale and justification for this submission is set out in Section 4.

3.2 Scheduled Works

- 3.2.1 The relevant Scheduled Works as set out under Schedule 1 of the Act to which this Schedule 17 submission relates are:
- *Work No. 2/49 - A railway (33.55 kilometres in length), partly in tunnels and partly on viaducts, commencing by a junction with Work No. 2/28 at its termination and terminating at a point 220 metres north-west of the junction of The River Great Ouse with Well Stream. Work No. 2/49 includes viaducts over the River Thame, Padbury Brook and the River Great Ouse and bridges over Fleet Marston Brook, the River Ray and Muxwell Brook.*
 - *Work No. 2/82 - A railway (4.77 kilometres in length) commencing at a point 154 metres west of Queen Catherine Road level crossing over the Bicester to Bletchley Line and terminating at a point 160 metres east of the bridge carrying the dismantled railway over Padbury Brook. Work No. 2/82 includes a depot.*

- *Work No. 2/96 - A bridge over Work No. 2/49, commencing on bridleway PBI/5A/3 at a point 206 metres west of the junction of PBI/5(F)/7 with the dismantled railway and terminating at a point 304 metres north-west of that junction.*
- *Work No. 2/96A - An access road commencing by a junction with the termination of Work No. 2/96 at a point 304 metres north-west of the junction of footpath PBI/5(F)/7 with the dismantled railway and terminating at a point 176 metres north-east of the junction of Byway PBI/5A/1 with footpath PBI/5(F)/5.*
- *Work No. 2/96C - An access road commencing at a point 30 metres north of the junction of bridleway CHW/24/2 with bridleway 225/4 and terminating at a point at the junction of bridleway CHW/24/2 with The Green. Work No 2/97 - A diversion of Padbury Brook commencing at a point 38 metres east of the junction of bridleway CHW/24/2 with bridleway 225/4 and terminating at that junction.*

3.3 Description of the Proposed Works for Approval

- 3.3.1 Through the site, the HS2 line will continue in a southeast to north-west direction onto Viaducts, one north of Twyford ('Twyford Viaduct') and two east of Godington ('Godington East Viaduct' and 'Godington West Viaduct'). These Viaducts are required to cross Padbury Brook and to reduce habitat loss and fragmentation of the watercourse.
- 3.3.2 The works for approval comprise of those parts of the Viaducts and associated earthworks that falls within BC's administrative area. The 'other part of' the Godington East and West Viaducts that fall within CDC will be the subject of a separate Schedule 17 application to CDC (CDC Package 1). The 'other part of' Twyford Embankment (AVDC Package 13b) and Chetwode Embankment (AVDC Package 15) will be the subject of separate Schedule 17 submissions to BC.
- 3.3.3 Other works that require approval include PBI/5A Accommodation Overbridge, Cowley Embankment, Twyford Cutting, Godington East Embankment, earthworks required to bridleway CHW/24/1 and Byway PBI/5A/3 and new maintenance access track off Byway PBI/5A/3, Godington East Culvert, Godington West Culvert, location of the vehicle restraint barriers, diversion of Padbury Brook and other watercourses (Part of), nine drainage ponds, drainage ditches, two Flood Compensation Areas, one vehicle restraint bund, noise barriers, and location of the permanent (security) fencing. With regards to the culverts only those works above ground require approval.
- 3.3.4 All the works for approval are described below and are shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.5 The Proposed Scheme accords with the HS2 Phase 1 Environmental Statement (ES) (London-West Midlands ES Volume 2 Community Forum Area Report, CF13 Calvert, Steeple Claydon, Twyford and Chetwode, November 2013), as described in paragraphs 2.2.13 to 2.2.16 ([Link to Vol 2 Community Forum Area Report 13](#)).

- 3.3.6 The scheme assessed in the HS2 Phase 1 ES is shown on the maps for the area (Map CT-06-057, CT-06-57 L1, CT-06-058 and CT-06-58 L1 of the Community Forum Area 13 Map Book) ([Link to Community Forum Area 13 Map Book](#)).

Proposed Structures for Approval

- 3.3.7 The location and appearance of Twyford Viaduct, Godington East Viaduct and Godington West Viaduct, PBI/5A Accommodation Overbridge and the other structures for approval are shown on the following drawings for approval.

Twyford to Chetwode General Arrangement Plan – For Approval Sheet 1 of 2	1MC06-CEK-TP-DGA-CS06_CL10-000011
Twyford to Chetwode General Arrangement Plan – For Approval Sheet 2 of 2	1MC06-CEK-TP-DGA-CS06_CL10-000012
Twyford Viaduct General Arrangement Plan - For Approval	1MC06-CEK-TP-DGA-CS06_CL10-000017
Twyford Viaduct Plan Details - For Approval	1MC06-CEK-TP-DGA-CS06_CL10-000019
Godington East and West Viaducts General Arrangement Plan - For Approval	1MC06-CEK-TP-DGA-CS06_CL10-000021
Godington East and West Viaducts Plan Details - For Approval	1MC06-CEK-TP-DGA-CS06_CL10-000023
Godington East and West Viaducts Superstructure and Pier Elevation and Section	1MC06-CEK-TP-DSE-CS06_CL10-000006
Godington East and West Viaducts Superstructure Longitudinal Section	1MC06-CEK-TP-DSE-CS06_CL10-000007
Twyford Viaduct Superstructure and Pier Elevation and Section	1MC06-CEK-TP-DSE-CS06_CL10-000013
Twyford Viaduct Superstructure Longitudinal Section	1MC06-CEK-TP-DSE-CS06_CL10-000014
Twyford Viaduct Elevation and Longitudinal Section - For Approval	1MC06-CEK-TP-DSE-CS06_CL10-000027
Twyford Viaduct Abutment Section - For Approval	1MC06-CEK-TP-DSE-CS06_CL10-000029
PBI/5A Accommodation Overbridge Longitudinal Section and Elevation – For Approval	1MC06-CEK-TP-DSE-CS06_CL10-000031
Godington East and West Viaducts Elevations and Section – For Approval	1MC06-CEK-TP-DSE-CS06_CL10-000033

Godington East and West Viaducts Abutment Section	1MC06-CEK-TP-DSE-CS06_CL10-000035
Godington East and West Viaducts Parapet Details	1MC06-CEK-TP-DDE-CS06_CL10-000001
Godington East and West Viaduct Plan on Deck Details	1MC06-CEK-TP-DDE-CS06_CL10-000003
Godington East and West Viaduct Reflected Soffit Plan Details	1MC06-CEK-TP-DDE-CS06_CL10-000004
Twyford Viaduct Plan on Deck Details	1MC06-CEK-TP-DDE-CS06_CL10-000012
Twyford Viaduct Reflected Soffit Plan Details	1MC06-CEK-TP-DDE-CS06_CL10-000013
Twyford Viaduct Noise Barrier Details	1MC06-CEK-TP-DDE-CS06_CL10-000015
PBI/5A Accommodation Overbridge Cross Section and Parapet Details - For Approval	1MC06-CEK-TP-DDE-CS06_CL10-000019
Twyford Viaduct Noise Barrier Transition Details	1MC06-CEK-TP-DDE-CS06_CL10-000022
Godington East and West Viaducts and Twyford Viaduct Pier Details	1MC06-CEK-TP-DGA-CS06_CL10-000026
Godington East and West Viaducts and Twyford Viaduct Superstructure Exploded Axonometric	1MC06-CEK-TP-DDE-CS06_CL10-000042
PBI/5A Accommodation Overbridge Plan on Deck – For Approval	1MC06-CEK-TP-DPL-CS06_CL10-000067
Godington East Culvert Plans and Sections	1MC06-CEK-TP-DPL-CS06_CL10-000069
Godington West Culvert Plans and Sections	1MC06-CEK-TP-DPL-CS06_CL10-000071

3.3.8 A description of each structure within the site is provided below. These should be read in conjunction with the plans being submitted for approval.

Viaducts and Overbridges

3.3.9 Twyford Viaduct, Godington East Viaduct and Godington West Viaduct and PBI/5A Accommodation Overbridge have been designed in accordance with the HS2 Design Principles and other relevant HS2 standards.

3.3.10 The structures align with the design rationale for the Common Design Elements (CDEs) being developed and reviewed with the main works contractors and Design Panel. The CDEs include frequently used structures, such as bridge piers and parapets, which form part of this submission.

3.3.11 The CDEs have been the subject of a thorough engagement process in terms of their appearance and comply with HS2's goal of ensuring the HS2 infrastructure is easily recognisable as a brand and has a standardised appearance. Piers and parapets have

now been formally approved by the Planning Forum. The design for the CDEs follows what has been discussed as the CDE design approach.

- 3.3.12 The CDE structures are the normal starting point for determining the design of HS2 works as they support efficiencies in design and construction.
- 3.3.13 The parapets include a 'crease' a third of the way up the parapet. The bottom third is gently angled to face the ground and the top two thirds are angled towards the sky. The horizontal crease a third of the way up the parapet is to provide a subtle contrast of light and shadow while the bottom edge of the parapet extends below the deck level to partially conceal the structural depth and throw the beams that support the deck into shadow. The parapets on the Twyford Viaduct will also act as a noise barrier.
- 3.3.14 The Viaduct parapets follow the profile of the track alignment whilst the overbridge parapets follow the profile of the highway alignment. The parapets extend beyond the abutments to allow for a 'wrapping' down of the landform to the wing wall edge to reduce their height such that the parapet is the defining feature of the structure. In distant views the parapets will be the visible elements of the structure more so than the wing walls.
- 3.3.15 The parapet joints are consistent along the entire length of an individual structure and will be formed in pre-cast concrete. The external parapet face will be plain concrete.
- 3.3.16 The viaduct deck will be formed using reinforced concrete supported on prestressed concrete beams that span longitudinally between the support piers/abutments.
- 3.3.17 The bridge piers, abutments and wingwalls will be formed using reinforced concrete and these in turn will be supported on reinforced concrete piles.

Twyford Viaduct, Godington East Viaduct (Part of) and Godington West Viaduct (Part of)

- 3.3.18 Twyford Viaduct will extend from chainage 82+290 to 82+350), Godington East Viaduct from chainage 84+070 to 84+145 and Godington West Viaduct from chainage 84+392 to Ch 84+467. The Viaducts will carry the HS2 line over Padbury Brook and its floodplain.
- 3.3.19 Only part of Godington East and Godington West Viaducts falls within this package, the remaining parts fall within the CDC's administrative area and are included in the CDC Package 1 Godington that will be submitted to CDC.
- 3.3.20 Twyford Viaduct crosses Padbury Brook approximately 250m north-east of the village of Twyford. The Viaduct will be a compact and low-lying structure minimising impact on farmland and the adjoining riparian woodland. The Viaduct will be visible from PRoW PBI/6/3 that passes close to and beneath the structure, therefore, the appearance and legibility of the viaduct at a close distance is of particular importance.
- 3.3.21 Godington East Viaduct and Godington West Viaduct also cross Padbury Brook, together with a connecting section of embankment straddling a pronounced bend in the watercourse approximately 2km north-west of Twyford. As with Twyford Viaduct,

the structures will be experienced at close quarters due to the alignments of PRoW CHW/24/2 and PBI/9/3 passing near to each viaduct

- 3.3.22 Given the close proximity of the Viaducts to one another, commonality of detail and structural form is considered to be important. As such, the Viaducts have been developed as a family of structures with a similar structural form comprising of a prestressed concrete U beam and in-situ slab deck supported on bearings at intermediate twin leaf piers and low-level wall abutments. The parapets are precast and will be stitched to the in-situ deck
- 3.3.23 Godington East Viaduct and Godington West Viaduct are four span 'identical twins' with Twyford Viaduct being the more compact sibling at three spans.
- 3.3.24 The total length of Twyford Viaduct will be approximately 60m (3x20m spans and abutments), 12.15m wide with the track height approximately 5m above (track height) existing ground level. The existing ground level ranges from 83m to 88m AOD.
- 3.3.25 The total length of Godington East and Godington West Viaducts are each 75m in length, 12.75m wide with the track height approximately 5.5m above (track height) existing ground level. The existing ground level ranges from 86m to 89m AOD. The approach embankments either side of the Viaducts will provide a ramp from the ground level to deck level.
- 3.3.26 In terms of visual impact, the established vertical alignment of the route provides significant aesthetic advantages to the design of these three viaducts – each structure will be low slung, with the average soffit level approximately 3m above the underlying proposed ground profile. From much of the surrounding area the subtle undulations of the existing topography will provide a significant masking effect to the viaducts, especially in the case of distant views where the main visible components will be the adjacent embankments and trackside mounted Overhead Catenary System (OCS).
- 3.3.27 In terms of the design of the Viaducts, they follow the classic Viaduct principles of simple, evenly spaced vertical piers combined with predominantly below deck structure.
- 3.3.28 Care has been taken to simplify the profile of the deck spans as much as possible while unifying the deck and pier connection – breaking up the length of each viaduct into discrete and identifiable individual spans, much like the individual arches on their brick-built predecessors.
- 3.3.29 The Godington East and West Viaducts feature simple abutments that step up from the embankment slope to receive the ends of the structure. Just as the bearings at the piers are masked in elevation the end bearings are also partially concealed by cheek walls that are cut parallel to the embankment face; a feature that visually marries the ends of the structure to the piers and diaphragms along its length.
- 3.3.30 Beyond the end bearings the parapets continue to the ends of the abutment structures where they meet the full height of the approach embankments. In plan these extensions to the parapet line follow a splayed alignment parallel to the splay in

the robust kerb that provides containment for the train as it crosses the viaduct. The end parapet units are then tapered downwards in elevation to meet track level – as a continuation of the simple angled language of the structure and providing a neat end to the viaduct.

- 3.3.31 At Twyford Viaduct the splayed ends on the west side of the tracks have been modified to provide a vertical end face in order to permit the lineside noise barriers to directly abut the parapet in order to ensure continuation of the acoustic line. The modified transition panel incorporates diagonal fold lines to manage the change in profile from the faceted parapet cross section to the flat elevation of the noise barriers.
- 3.3.32 The appearance of the Viaducts can be seen on the 3d visual perspectives Sheets 1 - 4 (Drawing Nos. 1MC06-CEK-TP-DDE-CS06_CL10-000033, 1MC06-CEK-TP-DDE-CS06_CL10-000034, 1MC06-CEK-TP-DDE-CS06_CL10-000035 and 1MC06-CEK-TP-DDE-CS06_CL10-000036). These drawings are submitted for information only.

PBI/5A Accommodation Overbridge

- 3.3.33 PBI/5A Accommodation Overbridge is required to maintain access to Cowley Farm and will carry PBI/5A, PBI/5(F), PBI/6/2, PBI/6/3 PRowS over the HS2 line. It will be a restricted byway, which means it will be a public right of way for those on foot, horseback, or cycle but not unauthorised motor vehicles.
- 3.3.34 The Overbridge will be 67.5m in length, 5.95m wide and up to 8m above existing ground level. The existing ground level ranges from 90m to 95m AOD.
- 3.3.35 The construction of the Overbridge will involve land clearance and the construction of approach embankments. The approach embankments either side of the Overbridge will provide a ramp from existing ground level to deck level.
- 3.3.36 The Overbridge is a three-span structure crossing HS2 at a slight skew in plan. The near symmetry of the bridge combined with the subtle curve of the parapet results in an understated and well-mannered design that follows classic bridge principles of a longer main span and relatively shorter back-spans.
- 3.3.37 The detailing of the Overbridge follows the principles established for Viaducts and other Overbridges. The deck will be formed using precast concrete U beams with an in-situ reinforced concrete slab. The piers comprise a pair of reinforced concrete columns supported on piles whilst the abutments comprise of a piled bank seat arrangement with short wingwalls. Precast parapets extend along the length of the deck and wingwalls either side.
- 3.3.38 The parapet line is brought forward of the supporting beams to provide a shadow line, while the geometry of the pier is continued upwards, also proud of the beams, to visually connect the supports with the curve of the parapet.

Godington East Culvert

- 3.3.39 Godington East Culvert is required for land drainage.

- 3.3.40 Godington East Culvert will be a box culvert with internal dimensions of 3m height by 2.5m width. A 0.5m wide by 0.15m thick mammal ledge with a headroom height of 0.9m will be incorporated in the culvert design to allow for safe passage of otters and badgers across the route. On either side of the culvert there will be a maintenance access track.
- 3.3.41 Only those works above ground associated with the culvert require approval through Schedule 17. Most of the culvert is below ground, however above ground elements comprise the opening and wingwalls (which protrude vertically to retain the embankment) which tie into any associated fencing. This culvert also incorporates a mammal ledge to allow wildlife to cross the HS2 line without going near the track.
- 3.3.42 Details of the culvert are shown on the Godington East Culvert Plans and Sections (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000069).

Godington West Culvert

- 3.3.43 Godington West Culvert is required for land drainage.
- 3.3.44 Godington West Culvert will be a box culvert with internal dimensions of 3m height by 2.5m width. This is large enough to allow bats to fly safely through it under the HS2 line. A 0.5m wide by 0.15m thick mammal ledge with a headroom height of 0.9m has been incorporated in the culvert design to allow for safe passage of otters and badgers across the route. On either side of the culvert there will be a maintenance access track.
- 3.3.45 Only those works above ground associated with the culvert require approval through Schedule 17. Most of the Culvert will be below ground, however above ground elements comprise of the opening and wingwalls (which protrude vertically to retain the embankment) which tie into any associated fencing. This Culvert also incorporates a mammal ledge to allow wildlife to cross the line without going near the track.
- 3.3.46 Details of the culvert are shown on the Godington West Culvert Plans and Sections (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000071).

Location of the Vehicle Restraint Barriers

- 3.3.47 Only the location of the vehicle restraint barriers requires Schedule 17 Plans and Specifications approval. The design of the vehicle restraint barriers is not yet known; however, such details are not subject to approval under Schedule 17 of the Act.
- 3.3.48 The location of the barriers is shown on the Twyford to Chetwode General Arrangement Plan - For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.49 Vehicle restraint barriers are proposed on both sides of the approach embankments to the PBI/5A Accommodation Overbridge as well as part way along the maintenance access track off PBI/5 on the eastern side of the HS2 line.
- 3.3.50 The number of vehicle restraint barriers has been kept to an absolute minimum to reduce visual impact. They have only been used when other measures have been

considered inappropriate or ineffective to reduce the number and severity of injuries, in the event that a vehicle leaves the carriageway and would otherwise encounter a hazardous feature.

Noise Barriers

- 3.3.51 A 'Lineside' noise barrier is proposed within the site on the approach embankments to Twyford Viaduct between chainages 82+200 to 82+289 and 82+360 to 82+500 on the west (down) side of the HS2 line only. The noise barriers are designed to help reduce the perceived sound of the high-speed trains.
- 3.3.52 Noise barrier provision on Twyford Viaduct will be achieved by a 1.85m in height (above ToR) parapet on the west (down) side only. The parapet will be constructed from pre-cast concrete and will incorporate absorptive features.
- 3.3.53 No noise barrier provision is required on the Godington Viaducts. The parapet on the east (up) side of Twyford Viaduct and on both sides of the Godington Viaducts will be a standard concrete parapet 1.25m in height (ToR). The standard parapets have no specialist acoustic features, such as absorptive panels.
- 3.3.54 Top of Rail (ToR) means that the noise barrier will vary in height compared to the ground level. ToR means that the actual noise barrier height will vary in height based on local ground conditions. As a guiding statement, the actual noise barrier height from proposed ground level can be expected to be approximately 1.0m taller than the reported ToR height.
- 3.3.55 The location of the lineside noise barriers are shown on the Twyford to Chetwode General Arrangement Plan - For Approval Sheet 2 (Drawing No. 1MC06-CEK-TP-DGA-CS06_CL10-000012), Twyford Viaduct Noise Barrier Details (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000015 and on the Twyford Viaduct Noise Barrier Transition Details (Drawing No. 1MC06-CEK-TP- DDE-CS06_CL10-000022) . The location of the 1.85m high parapet on Twyford Viaduct is shown on Twyford Viaduct Noise Barrier Transition Details (Drawing No. 1MC06-CEK-TP- DDE-CS06_CL10-000022).
- 3.3.56 The proposed appearance of the noise barriers and parapets are shown on the following drawings:-
- Godington East and West Viaduct Parapet Details - 1MC06-CEK-TP-DDE-CS06_CL10-000001
 - Twyford Viaduct Noise Barrier Details - 1MC06-CEK-TP-DDE-CS06_CL10-000015
 - Twyford Viaduct Noise Barrier Transition Details - 1MC06-CEK-TP-DDE-CS06_CL10-000022
- 3.3.57 The height and extent of the noise barriers and the 1.85m parapet on Twyford Viaduct is set out in **Table 3** below.

Table 3: Noise Barrier Details

Location	Start Chainage	End Chainage	Length (m)	Up / Down Line	Barrier Type	Height Above Top of Rail (ToR) (m)
Twyford Viaduct	82+200	82+289	89	Down	C	4
	82+289	82+360	69	Down	Parapet	1.85
	82+360	82+500	140	Down	B	3

- 3.3.58 The lineside noise barrier has a standardised appearance to give HS2 a recognisable look but has also been designed to be sensitive to their surroundings where they will be visible to the public.
- 3.3.59 A Type B barrier is proposed within the site to the north of Twyford Viaduct because it will be visible to the public. The steel posts are hidden from view to give the barrier a more seamless and coherent appearance and includes a curved top panel.
- 3.3.60 A Type C barrier is proposed within the site to the south of Twyford Viaduct because the barrier will be visible to the public and the height exceeds 3m above top of rail. The steel posts will be hidden from view, similar to the Type B barrier, and the top section of the noise barrier will be cranked towards the HS2 tracks at approximately 25° from the vertical.
- 3.3.61 Facing the HS2 line, the internal surface of the noise barrier will be lined with acoustically absorptive material. The finish to the inner and outer face on the concrete panels of the noise barriers, including the absorptive material will be agreed with the LPA via a planning condition
- 3.3.62 Where the barrier is required to change in height, a 45-degree transition panel has been used to avoid a sudden stop or stepping in the barrier. The noise barrier drops to 1.0m ToR at its termination.
- 3.3.63 The noise barrier will be constructed and installed in sections, using steel posts and concrete panels. The noise barrier has been designed to maximise the use of precast concrete panels to ensure a high quality form and surface is achieved. Precast concrete panels also provide a durable and long-lasting structural solution requiring minimal maintenance.
- 3.3.64 The Viaduct and lineside noise barrier interfaces are to be dealt with as a continuous line that follows the splay of the wingwalls and robust kerb as they transition off the Viaduct and on to the earthworks. Lineside barrier ends will taper in the line of the embankment slope.

Location of the Permanent Fencing

- 3.3.65 HS2 needs to be continuously fenced for security and safety purposes to prevent access for trespassers. However, the location and type of fencing used is dependent on the security, its functional requirement, and the nature of the local landscape characteristics. Wherever possible, fencing has been avoided.
- 3.3.66 Only the location of the permanent fencing requires Schedule 17 Plans and Specifications approval. The permanent fencing comprises of boundary fencing and security fencing.
- 3.3.67 The location of the boundary fencing has not yet been determined; therefore, this will form part of a Schedule 17 Site Restoration / Plans and Specifications future application. The Act does not stipulate all items subject to Schedule 17 approval must be submitted as one single application.
- 3.3.68 The location of the permanent fencing (security fencing) is shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.69 The appearance (type) of fencing is not subject to Plans and Specifications approval and any detail provided is for information only. The type of security fencing proposed is shown on the Twyford to Chetwode General Arrangement Plan – For Information Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000013 and 1MC06-CEK-TP-DGA-CS06_CL10-000014). The colour of the security fencing will be powder coated black, as the most sympathetic in terms of landscape integration.
- 3.3.70 Security fencing will be located around the operational railway boundary, which includes the associated engineered earthworks that need to be secured to safeguard them from any damage. The security fencing will be continuous along the toe of embankments and top of cuttings. Where security fencing has been removed around ponds by agreement of a departure from HS2 standards, stock proof fencing is proposed. The purpose of the stock proof fencing is to delineate perimeters or boundaries and mitigate health and safety risk.
- 3.3.71 As required by the HS2 Technical Standards, the security fencing has been located a minimum of 1.0m away from the top of the cutting or embankment toe and will tie into the headwalls for the bridges and culverts. However, wherever possible these standards have been challenged to make positive improvements to the Proposed Scheme and to address comments made during the pre-application meetings. The standards have been challenged by doing the following:-
- Changing the standard for fencing around the ponds to stock proof fencing instead of Type 2 or Type 3 security fencing, wherever possible;
 - Rationalising the amount of fencing around the ponds by aligning the fencing so that it is integrated with existing or proposed field boundaries and hedgerows or structures;

- The tie-ins adjacent to the structures and overbridges have been amended to reduce visual impact by aligning the fencing so that it sits as low as possible on the new approach earthworks and to maximise the ability of the landscape design to screen it; and
- Wherever possible, the design has utilised the noise barrier or parapet as a security feature to reduce cluttering.

3.3.72 In challenging the HS2 standards consideration has been given to the following considerations:-

- Access to the security fencing for maintenance. A reasonably level 3m wide strip should normally be provided parallel to the fence line for maintenance operations;
- The security requirement of the fencing;
- The visibility of the fencing; and
- The design implications of locating the fencing closer to the operational railway.

3.3.73 As a consequence, the type of security fencing proposed and where it will be used is set out below:

- Stock Proof Fencing - will be located around the perimeter of the drainage ponds.
- Security Area Fencing Type 2 - will be located around embankments and cuttings.
- Security Area Fencing Type 3 - will be located on the approach to the proposed Viaduct abutments and adjacent to the PRoW at the PBI/5A Accommodation Overbridge.

3.3.74 The security fencing has been designed to incorporate ecological requirements to prevent animals accessing the tracks. Where provision for mammals is made through culverts by the inclusion of a mammal ledge, the security fencing either side of the culvert entrances will be made impermeable to badgers (*Meles meles*) and otters (*Lutra lutra*). It is proposed that this will be done by providing a barrier 50m either side of the culvert entrances that will extend the fence 300mm below ground level and will include a minimum 300mm kick back at the bottom of the fence, away from the operational railway.

3.3.75 The design and height of the permanent gates will be the same as the adjacent section of fence to ensure that security is not compromised by the gate when it is locked.

3.3.76 Two types of gates are proposed, one that allows for pedestrian access which will be located on footpath access points and has a width of 1.2m. The other is a vehicular access gate which will be located at vehicular access roads or tracks with a width of 4m. The vehicular access gates will have a pedestrian gate attached to allow safe passage for pedestrians using this route.

3.3.77 The location of the gates has not yet been determined; therefore, this will form part of a Schedule 17 Site Restoration / Plans and Specifications future application.

Proposed Permanent Earthworks for Approval

3.3.78 The proposed earthworks for approval are shown on the following drawings for approval. Landform Plans and Earthwork Cross Sections have been provided to indicate the existing and proposed ground levels.

Twyford to Chetwode General Arrangement Plan – For Approval Sheet 1 of 2	1MC06-CEK-TP-DGA-CS06_CL10-000011
Twyford to Chetwode General Arrangement Plan – For Approval Sheet 2 of 2	1MC06-CEK-TP-DGA-CS06_CL10-000012
Twyford to Chetwode Proposed Landform Plan Sheet 1 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000013
Twyford to Chetwode Proposed Landform Plan Sheet 2 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000014
Twyford to Chetwode Earthworks Cross Sections Sheet 1 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000001
Twyford to Chetwode Earthworks Cross Sections Sheet 2 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000002
Twyford to Chetwode Earthworks Cross Sections Sheet 3 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000003
Twyford to Chetwode Pond Details and Sections	1MC06-CEK-TP-DDE-CS06_CL10-000028
Padbury Brook Watercourse Diversions Sheet 1	1MC06-CEK-TP-DDE-CS06_CL10-000029
Padbury Brook Watercourse Diversions Sheet 2	1MC06-CEK-TP-DDE-CS06_CL10-000030
Padbury Brook Watercourse Diversions Sheet 3	1MC06-CEK-TP-DDE-CS06_CL10-000031
Twyford to Chetwode Flood Compensation Areas Sheet 1	1MC06-CEK-TP-DSE-CS06_CL10-000047
Twyford to Chetwode Access Tracks Sheet 1	1MC06-CEK-TP-DSE-CS06_CL10-000043
Twyford to Chetwode Access Tracks Sheet 2	1MC06-CEK-TP-DSE-CS06_CL10-000044

Twyford Embankment (Part of) and Cowley Embankment

3.3.79 The proposed Twyford Viaduct requires earthworks to lift the ground to the levels required for the Viaduct.

- 3.3.80 Twyford Embankment will extend from chainage 80+862 to 82+289, with the section subject to approval under this Schedule 17 application commencing from chainage 82+200. The total length of the embankment is approximately 1,425m long, of which approximately 89m falls within the site. The landscape mitigation earthworks will be up to 9.5m in height above existing ground level.
- 3.3.81 Cowley Embankment will extend from chainage 82+349 to 82+745 and will be approximately 396m in length. Cowley Embankment includes landscape mitigation earthworks. The total length of the landscape mitigation earthworks is approximately 300m. The landscape mitigation earthworks will be approximately 7m in height above existing ground level.
- 3.3.82 The inward slopes for the mitigation earthworks will be 1 in 4, whilst the outward slope of Twyford Embankment is variable and 1 in 8 for Cowley Embankment. The slopes of the HS2 embankments will be 1 in 2.
- 3.3.83 On the western sides of the Twyford and Cowley Embankment tree and shrub planting and grassland is proposed. On the eastern sides of the Twyford and Cowley Embankment grassland is proposed. The landscaping will help soften and overtime integrate the landscape mitigation earthworks.
- 3.3.84 The earthworks design for Twyford Embankment and Cowley Embankment is shown on the Twyford to Chetwode Earthworks Cross Sections Sheet 1 of 3 (Drawing No. 1MC06-CEK-TP-DSE-CS06_CL10-000001).

Twyford Cutting

- 3.3.85 Twyford Cutting is required to allow the HS2 line to pass beneath the PBI/5A Accommodation Overbridge.
- 3.3.86 The cutting will extend from chainage 82+745 to 83+886 and will be approximately 1,140m in length. It will be up to 5m below existing ground level. The existing ground level ranges from 90m to 95m AOD. The width of the cutting ranges from approximately 20m to 60m.
- 3.3.87 Earthworks will be carried out to create new 1 in 4 slopes. Grassland is proposed on the slopes.
- 3.3.88 The earthworks design for Twyford Cutting is shown on the Twyford to Chetwode Earthworks Cross Sections Sheet 2 of 3 (Drawing No. 1MC06-CEK-TP-DSE-CS06_CL10-000002).

Godington East Embankment

- 3.3.89 The proposed Godington East Viaduct requires earthworks to lift the ground to the levels required for the Viaduct. Godington East Viaduct will be up to 5.5 m above (track height) existing ground level. The existing ground level ranges from 85m to 90m AOD.
- 3.3.90 The approach embankments either side of Godington East Viaduct will provide a ramp from ground level to deck level. The approach embankments comprise of Godington

East Embankment and Godington West Embankment. Godington West Embankment falls outside of the site and within CDC.

- 3.3.91 Godington East Embankment will extend from chainage 83+886 to 84+070 and will be approximately 184m in length. The embankment will be up to 6m in height above existing ground level.
- 3.3.92 The engineered profile of the embankment has a slope gradient of 1 in 2.
- 3.3.93 The earthworks design for Godington East Embankment is shown on the Twyford to Chetwode Earthworks Cross Sections Sheet 3 of 3 (Drawing No. 1MC06-CEK-TP-DSE-CS06_CL10-000003).

Chetwode Embankment (Part of)

- 3.3.94 The proposed Godington West Viaduct requires earthworks to lift the ground to the levels required for the Viaduct. Godington West Viaduct will be up to 5.5 m above (track height) existing ground level. The existing ground level ranges from 85m to 90m AOD.
- 3.3.95 The approach embankments either side of Godington West Viaduct will provide a ramp from ground level to deck level. The approach embankments comprise of Chetwode Embankment (Part of) and Godington West Embankment. Godington West Embankment falls outside of the site and within CDC.
- 3.3.96 Chetwode Embankment will extend from chainage 84+467 to 84+925, with the section subject to approval under this Schedule 17 application ending at chainage 84+900. The total length of the engineered track embankment is approximately 458m, of which approximately 433m falls within the site.
- 3.3.97 The Chetwode Embankment Asset includes landscape mitigation earthworks. The total length of the landscape mitigation earthworks is approximately 480m, of which approximately 300m falls within the site. The landscape mitigation earthworks will be up to 9m above existing ground. The existing ground level ranges from 85m to 90m AOD.
- 3.3.98 At Chetwode Embankment, the landscape mitigation earthworks (east side) backslopes have been graded out to 1 in 28 in order to return the land to agricultural use and to tie-in with existing smooth flowing contours. Inward slopes will be 1 in 4.
- 3.3.99 Woodland and hedgerow planting will be used on the east side to re-establish the original field boundary and to help integrate and or screen the HS2 assets.
- 3.3.100 The earthworks design for Chetwode Embankment is shown on the Twyford to Chetwode Earthworks Cross Sections Sheet 3 of 3 (Drawing No. 1MC06-CEK-TP-DSE-CS06_CL10-000003).

Earthworks required to Bridleway CHW/24/1 and Byway PBI/5A/3 and for the new maintenance access track off Byway PBI/5A/3

- 3.3.101 Earthworks are required to Bridleway CHW/24/1 and Byway PBI/5A/3 that bisect the site to create passing places and to widen them at various pinch points because they

will be used to access HS2 (and associated structures) for inspection and maintenance. Bridleway CHW/24/1 is located between chainages 84+450 to 84+700. Byway PBI/5A/3 is located between chainages 83+100 to 83+300.

- 3.3.102 There will be no significant change in ground level to bridleway CHW/24/1 and PBI/5A/3. The changes in ground level will be localised regrading across the width of the tracks to construct a consistent crossfall from west to east side of the tracks. The works will mainly consist of surface material being applied where necessary, primarily to infill depressions in the tracks.
- 3.3.103 Between chainages 82+490 and 83+130 a new maintenance access track off Byway PBI/5A/3 is proposed. This maintenance access track will provide access to the pond located between chainages 82+520 to 82+650. The maintenance access track high point is at approximately 93m AOD sloping down south-east. The access track will be locally filled by up to 750mm to create a consistent gradient down to 84m AOD where there is a cut of approximately 500mm required before reaching the turning head which will be supported by an area of fill material up to 1.0m in height which will blend into the earthwork of the pond. Changes in ground level comprise localised regrading across the width of the track to construct a consistent crossfall from west to east side of the track of 100mm.
- 3.3.104 All these earthworks are shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012) and also on the Twyford to Chetwode Access Tracks Longitudinal Sections Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DSE-CS06_CL10-000043 and 1MC06-CEK-TP-DSE-CS06_CL10-000044).
- 3.3.105 The finish for the maintenance access track is not for approval under this Schedule 17 Plans and Specifications application. The typical construction for the access track(s) will be 3.5m wide unbound stone surface. The typical construction details for the access tracks (and roads) are shown in Appendix 1.

Diversion of Padbury Brook and other Watercourses (Part of)

- 3.3.106 The location of the diversions of Padbury Brook and other watercourses are shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.107 Earthworks required as part of the watercourse diversions are shown on the Twyford to Chetwode Padbury Brook Watercourse Diversions Sheets 1 – 3 (Drawing Nos. 1MC06-CEK-TP-DDE-CS06_CL10-000029, 1MC06-CEK-TP-DDE-CS06_CL10-000030 and 1MC06-CEK-TP-DDE-CS06_CL10-000031).
- 3.3.108 Diversion of Padbury Brook is required at several locations because the existing alignment of Padbury Brook is on a meander which brings it into conflict with the Viaduct piers. It is therefore proposed to straighten Padbury Brook's alignment to pass between the piers of Twyford Viaduct and Godington East Viaduct. The realigned channel beneath Twyford Viaduct is 6m wide at bed level, with 1 in 1 gradient slopes

and a typical depth of 1.55m, which is shown on the Padbury Brook Watercourse Diversions Sheet 2 (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000030). The realigned channel beneath Godington East Viaduct is 4m wide at bed level, with 1 in 1 gradient slopes and a typical depth of 1.85m, which is shown on the Padbury Brook Watercourse Diversions Sheet 3 (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000031).

- 3.3.109 A tributary of the Padbury Brook lies under the footprint of Chetwode Embankment, as such a diversion will be made to divert it through the Godington West Culvert. The diversion is 2m wide at bed level, with 1 in 2.5 gradient slopes and a typical depth between 1.75m and 2.35m. This is shown on the Twyford to Chetwode Padbury Brook Watercourse Diversions Sheet 1 (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000029).
- 3.3.110 A tributary of Padbury Brook lies under the footprint of Cowley Embankment, as such it needs to be diverted around the embankment and the Viaduct abutment. This diversion would be 2.0 m wide at bed level, with 1 in 1 gradient slopes and a typical depth of 1.2m. A second tributary will be diverted alongside a proposed new maintenance track running parallel to the HS2 line. This diversion will be typically 1m wide at bed level, with 1 in 1 gradient slopes and a typical depth of 1.1m. Both tributary diversions are shown on the Padbury Brook Watercourse Diversions Sheet 2 (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000030).
- 3.3.111 A tributary of the Padbury Brook lies under the footprint of Godington East Embankment, as such a short diversion will be made to divert it through the Godington East Culvert. The diversion is shown on Padbury Brook Watercourse Diversions Sheet 3 (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000031). The diversion will be 2.5m wide at bed level with 1 in 1 gradient side slopes and will have a typical depth of 1.4m.
- 3.3.112 The banks of each section of diverted watercourse will be covered with biodegradable erosion protection matting on disturbed bank faces to provide protection whilst vegetation/planting becomes established. These will be applied to the full height of the bank and will be anchored in 400 x 400mm trenches at the top and bottom of the slope and pegged to bank slopes.
- 3.3.113 The watercourse diversion of Padbury Brook under Godington West Viaduct will be the subject of a TCPA because it is a Scheduled Work (2/97) and falls outside of its LoD.

Drainage Ponds and Drainage Ditches

- 3.3.114 Nine drainage ponds are proposed. The HS2 Phase 1 ES proposed three drainage ponds. The number of ponds has increased because of track drainage requirements and to reduce the size of the proposed ponds to make them more sympathetic in terms of landscape integration.
- 3.3.115 The HS2 Phase 1 ES proposed a large single drainage pond on the eastern side of the HS2 line by Godington West Viaduct. This pond has now been replaced by six linear ponds located on either side of the HS2 line between chainages 84+550 to 83+950.

These ponds are low-lying linear features and have been positioned to sit at the toe of the railway embankment and aligned to run parallel to it.

- 3.3.116 The drainage pond associated with Twyford Embankment on the west side of the HS2 line between chainages 82+180 to 83+280 has been split into two ponds rather than being a single pond as proposed in the HS2 Phase 1 ES. This will help to better integrate the ponds into the landscape as well as allowing more vegetation to be retained and maximising the design of the adjacent associated landscape mitigation earthworks.
- 3.3.117 The location of the proposed drainage ponds and drainage ditches are shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.118 The depth of the drainage ponds is shown on the Twyford to Chetwode Pond Details and Section (Drawing No. 1MC06-CEK-TP-DDE-CS06_CL10-000028). This drawing is submitted for approval. Details of the ponds are provided in **Table 4** below.
- 3.3.119 The ponds have been designed to reduce their appearance in the landscape by minimising their size and through the introduction of new grassland wildflower meadow planting to integrate them into the landscape.
- 3.3.120 The ponds will appear as minor elements in this relatively flat landscape on either side of the Padbury Brook and set in the broader context of wetland marsh and meadow grassland and riparian vegetation associated with the watercourse.

Table 4: Pond Details

Location of Pond	Purpose	Length (m)	Width (m)	Depth (m)	Slope Gradient
82+520 - 82+650	Track Drainage Pond	120	80	0.7	1:5
82+180 – 82+230	Land Drainage Pond	21	9	0.6	1:5
82+240 – 82+280	Land Drainage Pond	37	29	0.7	1:4 – 1:5
Linear Ponds between 83+950 – 84+070	Track Drainage Pond	24	6	1.3	1:5
	Track Drainage Pond	27	10	0.7	1:5
	Track Drainage Pond	18	10	0.8	1:5
	Track Drainage Pond	35	6	0.6	1:5
Linear Pond between 84+460 – 85+570	Track Drainage Pond	104	6	0.7	1:5
	Track Drainage Pond	72	6	0.7	1:5

- 3.3.121 The ponds have been designed to contain the 100 year rainfall event adjusted for predicted climate change. In addition, a minimum 500mm freeboard (i.e. the distance between the normal water level and the top of the pond structure) is provided that in the event of the ponds being filled during an exceedance event, diffused flows will weir over the lower edge of the pond downhill of the HS2 alignment. Although these flows will be infrequent, they will be managed to not exacerbate any existing downstream flooding condition.
- 3.3.122 The drainage ditches will be open ditches that will range from 2.1m - 6.0m in width at ground level and 0.5 - 2.0m in depth. The drainage ditches will have 1 in 2 side slopes. The size of each ditch will depend on topography and capacity requirements.
- 3.3.123 Further information on the drainage arrangements is shown on the Twyford to Chetwode Drainage Plans Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DPL-CS06_CL10-000073 and 1MC06-CEK-TP-DPL-CS06_CL10-000074). These drawings are submitted for information only.

Flood Compensation Areas (FCA)

- 3.3.124 As some of the permanent works are proposed to be undertaken in Flood Zone 3, two flood compensation areas (FCA) are proposed within this submission. The proposed FCAs will require minor changes to the existing ground levels. Ground levels have been determined through flood modelling.
- 3.3.125 The location of the proposed FCAs is shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000011 and 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.126 The earthworks required for the proposed FCAs are shown on the Twyford to Chetwode Flood Compensation Areas Drawing (Drawing No.1MC06-CEK-TP-DSE-CS06_CL10-000047).
- 3.3.127 One FCA will be located at chainage 84+600 close to Rose Hill Farm and Godington West Viaduct. It will have a combined area of 1.3ha. The existing ground level will be reprofiled and slope from 84m AOD to 83m AOD.
- 3.3.128 This FCA will provide replacement floodplain storage to compensate for the loss of floodplain capacity as a result of the construction of the Godington East Viaduct and Godington West Viaduct in the floodplain. It will be planted with wet grassland species to increase fenland habitat. The hedgerows removed during construction of this FCA will be replaced with a proposed native hedgerow and standard trees.
- 3.3.129 The other FCA will be located at chainage 82+600 close to Church View Farm and northwest of Twyford. This 1.2ha site will provide replacement floodplain storage to compensate for the loss of floodplain capacity at Twyford. The existing ground level will be reprofiled and slope from 87m AOD to 86.2m AOD.
- 3.3.130 This FCA will be planted with wet grassland species to increase fenland / marsh grassland / reedbeds. Bat roosts will also be created in this area.

Vehicle Restraint Bund

- 3.3.131 The vehicle restraint bund will comprise of a grassed landscape bund. The vehicle restraint bund will run along the eastern side of the HS2 line between the railway line and maintenance access track.
- 3.3.132 The location and extent of the vehicle restraint bund is shown on the Twyford to Chetwode General Arrangement Plan – For Approval Sheet 2 (Drawing No. 1MC06-CEK-TP-DGA-CS06_CL10-000012).
- 3.3.133 The purpose of the vehicle restraint bund is to prevent any maintenance vehicles running onto the HS2 line.
- 3.3.134 The vehicle restraint bund will extend from chainage 83+030 to 83+140 and will be approximately 110m in length. It will have 1 in 2 side slopes and will be approximately 3m in height with a flat top. The top of the bund will be planted with native species shrub vegetation.

Works Not for Approval

Maintenance Accesses and Parking Bays

- 3.3.135 The maintenance accesses and parking bays that do not require approval because no earthworks are required are shown indicatively on the Twyford to Chetwode General Arrangement Plan – For Information Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000013 and 1MC06-CEK-TP-DPL-CS06_CL10-000014).
- 3.3.136 There will be a 3.0m wide grassed maintenance access strip around the drainage ponds to allow for inspection or maintenance either on foot or by an all-terrain vehicle.
- 3.3.137 The parking bays in the vicinity of the Viaducts are required to accommodate two long-wheelbase vans (2 x 4.8m x 2.4m). The parking bays at the drainage ponds are required to accommodate one tanker (17m x 3m) and two long-wheelbase vans (2 x 4.8m x 2.4m).

Related Submissions for Adjacent Works

- 3.3.138 Separate Schedule 17 approvals will be sought for the proposed works that fall within CDC Package 1 – Godington, AVDC Package 13b – Calvert North and AVDC Package 15 – Chetwode to Mixbury.
- 3.3.139 Schedule 17 Lorry Route Approvals are being sought in respect of the movement of Large Good Vehicles (LGVs) to and from construction sites associated with the Proposed Scheme. Schedule 17 lorry route applications that relate to the works within this application include:-
- West Street – Edgcott Route
 - West Street – Gawcott Route
 - A4421 Buckingham Road
 - A421 London Road

- A422 Brackley Road

- 3.3.140 At the time of writing all of these submissions to BC have been approved.
- 3.3.141 Schedule 4 approvals will be sought for interferences with PRowS.
- 3.3.142 Schedule 33, Part 5 approvals will be sought for the permanent works, temporary works and discharges associated with the drainage ponds and diversion of Padbury Brook and other watercourses.
- 3.3.143 A TCPA will also be required for part of the watercourse diversion of Padbury Brook that is a Scheduled Work (2/97) and falls outside of its LoD. This is identified on the Twyford to Chetwode General Arrangement Plan – For Information Sheet 1 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000013).
- 3.3.144 The proposed related consents are set out in Section 7 of this Written Statement.

3.4 Indicative Mitigation

- 3.4.1 This section describes the indicative mitigation and enhancement proposals that have been submitted for consultation purposes in parallel with this Schedule 17 application and in accordance with paragraph 7.5.2 of the HS2 Phase 1 Planning Memorandum and Planning Forum Note (PFN) 10 ([Link to PFN10](#)).
- 3.4.2 Plans and Specifications consent under Schedule 17 of the HS2 Act is sought for the works listed in Table 1 and Table 2 of this Written Statement. Some mitigation (i.e. landscape bunds and noise barriers) is covered by Plans and Specifications and is submitted for approval as part of this application. Other 'indicative mitigation' planting elements will form part of Schedule 17 Bringing into Use (BIU) application under Paragraph 9 of Part 1 of Schedule 17 of the Act that will be made towards the end of the HS2 scheme construction on completion of the Schedule 1 works. This will give the LPA an opportunity to agree that there are no reasonably practicable measures that need to be taken to mitigate the railway, in addition to those it has approved, or are detailed at that BIU application stage.
- 3.4.3 Details of the indicative mitigation and enhancement proposals submitted for consultation in accordance with paragraph 7.5.2 of the Planning Memorandum are shown on the Planting Plans and Environmental Masterplan Drawings and are the subject of a separate consultation (Letter Ref: 1MC06-CEK-TP-APP-CS06_CL10-000001).
- 3.4.4 Paragraph 7.5.2 of the Planning Memorandum States: *'....Where the works for approval will have a mitigating effect in relation to operational noise from the railway or new roads, the nominated undertaker will provide information to show, so far as is reasonably practicable at that stage in the design process, how the noise mitigation performs and the expected conditions. While not material to approvals under paragraph 2 or 3, this information will provide reassurance in advance of the request for approval under paragraph 9 that the mitigation is appropriate and will present an opportunity to raise concerns.'*

3.4.5 The proposed indicative mitigation and enhancement proposals are shown on the following drawings and are described below. These drawings are submitted for information only.

Twyford to Chetwode Environmental Masterplan Key Plan	1MC06-CEK-TP-DPL-CS06_CL10-000047
Twyford to Chetwode Environmental Masterplan Sheet 1 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000048
Twyford to Chetwode Environmental Masterplan Sheet 2 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000049
Twyford to Chetwode Landscape Planting Plan Sheet 1 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000020
Twyford to Chetwode Landscape Planting Plan Sheet 2 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000021
Twyford to Chetwode Landscape Cross Sections Sheet 1 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000022
Twyford to Chetwode Landscape Cross Sections Sheet 2 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000023
Twyford to Chetwode Landscape Cross Sections Sheet 3 of 3	1MC06-CEK-TP-DSE-CS06_CL10-000024
Twyford to Chetwode Existing Vegetation Plan	1MC06-CEK-TP-DPL-CS06_CL10-000025
Twyford to Chetwode Retained and Removed Vegetation Plan	1MC06-CEK-TP-DPL-CS06_CL10-000026
Twyford to Chetwode Planting Plan (Grassland) Sheet 1 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000052
Twyford to Chetwode Planting Plan (Grassland) Sheet 2 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000053
Twyford to Chetwode Planting Plan (Woodland and Hedgerow) Sheet 1 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000054
Twyford to Chetwode Planting Plan (Woodland and Hedgerow) Sheet 2 of 2	1MC06-CEK-TP-DPL-CS06_CL10-000055

3.4.6 Details of planting and soft landscaping do not require approval of Plans and Specifications under paragraphs 2 or 3 of Schedule 17.

3.4.7 The mitigation will comprise part of the overall mitigation scheme in relation to the Scheduled Works listed in section 3.2 above.

Landscape

- 3.4.8 The landscape proposals have been developed with regard to the Local Character Area (LCA) within which the site sits, as shown on the Twyford to Chetwode Landscape Context Plan (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000016).
- 3.4.9 Key features of this landscape are the Padbury Brook and its associated riparian vegetation and floodplain meadow. The medium sized fields on the gentle side slopes of the brook are delineated by strong well managed hedgerows with hedgerow trees. The well vegetated earthworks associated with the former GCML form a notable linear landscape feature on the west side of the HS2 line for the full extent of the site. Hedgerows with trees are a feature of the lanes and tracks which cross the area.
- 3.4.10 This area contains an Ecological Mitigation Area as well as advanced planting areas associated with the former GCML. These are shown on the Twyford to Chetwode Landscape Planting Plans Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DPL-CS06_CL10-000020 and 1MC06-CEK-TP-DPL-CS06_CL10-000021 and on the Twyford to Chetwode Environmental Masterplan Sheets 1 and 2 (Drawings Nos. 1MC06-CEK-TP-DPL-CS06_CL10-000048 and 1MC06-CEK-TP-DPL-CS06_CL10-000049). The advanced planting areas are being undertaken by HS2's EWC and do not form part of this submission.
- 3.4.11 The landscape strategy for this site and surrounding area seeks to:-
- Recognise and connect the historic field pattern of hedgerow with hedgerow trees field and lane side boundaries found within the area through the reinstatement of hedgerows, including native hedgerow species and hedgerow standard trees.
 - Recognise the importance of riparian vegetation associated with the watercourses and its associated importance for habitat connectivity through the introduction of quick effect woodland planting.
 - Recognise the importance of the historic floodplain meadow, unimproved and semi improved grassland habitat through the introduction of wildflower meadow with ecological interest.
- 3.4.12 The landscape strategy has been developed with regards to the ecological requirements of the area which are set out below, providing for habitat connectivity through the planting of riparian vegetation to the watercourses and hedgerows and tree belts along the HS2 boundary and around the drainage ponds. The landscape planting also provides an integration and screening function of the HS2 assets. The landscape planting for the site is shown on Twyford to Chetwode Landscape Planting Plans Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DPL-CS06_CL10-000020 and 1MC06-CEK-TP-DPL-CS06_CL10-000021).
- 3.4.13 The landscape planting comprises several elements which includes woodland planting, tree belts, native species shrub planting, hedgerows with trees, riparian vegetation, scrub, wet and meadow grassland, wildflower grassland and amenity grassland.

- 3.4.14 Grassland is provided on the landscape earthworks north and south of the Twyford Viaduct (west side) to help integrate HS2 as it crosses the Padbury Brook and low-lying landscape to the north-west of Twyford. The planting south of the Twyford Viaduct and west of the HS2 line forms part of the landscape proposals which form part of a new amenity space adjacent to Twyford. The planting on the earthworks comprises of a varied height canopy mix of trees and shrubs which roll over the crest of the earthworks on to the upper part of the 1 in 4 inward slope facing the HS2 line. This is proposed to help integrate and soften the appearance of the new earthworks within a relatively flat landscape as well as overtime help integrate Twyford Viaduct and HS2 associated elements within the low-lying flat landscape on both sides of the Padbury Brook and to screen or break up these features in north westerly views from Twyford and the surrounding PRow network.
- 3.4.15 Elsewhere the landscape strategy seeks to retain, enhance, or replace the existing field and trackside hedgerows as well as provide for new hedgerows with hedgerow trees to connect the severed sections of existing hedgerow. This, in combination with extensive areas of wildflower, wet and meadow grassland on the west side of the HS2 line creates a significant swathe of ecology focussed planting which provides for a linear north south biodiversity connectivity along the HS2 line and links in with the advanced planting areas and Ecological Mitigation Area and up to the former GCML. Other planting includes woodland and riparian vegetation situated on the lower ground in the vicinity of the Padbury Brook.
- 3.4.16 At Godington, on the east side of the HS2 line between chainage 83+900 and 84+450 a continuous strip of planting is proposed which comprises a mix of tree belts and woodland to help integrate Godington East Viaduct and Godington West Viaduct into the low-lying landscape and to help screen them in views from the east.
- 3.4.17 Within the Godington area, hedgerows will be planted along both sides of the HS2 line to help break up the line of the security fence which sits at the toe of the Viaduct approach embankments. This planting will tie in with the riparian vegetation along the Padbury Brook. The hedgerows, in association with the linear drainage ponds will also help to encourage bat flight lines north and south along the HS2 line to the Viaducts and Godington West Culvert.

Ecology

- 3.4.18 Species-rich grassland will be created to offset the habitat losses beneath the permanent works footprint as shown on the Twyford to Chetwode Landscape Planting Plans Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DPL-CS06_CL10-000020 and 1MC06-CEK-TP-DPL-CS06_CL10-000021). The creation of a larger area of grassland habitat to that which is being lost means that the adverse effect on the conservation status of this grassland habitat type will be offset. Grassland compensation will be provided in accordance with the approach outlined in the ecological principles of mitigation identified within the HS2 Phase 1 ES Volume 5: Appendix CT-001-000/2 ([Link Vol 5](#)).

- 3.4.19 An Ecological Mitigation Area will be created within the site adjacent to Padbury Brook as shown on the Twyford to Chetwode Landscape Planting Plan Sheet 1 (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000020) and on the Twyford to Chetwode Environmental Masterplan Sheet 1 of 2 (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000048). The Ecological Mitigation Area will consist of species rich grassland to be planted to the south-west and north-east of the HS2 line.
- 3.4.20 An area of wetland habitat will be created within the Ecological Mitigation Area to offset the loss of fen habitat from Barton Hartshorn Railway Wood LWS (located approximately 2.2km to the north of the site) and to compensate for the loss of floodplain capacity as a result of the construction of the Godington East Viaduct and Godington West Viaduct in the floodplain.
- 3.4.21 Habitat creation will be conducted in accordance with the ecological principles of mitigation detailed in the HS2 Phase 1 ES Volume 5: Appendix CT-001-000/2 ([Link Vol 5](#)). Bat roosts will also be created in this area. These are likely to comprise bat boxes and translocated sections of existing trees (to be lost to construction) with good quality roosting potential. The locations and specifications of the created bat roosts will be outlined within an Ecology Site Management Plan for the habitat creation area, which will be produced and consulted on during detailed design. Scrub and hedgerow planting will be included at the edge of the mitigation area close to existing habitat and in areas where connectivity with features in the area outside the site is possible. The site will also provide habitats of value to amphibians and reptiles which may be present in the wider area. Two ponds ('ecology ponds') each measuring between 100m² and 300m² in size and one hibernaculum measuring at least 2m width by 1m in height will be created to provide breeding sites and hibernation sites for amphibians, including potentially great crested newt. These features will also be suitable for reptiles, in particular grass snake that has been recorded in the vicinity. The ecology ponds do not form part of this request for approval of Plans and Specifications under Schedule 17 and are submitted for information only. The ecology ponds are proposed within the Ecological Mitigation Area.
- 3.4.22 Mitigation for the loss and fragmentation of important hedgerows will include planting replacement hedges in accordance with the ecological principles of mitigation in the HS2 Phase 1 ES Volume 5: Appendix CT-001-000/2 ([Link Vol 5](#)). This will include linear planting on the eastern side of the route near the Godington Viaducts, which will contribute to the extent and connectivity of habitat networks in this area. The species composition of the new hedgerows will be tailored to match that of those in the surrounding area.
- 3.4.23 Habitat fragmentation affecting local bat assemblages, particularly those that commute along the former GCML, will be mitigated through the provision of linear planting parallel to the HS2 line. This will provide a flight line to guide bats to safe crossing points both within and outside the site, including the Viaducts and Godington West Culvert.

- 3.4.24 Construction of the Chetwode Cutting immediately to the north of the site will involve the direct loss of bat roosts. This will be addressed by provision of replacement bat roosting habitats in accordance with the ecological principles of mitigation of the HS2 Phase 1 ES Volume 5: Appendix CT-001-000/2 ([Link Vol 5](#)). Compensatory roosts will be located within the site, south of the Godington Viaducts, in an area of grassland habitat creation near retained vegetation along the former GCML.
- 3.4.25 Colonies of black hairstreak butterfly on the former GCML adjacent to the railway cutting north of Twyford BNS will be lost to the Proposed Scheme. This will be partly mitigated by the habitat creation areas that will mitigate habitat fragmentation for bats. The new planting will include a large proportion of Blackthorn that will greatly increase available habitat once Blackthorn is sufficiently mature to provide habitat for egg laying (estimated at 10-15 years).
- 3.4.26 Raising the vertical alignment of the HS2 line onto the Viaducts, one north of Twyford and two east of Godington, will reduce habitat loss and fragmentation of the watercourse at the Padbury Brook and its margins. These three Viaducts within the site will provide space for the Padbury Brook and associated habitat either side underneath the HS2 line, thus maintaining its importance for otters.
- 3.4.27 Mitigation measures to address the potential killing, injury and disturbance of badgers will be provided in accordance with the ecological principles of mitigation identified within the HS2 Phase 1 ES Volume 5: Appendix CT-001-000/2 ([Link Vol 5](#)). This will enable the provision of badger proof fencing and replacement setts where necessary. New planting within the ecological mitigation area will benefit badgers present in those areas by improving foraging habitat and providing new opportunities for sett creation.
- 3.4.28 Godington East Culvert will be a box culvert with internal dimensions of 3m height by 2.5m width. A 0.5m wide by 0.15m thick mammal ledge with a headroom height of 0.9m will be incorporated in the culvert design to allow for safe passage of otters and badgers across the route.
- 3.4.29 Godington West Culvert will be a box culvert with internal dimensions of 3m height by 2.5m width. This is large enough to allow bats to fly safely through it under the HS2 line. It is considered that the headwall and wingwalls of the culvert will provide a physical barrier that will encourage bats to fly through the culvert rather than over the top of it. A 0.5m wide by 0.15m thick mammal ledge with a headroom height of 0.9m has been incorporated in the culvert design to allow for safe passage of otters and badgers across the route.

Noise Mitigation

- 3.4.30 The noise mitigation comprises of noise barriers and landscape earthworks and are the only elements of mitigation that are submitted for approval as set out in Paragraph 3.3.1 to 3.3.4 above.
- 3.4.31 Scheme wide design updates have been considered in the noise modelling and are based on a track alignment which incorporates the reduction of track centres from

5.0m to 4.7m from track centre line to centre line. By positioning the earthworks closer to the tracks, their effectiveness at screening noise has been improved.

- 3.4.32 The accompanying Noise Demonstration Report (NDR) (Document Ref: 1MC06-CEK-TP-REP-CS06_CL09-000002) demonstrates how all reasonable steps have been taken to reduce the combined airborne sound from altered roads and operational railways, predicted in all reasonably foreseeable circumstances, to not to exceed the Lowest Observed Adverse Effect Level (LOAEL).
- 3.4.33 Where it has not been reasonably practicable to achieve this objective, the NDR shows how airborne sound has been reduced 'As Far As Reasonably Practicable' (AFARP).
- 3.4.34 The design of the proposed noise barriers has been developed using an optioneering process, where several options have been evaluated against a range of criteria including the acoustic effects; landscape and visual effects; engineering practicality, stakeholder engagement and value for money. This process has been used to optimise the design of the barriers and reduce the noise impacts as far as reasonably practicable resulting in the proposed noise barrier proposals as set in **Table 3** of the Noise Barrier Section above. The options assessed are evaluated in the accompanying NDR.
- 3.4.35 The noise barrier height of 4.0m in height (ToR) between chainages 82+200 – 82+289 and 3.0m in height noise barrier (ToR) between chainages 82+360 – 82+500 are an improvement over the HS2 Phase 1 ES with the noise barriers generally having either a similar or reduced height. A 1.85m in height (ToR) parapet with an absorptive internal facing will be located on the west (down) side of Twyford Viaduct.
- 3.4.36 The parapet on the east (up) side of Twyford Viaduct and on both sides of the Godington Viaducts will be a standard concrete parapet 1.25m in height (ToR). The standard parapets have no specialist acoustic features, such as absorptive panels.
- 3.4.37 The HS2 Phase 1 ES proposed a noise barrier of 5.0m in height above ToR between chainage 081+390 – 082+250, with a 4.0m in height noise barrier (ToR) on Twyford Viaduct placed on the robust kerb between chainage 082+250 – 082+320. The HS2 Phase 1 ES also proposed a 3.0m in height noise barrier (above ToR) to the north of Twyford Viaduct between chainage 082+320 – 082+750, and a noise barrier 3.0m in height (above ToR) on the up (east) side of the track at Godington.
- 3.4.38 The NDR demonstrates that the proposed noise barrier provides the required level of acoustic mitigation.

3.5 Construction Method

- 3.5.1 This section summarises the currently envisaged general construction methodology, programme, the main temporary works arrangements, and other works. The arrangements described may alter and are for information and background only. They do not form part of this request for approval.

- 3.5.2 The works subject to this request for approval of Plans and Specifications will be undertaken in accordance with the HS2 CoCP ([Link to EMR CoCP](#)) and the Class Approval issued by the Secretary of State (March 2017).
- 3.5.3 The temporary construction arrangements and interference with the PRoWs will be the subject of a separate consent under Schedule 4 of the HS2 Act. All the other main consents likely to be required for the works are summarised in Section 7.
- 3.5.4 The location of the maintenance accesses and the temporary work arrangements are shown on the Twyford to Chetwode General Arrangement Plan – For Information Sheets 1 and 2 (Drawing Nos. 1MC06-CEK-TP-DGA-CS06_CL10-000013 and 1MC06-CEK-TP-DGA-CS06_CL10-000014).
- 3.5.5 The construction of the Proposed Scheme will utilise the West Street Overbridge Main Compound ('Temporary Compound Area'). This compound is located to the east of the Proposed Scheme, outside of the site. The compound forms part of AVDC Package 13b Calvert North application area and does not form part of this submission.
- 3.5.6 The Main Compound will be accessed from the Strategic Road Network (SRN) to site via the following routes:-
- The M40, A41, The Broadway, Edgcott Road, Grendon Road, Buckingham Road and Perry Hill. and / or the M40, A41, A4421 and A421 and / or the M40, A43, A421, Gawcott Road, Hillesden Road and Perry Hill from the west; or
 - The M1, A421 and / or M1, A509, A4146, A421 and / or the M40, A43, A421, Gawcott Road, Hillesden Road and Perry Hill from the east. Indivisible abnormal load transporters will need to access between the A43, A421, Radcliffe Road, Main Street, Hillesden Road, Edgcott Road and Gawcott Road. LGV's exiting West Street Overbridge Main Compound to use the same inbound routes.
- 3.5.7 Access to the Compound will be strictly controlled from a security hut that will be located at the entrance to the construction site. The security hut will be manned 24hrs a day throughout the construction period. The compound will be monitored by 24hr CCTV surveillance and security patrols. Movements between the construction compound and work sites will be on designated haul roads within the site
- 3.5.8 Closures and temporary and permanent diversions of the following PRoWs will be required as a result of the Proposed Scheme. Schedule 4 Part 2 applications will be submitted for these in line with the construction programme and these are summarised below:
- PRoW TWY/16/1 will be temporarily closed during the associated construction phase. It will then be permanently diverted, approximately 250m to the west under Twyford Viaduct, adding approximately 500m.
 - PRoW TWY/17/1 will be temporarily closed during the associated construction phase. It will then be permanently aligned to TWY/16/1 and diverted approximately 500m to the west under Twyford Viaduct, adding approximately 800m.
 - PRoW PBI/5A/3, PBI/5(F)/7 and PBI/6/2 will be temporarily closed during the associated construction phase. PBI/5A/3 will be permanently diverted across the

new overbridge and linked to PBI/5F/7. PBI/5F/7 will be permanently diverted approximately 200m to the east across the new overbridge. PBI/6/2 will be permanently diverted under Twyford Viaduct.

- PRow PBI/9/3 and CHW/24/2 will be temporarily closed during the associated construction phase. PBI/9/3 will be permanently diverted under Godington East Viaduct, adding approximately an additional 300m of length. CHW/24/2 will be permanently diverted under Godington West Viaduct adding a negligible difference to the distance.

3.6 Environmental Management During Construction

- 3.6.1 The Environmental Memorandum (part of the HS2 Environmental Minimum Requirements) sets out the arrangements for the management of environmental issues during construction and the CoCP sets out specific details and working practices that apply. The CoCP is supported by Local Environmental Management Plans (LEMPs) and Key Environmentally Sensitive Worksite Management Plans (KESWMP) which include specific measures by topic, relevant to each relevant local authority area.
- 3.6.2 The LEMP relevant to the works subject to this Schedule 17 submission is the Local Environment Management Plan (Dec 2017) and can be found here ([Link to Local Environmental Management Plan](#)).
- 3.6.3 The 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 Aylesbury Vale District Council area, and other areas.
- 3.6.4 Environmental management arrangements during construction do not form part of this request for approval of Plans and Specifications under Schedule 17 and are submitted for information only.
- 3.6.5 As part of the LEMPs the Environmental Memorandum requires the preparation of site-specific management plans. These focus on mitigation, compensation, and monitoring requirements and opportunities for enhancement in relation to identified environmental topics, including nature conservation, terrestrial and aquatic ecology, water resources, geomorphology, recreation and amenity, landscape, public open space and agricultural land.
- 3.6.6 Ecological surveys undertaken by HS2 for this application have identified the presence of the following protected or notable species / habitats within, or near to, the site; each of which is described in further detail below:
- Great Crested Newts (GCN);
 - Reptiles;
 - Nesting birds;
 - Barn Owls;
 - Bats;

- Otters; and
- Badgers.

Great Crested Newts (GCN)

- 3.6.7 GCN have been recorded in three existing ponds north of Twyford. One of these falls within the site and the other two are outside but within 250m of the site. The pond inside the site will be lost to accommodate the construction works and the other two ponds will be retained. Terrestrial habitat within the site that may be utilised by GCNs from these three ponds will be lost to accommodate the construction works.
- 3.6.8 The loss of GCN habitats will affect the viability of the associated breeding populations and will result in an adverse effect on their conservation status. A translocation exercise will therefore be undertaken by suitably experienced and qualified ecologists working under the HS2 GCN Organisational Licence (Reference WML-OR25). Newts from the pond to be lost and from terrestrial habitats to be lost within 250m of the three ponds will be translocated to an ecological receptor site that has been created as part of the Enabling Works for HS2, which is not subject to this application. The ecological receptor site is adjacent to the former GCML to the north of Twyford Mill and is shown as 'Advanced Planting Area' on the Twyford to Chetwode Landscape Planting Plan Sheet 2 of 2 (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000021). The translocation exercise will be undertaken in accordance with the GCN Mitigation Guidelines (Natural England, 2001).
- 3.6.9 A small population of GCN has also been recorded in a pond at Sunflower Farm, near Chetwode. The pond will be retained but a proportion of the habitat within 250m of the pond will be lost to the Proposed Scheme. The pond and terrestrial habitat within 250m of the pond are outside of the site. An ecological receptor site south of Rosehill Farm will be used to accommodate newts translocated from the terrestrial habitat affected. The receptor has been created as part of the Enabling Works for HS2 and is not subject to this application. It is shown as an 'Advanced Planting Area' on the Twyford to Chetwode Landscape Planting Plan Sheet 1 of 2 (Drawing No. 1MC06-CEK-TP-DPL-CS06_CL10-000020).

Reptiles

- 3.6.10 Small and medium populations of grass snake and small populations of common lizard have been recorded in areas north-east of Godington, including along the former GCML. Habitat suitable for reptiles in these areas will be cleared for the construction of the Proposed Scheme, some of which is inside the site. Compensatory reptile habitat has been created in the ecological receptor areas adjacent to the former GCML to the north of Twyford Mill and south of Rosehill Farm, Chetwode (as described for GCN). These areas will provide receptor sites for the reptile populations north-east of Godington, and for other reptile populations identified outside of the site near Barton Hartshorn and Chetwode.
- 3.6.11 Prior to the commencement of construction works, any reptiles present within the site would be relocated by suitably experienced ecologists to the ecological receptor sites

to the north of Twyford Mill and south of Rosehill Farm, which lie outside of the site. The translocation exercise will be undertaken in accordance with the Herpetofauna Workers' Manual published by the Joint Nature Conservation Committee Guidelines (Gent and Gibson, 2003).

Nesting Birds

- 3.6.12 Any hedgerow, woodland and other vegetation that is likely to support nesting birds and which requires clearance will be cleared outside of the bird nesting season as far as possible. Should this not be feasible, then the vegetation will be subject to inspection by a suitably experienced ecologist for nesting birds prior to its removal. Should any active bird nests be identified they will be left in situ and undisturbed until any chicks have fledged. Works within these areas will only commence once an ecologist has confirmed that any chicks have fledged and it is acceptable to proceed.
- 3.6.13 The growth of arable crops within the site will be prevented during spring/summer months (March to August) to avoid potential impacts and delays resulting from nesting birds being present at the time when construction works are due to commence. However, an exception to this will be made if works do not commence until after the month of August when birds are most likely to have finished breeding. In such cases crops can be harvested after the bird breeding season.

Barn Owls

- 3.6.14 Six barn owl nests were recorded during field surveys and from desk study records between Twyford and Godington. There are also two barn owl territories in the area of connected habitat near Chetwode. These two populations are both of county / metropolitan importance. To offset the likely loss of barn owl territories from the vicinity of the Proposed Scheme, opportunities to provide barn owl nesting boxes in areas greater than 1.5km from the route will be explored with local landowners. As the availability of nesting sites is a limiting factor for this species the implementation of these measures would be likely to increase numbers of barn owls within the wider landscape and thus offset the adverse effect.

Bats

- 3.6.15 Field surveys undertaken to inform the HS2 Phase 1 ES recorded an assumed assemblage of bats present using the habitats between Twyford and Chetwode that is of district / borough importance.
- 3.6.16 The habitats present in this area largely comprise arable fields bounded by hedgerows. Woodland and scrub on the GCML is also present.
- 3.6.17 Transitional roosts supporting common pipistrelle, soprano pipistrelle and brown long-eared bat were recorded in residential properties to the north of Twyford. These are of local / parish importance. Bats have also been confirmed roosting within buildings at Moat Farm near Godington, Cowley Farm north of Twyford and at Three Bridge Mill to the north east of Twyford. All of these buildings are outside the site and

will be retained and remain connected to suitable foraging habitat sites. No significant adverse effects are therefore expected, and no mitigation is required.

- 3.6.18 To avoid the risk of causing disturbance to any bats, construction works are not planned to take place between the hours of sunset and sunrise when bats are active between the months of March and November.
- 3.6.19 Several trees within, and close to, the site have been assessed as having confirmed bat roosts or a high potential to support roosting bats. Any sites holding trees that require removal to accommodate the Proposed Scheme will be registered under the Bat Mitigation Class Licence (Reference WML-CL40). This sets out the requirements for survey/inspection, mitigation and monitoring. This licence obviates the normal requirement to submit individual licence applications for each roost affected, provided the criteria for species/numbers are met. If not, an individual licence will be required. The class licence confirms the approach that must be adopted in all cases where there are licensable activities, based on the measures identified in Section 10 of the HS2 Ecology Technical Standards. For example, it may include the provision of artificial replacement roosts in advance of tree felling.

Otters

- 3.6.20 Evidence of otter presence, including two potential holts, was recorded along Padbury Brook and its tributaries at eight locations during field surveys, most of which were along the main watercourse north east of Twyford and east of Godington. The Padbury Brook has extensive suitable habitat for this recovering species and the concentration of records in the vicinity of the watercourse suggests that it is a local stronghold.
- 3.6.21 Measures in the CoCP will reduce the effect of disturbance from construction activity to the extent that there will not be a significant adverse effect on the conservation status of the otter population present on the Padbury Brook or its tributaries.

Badgers

- 3.6.22 There is a large concentration of badger activity within the site and surrounding area. Multiple badger setts of varying levels of use and importance have been identified through surveys since 2013, including six main setts and others classified as outliers, subsidiaries and annexes. As compensation for the loss of badger setts, three artificial setts will be constructed at three separate locations within the site. The construction of these setts is being provided by HS2's EWC and they are not included as part of this application. The closure of any badger setts will be done in accordance with relevant best practice and under the HS2 scheme-wide organisational badger licence from Natural England (Reference WML-OR24).
- 3.6.23 In accordance with best practice, any excavations that could entrap badgers will be covered at night to prevent badgers and other animals from becoming trapped. Should this not be possible then access ramps will be provided to allow any animals to safely escape.

3.7 Management of Historic Environment During Construction

- 3.7.1 The HS2 Heritage Memorandum (part of the HS2 Environmental Minimum Requirements) explains that a route-wide Generic Written Scheme of Investigation: Historic Environment Research and Delivery Strategy (GWSI: HERDS) has been prepared in consultation with Historic England (HE) and the LPAs ([Link to HS2 Heritage Memorandum](#)). It also sets out the research framework and general principles for design, evaluation, investigation, recording, analysis, reporting and archive deposition to be adopted for the design development and construction of HS2.
- 3.7.2 The HS2 Heritage Memorandum also sets out how the historic environment (including heritage assets and their setting) will be addressed during design. The HS2 Environmental Memorandum sets out the approach to landscape and visual mitigation which takes account of the historic environment.
- 3.7.3 In accordance with HERDS, Location Specific Written Scheme of Investigations (LSWSI) and Project Plans for geophysical surveys have been prepared and issued to Buckinghamshire County Council. Buckinghamshire County Council now forms part of the BC Unitary Authority following re-organisation in 2020.
- 3.7.4 LSWSIs set out the methodology, deliverables, programme, health, safety and environmental requirements, resources and interfaces necessary to deliver the surveys defined in the Project Plans.
- 3.7.5 The Project Plans establish the scope, aims, contribution to the GWSI: HERDS objectives, techniques, deliverables and reporting mechanism for the surveys. They also detail the results of engagement with the County Council's Archaeologist.
- 3.7.6 A LSWSI for Geophysical and Fieldwalking Surveys in Buckinghamshire was issued by HS2 to Buckinghamshire County Council in January 2016. This document set out the strategy and methodology by which the non-intrusive surveys would be carried out, including areas covered by this application. Buckinghamshire County Council's Archaeologist was consulted on this document between August and October 2015 and comments were incorporated prior to any archaeological works being carried out.
- 3.7.7 The non-intrusive surveys took place in Spring 2016. Geophysical surveys have been completed for all suitable land within the site. No significant positive anomalies were identified.
- 3.7.8 Further desk-based assessment, and field walkover/topographic survey is proposed at the site of the former Chetwode Mill once vegetation clearance has been carried out. The site is a Buckinghamshire Council archaeological notification area and will be impacted by a permanent highway access road. The preferred mitigation is to preserve the site of the former mill in-situ. The community research project planned for early 2021 has now been completed. The former mill is located to the east of the HS2 Line at chainage 84+500. A design for preservation in-situ for the former Chetwode Mill site shall be set out once the further non-intrusive surveys are completed. The current agreed scope for this location is Construction Integrated

Recording of ground works undertaken by EKFB, the design is in preparation, which will include stakeholder consultation.

- 3.7.9 A trench evaluation survey was completed for the Chetwode Ecological Habitat site, north of Moat Farm, Godington in January 2018. This revealed some evidence for a minor Roman farmstead in the south-east part of the site. Since the habitat construction was not going to further disturb the remains no further work was carried out.
- 3.7.10 The north and south end of the site cross the drainage of the Padbury Brook, a tributary of the River Great Ouse. The potential for late Pleistocene and Holocene alluvial deposits to contain palaeo-environmental indicators and/or buried terrace land surfaces is being assessed by a programme of archaeological works set out in the Project Plan for Route-wide Palaeo-environmental Evaluation.
- 3.7.11 Three fields within the site were selected for testing negative geophysical results to determine artefact population in the surface soils. This work was completed in December 2020. 320no. test pits were carried out across the fields, though part of one of the fields was found to be flooded and inaccessible and a small number of test pits were not possible due to the location of the welfare compound. Test pits have recorded two pieces of worked flint and two sherds of pottery across the entire area.
- 3.7.12 Further mitigation measures in relation to the palaeo-environmental potential of the Padbury Brook drainage maybe required following field evaluation.
- 3.7.13 The site has a low to medium potential for further discoveries associated with palaeo-environmental indicators and/or buried terrace land surfaces within the Padbury Brook drainage catchment. There is medium potential for discovery of remains related to the former Chetwode Mill. The likelihood of further discoveries during construction is low to medium.
- 3.7.14 As a result of the archaeological investigations, it is recommended that any works to the access road adjacent to the Chetwode Mill should seek to adopt methods that protect and preserve the site in-situ.

4 Design Criteria and Rationale

4.1 Introduction

4.1.1 This section outlines the design criteria and design rationale.

4.2 Design Rationale

4.2.1 The purpose of this submission is to allow HS2 to cross Padbury Brook on three Viaducts in order to reduce habitat loss and fragmentation of the watercourse. The Proposed Scheme put forward for Schedule 17 approval accords with this design rationale.

4.2.2 The design rationale that has informed the design of the Proposed Scheme includes:

- Providing a sympathetic development that respects the landscape and ecological elements of the site and the wider landscape context;
- Retaining and protecting as much existing vegetation as possible;
- Retaining and protecting existing hedgerows, field patterns and fence lines, where possible, to reduce any potential negative impacts for navigating bats;
- Minimising disruption during construction of the site and site delivery of materials through the surrounding area and settlements;
- To avoid or reduce the adverse effects of the Proposed Scheme, such as airborne noise effects;
- Integrating HS2 Viaducts and associated assets;
- Integrating HS2 earthworks cutting and associated assets including security fencing; and
- Integrating and or screening HS2 earthworks embankments and associated assets, including security fencing and noise barriers.

4.3 Design Constraints

4.3.1 The general constraints and drivers which have informed the design of the Proposed Scheme include:-

- Accordance with the HS2 Design Vision, Landscape Design and the technical requirements set out in the HS2 Design Panel Handbook and HS2 Bridge Design Guide;
- Compliance with the CoCP (London-West Midlands Environmental Statement - Environmental Minimum Requirements - Annex 1: Code of Construction Practice) (February 2017) ([Link to EMR CoCP](#)) and HS2 Phase 1 ES;
- That all of the works are contained within the Limits of Deviation (LoD) and Limits of Land to be Acquired or Used (LLAU);

- Compliance with all terms and conditions set out in the route wide GCN licence, granted by Natural England and held by HS2 Ltd;
- Providing a sympathetic development that respects the site and surroundings;
- Retaining and protecting as much existing woodland and trees as possible;
- Retaining and protecting existing hedgerows, field patterns and fence lines, where possible, to reduce any potential negative impacts for navigating bats;
- Minimising disruption during construction of the site and site delivery of materials through the surrounding area and settlements;
- Providing safe access to the site for construction traffic; and
- The 120-year design life required for all structures on HS2 provides a further constraint on appropriate bridge forms. Design life has a direct bearing on the suitability of materials in respect of their durability through weathering and/or corrosion and an impact on structural size and form with respect to material fatigue.

4.4 Design Criteria and Rationale for Structures

- 4.4.1 Consideration has been given to HS2 Efficiency Challenge Programme. This is where HS2 challenges contractors and designers to increase the efficiency of necessary works, and the design and construction process. Through early engagement in the design process, the Design for Manufacturer Assembly (DfMA) approach, where applicable, allowed construction and engineering challenges to be addressed. The DfMA is a design approach that focuses on ease of manufacture and efficiency of assembly.
- 4.4.2 The DfMA design approach adds benefits to the quality and durability of the structures, as the repetition and standardisation of offsite construction lead to improved and more efficient construction methods which reduce the risk of errors and poor-quality construction.
- 4.4.3 The DfMA design approach reduces the construction period and time spent onsite, therefore reducing impact on the public and stakeholders during the construction period.
- 4.4.4 The general principles of DfMA design are:
- Standardisation of components;
 - Reducing man-hours on site;
 - Product led delivery;
 - Contractor input from the start of design;
 - Increased construction efficiency and less wastage;
 - Producing workable details which are repeatable and less subject to error;

- Collaborative Design integrating all Stakeholders at an early stage.

4.4.5 The overall structural form and detailing of the bridges, which includes Viaducts has been developed to meet best practice design principles in line with the examples of what is acceptable in the HS2 Bridge Design Guide and complies with the HS2 Design Vision as explained below.

4.4.6 All the bridges align with the design rationale for CDEs being developed and reviewed with the main works contractors and Design Panel. Typical CDE structures are rail overbridge parapets and viaduct piers. CDE structures are the normal starting point for determining the design of HS2 works as they support efficiencies in design and construction, have been through a consultation process in terms of appearance and comply with HS2's goal of ensuring the HS2 infrastructure is easily recognisable as a brand.

Twyford Viaduct, Godington East Viaduct and Godington West Viaduct

4.4.7 The Viaducts have been developed as a family of structures with a similar structural form comprising of a prestressed concrete U beam and in-situ slab deck supported on bearings at intermediate twin leaf piers and low-level wall abutments. The parapets are precast and will be stitched to the in-situ deck. The deck diaphragm detail has been developed to include a downstand to conceal the bearings in elevation. This solution maximises off-site construction and minimises construction duration providing advantages in terms of environmental impact, health and safety and value for money.

4.4.8 The length of the Viaducts has been determined by the floodplain requirements associated with Padbury Brook. As a result, the span arrangement has been developed to balance the required vertical clearance to the underside of the deck with the depth of construction of the deck.

4.4.9 The approach to the architectural design of the proposal largely falls into two categories: firstly, the appearance of the Viaducts in elevation when read against the largely flat immediate topography; secondly, the impression made by the support piers when viewing along the Viaduct through breaks in the trees from oblique vantage points such as from the PRoW approaches to the east and west.

4.4.10 In the first instance, the intention has been to maximise the advantage gained by the low vertical alignment of the railway in this location: the primary structure of the Viaduct is located below deck level with the piers tucked in away from the edge, keeping the overall height of the structure to a minimum such that it appears to 'skim' over the landscape.

4.4.11 The individual spans of the structure are accentuated by visually locating the deck onto the support piers with beam connections contained within a projecting wedge-shaped detail that splays upwards in elevation from the pierhead.

4.4.12 By accentuating the connection between the bearing shelf and crosshead the deck appears to fasten into place over the columns, emphasising that the Viaduct is

comprised of a series of individual spans that bear down on their supports, breaking down the overall length of the structure while celebrating its means of construction – much like the emphasis often given to keystones in a masonry arch.

- 4.4.13 With a total of eight pairs of supports along the combined length of the three Viaducts the appearance of the piers from the oblique vantage points has also been a focus of the design. The combination of outwardly smooth and inwardly textured surfaces aims to catch the sunlight and draw the eye, minimising the apparent bulk of the pier.
- 4.4.14 The repetition of this form provides a strong visual consistency between piers and the angled and curved faces of the deck connections above, reinforcing the impression that each bridge span is firmly located onto its supports.

PBI/5A Overbridge

- 4.4.15 The overbridge design has been developed after consideration of the span requirement and the skew angle of the crossing relative to the HS2 line. The central span of 27.5m has been determined from the clearance requirements to the railway and this length is within the length of precast beam that can be transported to site. The deck will be formed using precast concrete U beams with an in-situ reinforced concrete slab. This is considered to be most advantageous in terms of maximising off-site construction, reducing health and safety risks, reducing carbon footprint, minimising construction programme and offering best value for money. Alternative deck options considered included precast Y beam decks however these were discounted due to increased health and safety risks during construction. Similarly, steel composite deck solutions were discounted on the basis of value for money.
- 4.4.16 The crossing is set at a relatively small skew of 13.5° which means that the deck structure can be made integral with the piers thereby removing the need for bearings at the intermediate supports. The abutments will be designed as semi-integral with the deck thereby removing the need for a movement joint. The piers comprise a pair of reinforced concrete columns supported on piles whilst the abutments comprise of a piled bank seat arrangement with short wingwalls. Precast parapets extend along the length of the deck and wingwalls either side.

4.5 Options Considered

- 4.5.1 This section provides a summary of how the Proposed Scheme has been developed in accordance with the HS2 Design Vision, setting-out the approach to the scheme design and a justification for the scheme proposals
- 4.5.2 Prior to the submission of the application, a series of pre-application meetings have been held with BC, largely focussed on the design aspects of the Proposed Scheme. A summary of the pre-submission engagement undertaken with the Council, as well as with Natural England and Historic England is set-out in Tables 5 and 6 of Section 5. Details of these discussions and revisions to the scheme design arising from these discussions are summarised below. However, where it has not been possible to

incorporate changes to the scheme design from the pre-application discussions an explanation for this is also provided.

4.5.3 The Proposed Scheme has been developed to address comments received during the pre-application stage:-

- The design blends the landscape mitigation earthworks in with existing contours so that they fit the landscape, to minimise disruption to important screen vegetation and to help integrate and screen HS2 and its associated assets;
- Within the new amenity space such as immediately adjacent to the rural settlement of Twyford (west side) further detailed finessing of the landscape mitigation earthworks contours has been undertaken to reflect the greater sensitivity of the location and the local sense of place;
- At Chetwode Embankment the landscape mitigation earthworks (east side) backslopes have been graded out to 1 in 10 and 1 in 28 in in order to facilitate a return to agricultural use and to tie-in with existing smooth flowing contours. Inward slopes will be 1 in 4.
- Tree and shrub planting and grassland is used at Twyford and Cowley Embankment (west side) to help further soften and overtime integrate the landscape mitigation earthworks. This is shown on the Twyford to Chetwode Landscape Planting Drawing Sheet 2 of 2 (Drawing No 1MC06-CEK-TP-DPL-CS06_CL10-000021).
- Woodland and hedgerow planting is used at Chetwode Embankment (east side) to re-establish the original field boundary as well as to help integrate and or screen the HS2 assets. This is shown on the Twyford to Chetwode Landscape Planting Drawing Sheet 2 of 2 (Drawing No 1MC06-CEK-TP-DPL-CS06_CL10-000021).
- Hedgerow, riparian vegetation and woodland is used to help integrate and or screen overtime the mainline engineered earthworks and structures along with other HS2 assets such as access or drainage ponds;
- Existing vegetation which provides amenity and or biodiversity connectivity as well as helping to integrate new HS2 assets such as accesses or drainage ponds has been retained where practical to do so;
- Security fencing around drainage ponds has been rationalised or avoided to reduce the visual impact on the landscape by aligning the fencing so that it is integrated with existing or proposed field boundaries or structures or by departing from the standard for fencing around the ponds to stock proof fencing instead of Type 2 security fencing;
- Fencing to track drainage ponds will comprise stock proof fencing. The fencing will align where possible with other fencing such as highway or other boundary fencing. Fencing to ponds will in most situations be associated with a perimeter hedgerow or screen planting;

- Bat mitigation fences have been designed out through utilising the drainage ditches and hedgerows either side of HS2 to direct the bats to points of safe crossing through Godington West culvert and beneath Godington West Viaduct.
- One land drainage pond associated with Twyford Embankment (west side) has been split into two ponds with variable side slopes in order to have a better fit with the landscape. This has helped to retain existing vegetation and maximise the design of the adjacent associated landscape mitigation earthworks;
- Where it is likely that vegetation under a structure i.e. a Viaduct will not establish due to lack of light and rain penetration, a central level bound stone surface is proposed. The extent of the stone strip will be off set 3m from the parapet edge to maximise the establishment of vegetation under the structure. It is anticipated that the edges of the stone strip will overtime be softened as vegetation, through natural colonisation finds its own limits.
- Earthwork bunds have been designed to provide vehicle restraint between the HS2 access track and the HS2 line wherever possible in order to fit better with the landscape.
- Flood compensation areas have been designed to minimise removal of existing vegetation.
- The Viaduct deck diaphragm detail has been developed to include a downstand to conceal the Viaduct bearings when viewed in elevation.
- The noise barrier will be visible to the public and therefore the steel posts are hidden from view to give the barrier a more seamless and coherent appearance. The top panel will also incorporate a gently curved end to provide a visually softer and more refined edge. Similarly the noise barrier has been designed to provide a continuous line between Viaduct and lineside barrier off the Twyford Viaduct. Where the barrier is visible to the public and the height exceeds 3m above top of rail, the upper concrete panel has been designed as an 'overhang' in the direction of the HS2 track. This feature provides a visible cap to the barrier: much like coping stones on a masonry wall this feature terminates the vertical external face with a brighter skyward facing surface. By directing the lean towards the tracks this feature also serves to increase the perception that the railway is being partially enveloped by the barrier to the advantage of the surrounding landscape – in visual terms the overhang implies 'containment' of HS2.

4.6 Landscape Maintenance Management and Monitoring

- 4.6.1 A Landscape Maintenance, Management and Monitoring Plan (LMMMP) will be prepared as part of the landscape detail design and will follow the requirements set out in HS2 Standard document. The purpose of this section is to provide an outline of the LMMMP requirements for the planting proposals at Godington which have been submitted for information.

- 4.6.2 The landscape planting proposals reflect the typical natural landscape features of the area, including hedgerows with hedgerow standards, bushes and shrubs and wildflower meadow planting and as such many of the planting features indicated on the landscape plans will require standard maintenance and management. However, there are key locations that will be identified in the LMMMP where the landscape proposals will require specific landscape maintenance and management requirements.

5 Pre-submission Consultation

5.1.1 Pre-submission consultation with the Local Planning Authority and other relevant statutory consultees is summarised in **Table 5** below.

Table 5: Pre-submission Consultation with LPA and Statutory Consultees

Consultee Name	Consultation Date	Method of Consultation / Attended by	Summary of Consultation Outcome
Aylesbury Vale District Council (now Buckinghamshire Council as of 1/4/20)	05/10/2018 06/03/2020 05/06/2020 27/08/2020 06/11/2020 18/02/2021	A series of pre-application meetings, largely held on a monthly basis between AVDC Officers, Eiffage Kier Ferroviaal BAM (EKFB) (Main Works Contractor), Fusion (Enabling Works Contractor), HS2 Ltd, Design Joint Venture (DJV).	A range of planning matters discussed leading to the current Schedule 17 submission for Twyford to Chetwode. Whilst most of the matters discussed have covered a range of HS2 route-wide issues within BC, a number of meetings focussed on individual Packages. For this submission, the following key areas were discussed: <u>Schedule 17 consents package boundaries</u> BC suggestion that consent boundaries should be based on Landscape Strategy Areas accepted. <u>Schedule 17 pre-application strategy</u> BC agreement to EKFBs initial approach of 15 Schedule 17 consent packages and the involvement of statutory consultees through pre-application process. <u>Landscape Strategy</u> BC supportive of EKFB's Landscape Strategy approach. <u>Ecology Strategy</u> Ecology Strategy presented highlighting the key ecological issues. <u>Noise Assessment</u> BC supportive of the aim to replace noise barriers with landscape material. Also keen to support proposals that extend outside Act Limits for landscape integration reasons <u>Viaduct and Overbridge Typologies</u> Presentation of the different Viaduct and overbridge typologies by EKFB. A number of design responses made by BC. <u>Schedule 17 Consenting Programme</u>

Consultee Name	Consultation Date	Method of Consultation / Attended by	Summary of Consultation Outcome
			EKFBs preliminary programme presented, including priority submissions, timescales for submission and pre-application programme. BC requested clearer understanding between Fusion and EKFB's Schedule 17 programme and the continuing need to involve parish councils.
Historic England	06/03/2020	BC Pre-app meetings	Fencing standard for use of barbed wire was challenged. Questions remain on how textured concrete would be treated if it was graffitied.
Natural England	06/03/2020 05/06/2020 06/11/2020	BC Pre-app meetings	No notable outcomes specific to NE engagement.

5.1.2 Pre-submission engagement with other relevant stakeholders is summarised in **Table 6** below.

Table 6: Other Engagement Activities

Stakeholder Name	Engagement Date	Method of Engagement / Attended by	Summary of Engagement Outcome
Twyford Parish Council	12/11/18	Presentation at PC Meeting	General update on works and proposal for Twyford Viaduct
Twyford Parish Council	31/5/19	Briefing with Parish Councillors	Briefing regarding the design optimisation for the changes to vertical alignment.
Calvert, Steeple Claydon and Twyford Community	4/6/19, 12/6/19 and 29/6/19	Exhibition of Material	Information shared on the scope of work and the interfaces between all stakeholders such as EWR, FCC and the utility companies. Design optimisation shared on the proposed raising of the railway line due to the complex deep drainage and requirement for 9 pumping stations.

Stakeholder Name	Engagement Date	Method of Engagement / Attended by	Summary of Engagement Outcome
			Information and visualisations displayed including information on the impact on the latest noise model and how that will inform the noise mitigation.
Calvert, Steeple Claydon and Twyford Community	8/10/19	Exhibition of Material	Information shared on scope of works, construction approach with the proposed batching plant at Calvert road and traffic routes and numbers.

6 Construction Programme

6.1.1 A high-level programme for the works subject to this submission and how they fit into the overall programme for other works in the area is contained in **Table 7** below. The programme for works on the site may vary from the indicative dates shown.

Table 7: Proposed Programme and Sequence of Works

Anticipated Start on Site Date (quarter (Q) /year)	Activity	Estimated Completion of Works (quarter/year)
Q4 2020	Site Clearance and Set up	Q4 2022
Q3 2021	Twyford Cutting Excavation	Q1 2025
Q3 2021	PBI/5A Overbridge Construction	Q1 2025
Q2 2021	Chetwode Embankment Construction	Q2 2025
Q4 2023	Twyford Viaduct Construction	Q1 2025
Q4 2023	Godington East Viaduct Construction	Q1 2025
Q3 2023	Godington West Viaduct Construction	Q2 2025

7 Other Consents

7.1.1 Other main consents likely to be required for the works are summarised in **Table 8** below. Consent requirements may alter during design development and further consents not identified in Table 8 may be required.

Table 8: Other Consent Requirements

Consent	Works Requiring Consent
HS2 Act, Schedule 4, Part 2	Interference with PRoW
HS2 Act, Schedule 33, Part 5	Permanent works, temporary works and discharges associated with the drainage ponds, diversion of Padbury Brook and other watercourses, working in the floodplain, fencing in the floodplain.
Bat Mitigation Class Licence WML-CL40 HS2 Phase 1 (London to West Midlands - Bats in Trees (Document Ref. 1D008-NEG- EV-LIC-000-000003	Works requiring the removal or disturbance of trees or other features supporting roosting bats.
HS2 GCN Organisational Licence WML- OR25,	Works requiring vegetation removal within 500m of confirmed great crested newt breeding ponds.
Schedule 17: Bringing Into Use	Environmental Mitigation Planting
Site Restoration	After discontinuation of the use of any site for carrying out operations ancillary to the construction of any of the scheduled works, restore the site in accordance with a scheme agreed with the relevant planning authority.
HS2 Badger Organisational Licence WML- OR24	Works requiring the closure or disturbance of badger setts.
Any other relevant Schedule 17 Plans and Specifications submissions for adjacent or associated works	CDC Package 1 - Godington AVDC 13b Calvert North AVDC 15 – Chetwode to Mixbury
Schedule 17 lorry routes	Approval of one lorry route (other routes approved).
Town and Country Planning Application Application (TCPA)	A TCPA for the diversion of Padbury Brook

8 Appendices

Appendix 1: Typical Construction Details for the Maintenance Access Tracks and Roads

